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Constructing a scale for managing high-performance sports organizations using artificial intelligence techniques

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Abstract

The current study addressed one of the most significant issues that faced by high-performance sports organizations, which is not fully benefiting from the applications of artificial intelligence techniques. The main problem of the research was to understand the effect of applying artificial intelligence technologies in the management of high-performance sports organizations and the extent of the contribution of applications of artificial intelligence techniques in diagnosing and addressing administrative and technical obstacles in the departments of sports activity and schooling in the General Directorates of Education in the province of Baghdad, with the aim of achieving high performance. In this context, the main objective of the study was to construct a conceptual framework for the implementation of artificial intelligence techniques in high-performance sports organizations, specifically in the sports and school activity departments of the General Directorates of Education in Baghdad province, as a model. In order to achieve the objectives of the study, the researchers followed a descriptive approach with an analytical method that suited the nature of the problem. They also conducted an informal exploratory study in the sports and school activity departments, utilizing a questionnaire as the tool for data collection. The study concluded by developing a reliable scale for the application of artificial intelligence technologies in high-performance sports organizations, consisting of five fields: Expert systems, virtual reality, intelligent agents, information technologies, and process automation. The sample size was chosen to be equal to the population to suit the nature of the research. The validity and reliability of this scale have been confirmed through statistical means, such as Cronbach's alpha coefficient, which amounted to 89.7. The five fields of the scale contained twenty-five items. The relative importance of these items ranged between (63-84%). The highest value of relative importance was 84% for the second item from the expert systems field, which states, (expert systems function as a consulting expert for the upper management in the sports and school activity departments to contribute to making correct decisions), whereas the lowest value for relative importance was for the first item from the virtual reality field, which states, (the use of virtual reality in the sports and school activity departments contributes to the acquisition of diverse skills for the employees and works on developing administrative and technical performance).

Keywords | **High-performance sports organizations, artificial intelligence techniques**

Introduction:

Sports organizations in the twenty-first century live in a rapidly changing environment due to the rapid developments in technology and its various techniques, including artificial intelligence technologies. These are a set of digital processes that mimic human intelligence, sports organizations' reliance on various artificial intelligence applications has contributed to the speed and ease of interaction with beneficiaries, expanding this base to include large numbers of beneficiaries around the clock, "Expert systems, artificial neural networks, genetic algorithms, intelligent agents, simulation systems, robots, and automation have replaced human resources

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in these organizations to achieve outstanding results. This is what high-performance sports organizations with distinguished outputs need, that are responsive to the requirements of competition and able of surviving, persisting, growing, and evolving in a changing environment. Therefore, there is an increased reliance on the applications of artificial intelligence technologies for current and future development" (1).

The researchers followed a systematic approach in identifying and diagnosing the research problem in this study, relied on the findings of previous similar studies, as well as their professional and academic experience. Additionally, they conducted an unregulated field exploratory in the sports and school activity departments of the General Directorates of Education in Baghdad province, in order to identify the most significant obstacles and difficulties that facing the sports and school activity departments, to improve their functional performance to become one of the high-performance sports organizations. The researcher identified a clear deficiency in the use of artificial intelligence techniques in all aspects of the departments of sports and school activity in the general directorates of education in the province of Baghdad. In addition to this, there is an absence of high-performance organization culture among the senior management in the departments of sports and school activity in the general directorates of education in the province of Baghdad. In light of the aforementioned issues, the current study attempts to find beneficial solutions to overcome these obstacles by harnessing the power of artificial intelligence techniques to enhance and develop the performance of the departments of sports and educational activities, ultimately transforming them into high-performance organizations. Recognizing this need, the researchers found it crucial to conduct this study. The research problem can be formulated with the following main question: (To what extent do the applications of artificial intelligence technologies contribute to the diagnosis and addressing of administrative and technical obstacles in the departments of sports and school activity in the general directorates of education in the province of Baghdad in order to achieve a shift towards high performance?).

The topics of artificial intelligence and high-performance organizations are modern subjects in contemporary administrative thought, both at the academic theoretical level and in practical applications. The debate and discussion around these topics are still ongoing. Furthermore, the advancements and innovations in the field of artificial intelligence and high-performance organizations continue to evolve.

Thus, studying these two topics and linking them in the field of sports is considered highly significant from the researchers' perspective. Therefore, they were addressed together, hence highlighting the importance of the study in the following aspects:

1- The current study is an extension of previous studies that focus on artificial intelligence technologies in general. It also adds to the academic accumulation in the field as it aims to understand the applications of artificial intelligence technologies in sports organizations, which are rarely studied or attempted to be applied in the Iraqi sports environment.

2- The modernity in addressing the topics of artificial intelligence and high-performance organizations together in the sports sector in the Arab world in general, and the Republic of Iraq in particular.

3- Identifying the foundations, principles, and necessary requirements for leveraging artificial intelligence as techniques for investment purposes, that can be employed to enhance sports organizations, including departments of sports and educational activities in the General Directorates of Education, towards high performance.

The main objective of this research is to construct a conceptual framework for the

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application of artificial intelligence technologies in high-performance sports organizations.

The study included three fields. The first one is the human field, which was represented by the human resources in the departments of sports and school activity in the general directorates of education in the province of Baghdad. The second one is the temporal field, which extended from the first of September 2021 until the thirtieth of September 2022. As for the last field, it is the spatial field. The spatial field of this study was determined to be the departments of sports and school activity in the general directorates of education in the province of Baghdad in the Republic of Iraq.

Method and procedures:

"Choosing the appropriate method for research is one of the most important steps upon which the success of scientific research depends" (2). Therefore, the researchers used the descriptive approach with an analytical approach, as it suits the nature of the study's problem and its objectives. The descriptive approach is a precise perception of the reciprocal relations between the community and its sample, providing the research with an image of the reality of life along with the ability to predict the future" (3). "One of the important priorities that it is necessary to pay attention to in scientific research and precisely chosen so that they suit the procedures is the community and its samples" (4). The study population was deliberately identified from the departments of sports and educational activities in the General Directorates of Education in Baghdad Governorate. These include six directorates: The General Directorate of Education in Baghdad/Al-Karkh I Directorate, the General Directorate of Education in Baghdad/Al-Karkh II Directorate, the General Directorate of Education in Baghdad/Al-Karkh III Directorate, the General Directorate of Education in Baghdad/Al-Rusafa I Directorate, the General Directorate of Education in Baghdad/Al-Rusafa II Directorate, the General Directorate of Education in Baghdad/Al-Rusafa III Directorate. As for the total number of individuals included in the study population, which consists of sports department managers and their assistants, section and administrative unit officials, technical, and administrative supervisors, is (320) individuals. This number represents the research population for the academic year 2021-2022. Table (1) shows the population and sample of the study. The sample size was chosen to be equal to the study population due to the nature of the research, which requires a deep understanding and perception in dealing with the questionnaire items designed to study the applications of artificial intelligence in sports and educational activity departments and their relationship with the principles and foundations of high-performance organizations. The sample was distributed into three groups using a random sampling method. The first group represents the exploratory experiment sample and consists of (20) individuals, accounting for (6%) of the total sample. The second group represents the scale construct sample and consists of (100) individuals, accounting for (31%) of the total sample. The third group represents the application sample and consists of (200) individuals, accounting for (63%) of the total sample

Table (1)
It shows the research population and its sample

Seq.	Workplace	Research population	Research sample
1	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/Al-Karkh I	48	48
2	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/Al-Karkh II	43	43

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3	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/Al-Karkh III	62	62
4	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/ Al-Rusafa I	57	57
5	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/ Al-Rusafa II	60	60
6	The Department of Sports and School Activity in the General Directorate of Education in Baghdad/ Al-Rusafa III	50	50
	Total	320	320
	Percentage	%100	**%100**

In rigorous sports management researches, researchers require a multitude of methods, tools, and equipment to obtain the necessary data to complete the researches. Researchers can select what they deem suitable from these tools in line with their research objectives. “It is imperative that they select the appropriate tools for data collection, whether the data is primary or secondary" (5), Therefore, the researchers utilized various types of methods, tools, and devices, including references, scientific sources, credible websites, a supportive team, personal interviews, and field visits. "These are considered the means or method by which the researcher can solve his problem" (6). Field research procedures are considered the foundational cornerstone that the researchers relied upon in formulating the theoretical framework of their study, starting from theoretical studies, proceeding through research methodology, and culminating in the findings derived from it, the value of the results obtained by the researchers in this study lies in the accuracy of the field research procedures that were chosen to address the construction of a scale for the applications of artificial intelligence in sports and school activity departments in the general directorates of education in Baghdad governorate. The researchers relied on the field research procedures to construct the scale "proceeding through the procedures known for scale development in sports management and what its acceptance determinants require in terms of the availability of the foundations and coefficients for each. (7) as follows:

Firstly: Defining the phenomenon to be measured: When constructing any scale, it is crucial to precisely define the phenomenon, characteristic, or attribute that needs to be measured. The concept and boundaries of the phenomenon should be completely clear. It is also essential to determine whether the phenomenon actually exists and can be measured or not, according to the research problem, the research phenomenon has been defined as the extent of the contribution of artificial intelligence technology applications in diagnosing and addressing administrative and technical obstacles in the departments of sports and educational activities in the General Directorates of Education in Baghdad Governorate towards achieving high performance. This will be achieved through the adoption of procedures that fulfill the research objectives.

Secondly: Analysis of the research sample characteristics: In order to achieve the research objectives, the researchers sought to understand the characteristics of the research sample through reviewing master's theses and doctoral dissertations completed at Iraqi universities, especially the colleges of physical education and sports sciences, which addressed topics of artificial intelligence technologies and high-performance organizations, after that, the researchers visited the sports and school activity departments in the General Directorates of Education in Baghdad province in order to obtain information about the research sample in terms of their academic qualifications, specialties, professional experience, and number

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of years of experience. They are graduates from various Iraqi universities.

Thirdly: Identifying the goal and purpose of scale construction: An important step in scale construction is precisely and clearly defining the main goal or purpose, along with specifying the intended objective of these scales, therefore, the main goal of constructing the scale for the current study is to measure the contribution of artificial intelligence applications in improving the technical performance of human resources in the sports and school activity departments in the General Directorates of Education in Baghdad province, to upgrade them towards high-performance organizations.

Fourthly: Determining the scope and fields of the scale: In order to determine the scope of the scale in this study, the researchers reviewed literature, resources, and scientific references from research published in peer-reviewed journals, reputable conferences, as well as master's theses and doctoral dissertations locally, regionally, and international levels, that dealt with the concept of applying artificial intelligence technologies in the sports and school activity departments in the General Directorates of Education in Baghdad province to upgrade them towards high performance, in addition, the researchers relied on the results of personal interviews (open-ended questionnaire) with experts and specialists in the field of sports management and artificial intelligence, in order to obtain the necessary information that would assist the researchers in formulating the components or fields of the scale. The researchers have made great efforts to simplify and clarify the fields of the scale in order to ensure the accuracy of the responses of the research sample members and prevent differences in explanation. The questionnaire survey included expert opinions on the competencies in the field of applying artificial intelligence techniques in the general directorates of education in the province of Baghdad, included an introductory overview that clarifies the nature of the research, its objectives, and instructions for answering the questions. Its first aspect included several questions about participants' personal information in the questionnaire, such as full name, gender, age, educational level, academic title, specific specialization, years of experience, and workplace. As for the second aspect of the questionnaire, it focuses on the information related to the fields of the scale measuring the applications of artificial intelligence techniques. It includes ten fields representing the applications of artificial intelligence techniques, which are: (The first field: Expert Systems; the second field: Artificial Neural Networks; the third field: Genetic Algorithms; the fourth field: Fuzzy Logic; the fifth field: Virtual Reality; the sixth field: Intelligent Agents; the seventh field: Databases; the eighth field: Information Systems Management; the ninth field: Decision Support Systems; the tenth field: Process Automation). After completing the field of the scale and its power, the researchers presented scale form in the Arabic, after defining the domains of the scales and their authorities, the two researchers presented the scale form to an Arabic language specialist to ensure the correctness and wording of the statements and to linguistically evaluate them. After making the linguistic adjustments, the scale form in its initial version was presented to a selected elite of experienced and competent referees specialized in the field of sports and administrative sciences, artificial intelligence, testing and measurement.

The purpose of refereeing is to assess the face validity of the questionnaire "it is known as logical validity, which is a type of validity that relies on expert opinions and does not use any statistical operations except for the percentage" (8). The diagnosis of the validity of the scale's domains and their suitability for measuring what it is designed for. In addition to modifying and evaluating it in terms of formulation, content accuracy, and substance, along with their observations and suggestions regarding the

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questionnaire forms in general. Additionally, the use of the triple rating (suitable, not suitable, modification) scale to assess the responses of the research sample. The process of the referees' responses is done by marking a tick (√) in the field of the item itself to determine the validity of field or not. The results of the referees' responses were then analyzed using percentages and the Chi-square ($\chi 2$) test as a criterion for accepting or excluding scale fields. The fields that were agreed upon by (80%) or more of the referees were accepted. This percentage is considered acceptable in sports management science research. This is what the scholar Bloom pointed out, "When the item gets an agreement rate between experts and referees of (80%) or more, it can be considered a valid criterion for achieving content validity." After retrieving the scale questionnaire from the referees and experts, the researchers collected and analyzed the data. The valid items received an acceptance rate of (80%) or more. Notably, the calculated Chi-square ($\chi 2$) value at a significance level of (0.05) equals or exceeds its critical value of (3.84), which indicates the significance of this rate. It represents thirteen out of fifteen experts. The results indicated the validity of five out of ten proposed domains for the scale of artificial intelligence technology applications in the departments of sports and school activities in the General Directorates of Education in Baghdad province. These domains are: 1) Expert Systems, 2) Virtual Reality, 3) Intelligent Agents, 4) Information Technologies, and 5) Process Automation. Some of the proposed domains, such as Database Systems, Information Systems, and Decision Support Systems, were merged into the Information Technologies domain due to their similarity in goals. Additionally, some words were rephrased based on the feedback received from the referees.

Fifthly: Preparing the initial formulation of the scale items and their validity: The essential step in constructing scales is designing and formulating scale items. The researchers have made significant efforts in preparing the initial formulation of collecting, preparing, and organizing scale items used in this study by relying on relevant sources and references related to the applications of artificial intelligence techniques and their role in high-performance organizations. Additionally, the researchers benefited from conducting personal interviews with the research sample. This method is considered the correct scientific approach to gather as much information as possible about designing and formulating scale items. In addition to reviewing some of the scales related to the topic of the current study. As a result, some items were collected and reformulated, in addition to the researchers formulating several items that measure the different items of the scale. The researchers relied on a set of regulations and rules when formulating the scale items. They made significant efforts to simplify and clarify the items in order to ensure the accuracy of the responses from the research sample and to avoid differences in clarification of these items. Among the principles and rules considered by the researchers when formulating the scale items was to use a conversational style and exclude complex and compound items. They also avoided using psychological negation style and ensured that the items were clear, unambiguous, and had a single, specific, and understandable meaning. After completing the collection and formulation of the items for the scale of artificial intelligence technology applications, they were presented to an expert in the Arabic language to ensure the accuracy of their formulation and linguistic evaluation. After making the necessary linguistic modifications, the items were presented in their initial form to a selected group of experienced and competent experts in the fields of sports science, management, artificial intelligence, testing, and measurement. This was done for the purpose of refereeing these items and ensuring their validity. The items that received agreement from (80%) or more of the

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experts were accepted. It is worth noting that the calculated value of the chi-square ($\chi 2$) at a significance level of (0.05) was equal to or greater than the critical value of (3.84), indicating the statistical significance of this agreement. This represents thirteen out of fifteen experts. Based on the analysis of the experts' and referees' opinions, some items were removed due to their lack of validity, as they did not receive majority approval from the experts. Additionally, certain items were merged together. Upon careful examination of Table (2), it is evident that the number of items for the scale of artificial intelligence applications was initially thirty-six (36) items in their initial form, but after considering the opinions of the experts and referees, the number of valid items became twenty-five (25), distributed evenly among the five domains.

Table (2)
It shows the number of scale items before and after presentation to experts and specialists.

Seq.	Scales	Number of items in its original form	Number of items in its final form
A	**Scale of applications of artificial intelligence techniques**		
1	The first field: Expert systems	7	5
2	The second field: Virtual reality	5	5
3	The third field: Intelligent Agents.	6	5
4	The fourth field: Information technologies.	8	5
5	The fifth field: Process Automation	10	5
Total		**36**	**25**

Sixthly: Preparation of the questionnaire in its final format: After excluding unacceptable items based on expert and referee feedback, some items were modified, merged, and reorganized. The questionnaire was prepared in its final format with five response alternatives (Never, Rarely, Sometimes, Often, Always). Appendix (1) illustrates the questionnaire of artificial intelligence applications in its final format.

Seventhly: Exploratory experiment: It contributes to identifying the difficulties and obstacles that studies in the field of sports sciences may encounter, as well as finding appropriate solutions to overcome them. After the questionnaire was ready for implementation, the researchers conducted an exploratory experiment at an appropriate time before the final application. The researchers conducted this exploratory experiment with the assistance of the research team. The exploratory experiment is a miniaturized version applied to a small sample from the same research population under similar conditions to the main experiment. It was implemented on twenty (20) individuals from the research sample in the sports and school activity departments in the general directorates of education in Baghdad governorate on the dates of September 15-20/2022.

Eighthly: The Main Experiment of the Scales: After the completion of the artificial intelligence applications questionnaire in its final format, prepared by the researchers in this study, the researchers began implementing this questionnaire on the construction sample on Sunday 2/11/ 2022, in cooperation with the assistant work team. The construction sample consisted of (100) individuals, representing (31%) of the research sample, after completing the main experiment, the researchers scheduled the data from the construction sample, collected, organized, and arranged it in preparation for statistical analysis.

Ninthly: The statistical Basis of Scale Items: There are various scientific statistical bases used to ensure the validity of scales, and one of the most important is validity. "Validity is considered a necessary characteristic in constructing scales because it indicates the

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scale's ability to measure the trait it was designed for" (9). (Validity is defined as the degree to which a measurement is successfully associated with what it intends to measure). The concept of validity is one of the most important concepts in the field of testing and measurement. Validity is a crucial concept that relates to whether or not the test measures what it is designed to measure. The test is considered valid if it succeeds in measuring the intended objectives.

The researchers followed the following statistical indicators to verify the validity and reliability of the three scales:

A) Construct validity: Construct validity is one of the most important types of validity that proves the validity of the contents of the scale form. It specifically examines the relationship between the test and the theoretical concept it intends to measure. Construct validity is based on empirical verification regarding the extent to which the scores on the items align with the intended concept being measured. "Homogeneity is one of the requirements for construct validity of paper-and-pencil measures in sports management" (10). Consequently, the researchers relied on a single method of item analysis called the differential item functioning (DIF) method, to verify construct validity, which is a technique that examines the differentiation ability method. "The term differentiation refers to the ability of an item to distinguish between individuals who possess the characteristic or attribute that the instrument is designed to measure and those who do not. Through this process, items with low differentiation power are excluded" (11). Indeed, this method is called the extreme groups approach, and the aim of using the differential item functioning (DIF) method is to exclude non-discriminating items and retain the discriminating items among respondents. The researchers applied the scale to a construction sample and relied on the percentage of (27%) to determine the two extreme groups from the total score. This percentage was chosen to achieve an appropriate sample size and maximize the contrast between the two groups. In order to calculate the differentiation power of the two questionnaire items, **the researchers followed the following methodology:**

1. Extracting the total score for each form after correcting it.
2. Arranging the scores for the respondents in descending order, from the highest score to the lowest score.
3. Determining a percentage of (27%) to the forms that obtained the highest scores and (27%) of the forms that obtained the lowest scores.
4. Calculate the arithmetic mean and standard deviation for the scores of the two groups in each item of the scale. Then, he t-test was applied for independent samples to identify the statistical significance of the differences between the upper and lower groups by comparing them to the critical t-value of (51.64) at a significance level (Sig) of (0.05).
5. It became clear through the t-value for the significance of the differences that all the items are significant at a significance level of (0.05) because they are greater than the critical t-value (1645). Therefore, the scale items remained unchanged, without any change in their number. This indicates the accuracy of the researchers' procedures and the precision of the responses provided by the experts who evaluated the questionnaire.

B) Reliability of the scales: The reliability of a questionnaire refers to the ability and reliability of the questionnaire tool to achieve the same results if you repeatedly measure the same individuals from the study sample multiple times under the same conditions. Reliability in most cases is a correlation coefficient, meaning the extent of the correlation of repeated measurement results for the study tool, therefore, reliability should be of a high level of accuracy and perfection in constructing the items of the scales. "Both Cronbach and Meehl point out that attaining construct validity or formation of the scale involves examining the theoretical background of the scale" (12). In order to obtain

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reliability values, the researchers relied on the method of split-half reliability. The split-half reliability method is one of the statistical techniques that is characterized by its ease, simplicity, and speed of use. Therefore, **the researchers applied this method to the scale of applications of artificial intelligence techniques as follows: -**

1) The construction of the scale was based on data obtained from a sample of (100) individuals.
2) The scale questionnaire was divided into two main sections. Since each scale consisted of twenty-five (25) items, the first section included thirteen items with odd numbers, while the second section included twelve items with even numbers.
3) Finding the total score for each of the two main sections,
4) Finding the Pearson correlation coefficient for the equality of the two sections of the questionnaire of each scale, which is (50) individuals for each of the two main sections,
5) The correlation coefficient represents the scale's reliability before correction, as it represents the split-half reliability coefficient of the questionnaire.
6) Calculating the corrected correlation coefficient using the Spearman-Brown equation for the purpose of correcting the reliability coefficient,
7) The results, as shown in Table (3), indicate that the questionnaire can be considered a reliable research tool.

Table (3)
It shows the results of the split-half reliability for the questionnaire of the three scales

Seq.	Scales	Reliability before correction	Reliability before correction	Degree of (sig)	significance of the correlation
1	Scale of Applications of Artificial Intelligence Techniques.	0.807	0.893	0.000	Significant
Significance of the correlation if the significance level (Sig.) is ≤ (0.05)					

Tenthly: The final application of the scale: Based on the results of validity and reliability, the reliability of the study tool is shown a high degree of reliability and internal consistency, which makes it possible to successfully apply it to the entire sample. Finally, the scale is ready for application after completing all the requirement, design procedures, and organizational arrangements. The scale of artificial intelligence technology applications consists of (5) aspects, including (25) valid items. Appendix (4) presents the final form of the scale for applying artificial intelligence technologies the application of artificial intelligence techniques. The researchers then applied the final form of the scale to a sample of (200) individuals. These individuals are members of the sports and school activity departments in the general directorates of education in the province of Baghdad. The sample includes directors of sports and school activities departments and their assistants, officials of departments and administrative units, specialized supervisors, technicians, technologists, administrators at various administrative levels. This was carried out over the period extending from 4/12/2022, until 31/1/2023. Then, the researchers collected all the questionnaires from all the participants in the sample, as the total number of distributed questionnaires was (200). They organized and arranged all the collected data in preparation for statistical analysis. The researchers used the SPSS (Statistical Package for the Social Sciences) software for statistical analysis of the data, to directly extract the results accompanied by illustrative figures such as histograms and radar chart. This enriched the research by presenting the results with accuracy and clarity.

Results:

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"The construction of any measure must be linked to a specific theoretical framework, and this framework is the reference that the researcher relies on to define the fields of the scale and formulating its items" (13). Therefore, this aspect of the current study includes presenting the results obtained by the study for the aspects of the scale of applications of artificial intelligence techniques and measuring the relative importance of its items from the perspective of the research sample comprising employees in the departments of sports and school activities in the general directorates of education in Baghdad. This is considering that these departments aspire to be high-performing sports organizations. The following is a presentation of the results of the five perspectives included in this scale: the expert systems perspective, the virtual reality perspective, the intelligent agent's perspective, the information technology perspective, and the automation of processes perspective. The researchers used a Likert scale with its five levels (never, rarely, sometimes, often, always) to measure the relative importance of each item in the five perspectives. The individual's responses to the five-point Likert scale were converted into quantitative units, by assigning numbers that represent those responses. Which are 90 for (always), 70 for (often), 50 for (sometimes), 30 for (rarely), and 10 for (never). The results revealed the following:

Firstly: The expert systems field: The expert systems field contained five items, as shown in Table (5), which also illustrates the responses of the sample individuals to each of the five items, and also indicates the relative significance of each item.

Table (4)
It illustrates the items of the expert systems field

Item No.	Never	Rarely	Sometimes	Often	Always	Total	The relative significance
	10	30	50	70	90		
1	0	0	0	90	110	200	81.0
2	0	0	10	40	150	200	84.0
3	0	0	2	93	105	200	80.3
4	0	0	3	90	107	200	80.4
5	0	0	15	50	135	200	82.0

Secondly: The virtual reality field: The virtual reality field contained five items, as shown in Table (6), which also illustrates the responses of the sample individuals to each of the five items, and also indicates the relative significance of each item.

Table (5)
It illustrates the virtual reality field.

Item No.	Never	Rarely	Sometimes	Often	Always	Total	The relative significance
	10	30	50	70	90		
1	0	5	100	55	40	200	63.00
2	10	10	50	90	40	200	64.00
3	0	4	50	46	100	200	74.20
4	0	7	58	43	92	200	72.00
5	0	8	70	32	90	200	70.40

Thirdly: Intelligent Agents Field: The intelligent agents field consists of five items, as shown in Table (7), which also illustrates the sample individuals' responses to each of the five items. It also indicates the relative significance of each item.

Table (6)
It shows the items of the field of intelligent agents

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Item No.	Never	Rarely	Sometimes	Often	Always	Total	The relative significance
	10	30	50	70	90		
1	0	0	75	100	25	200	65.00
2	0	8	43	119	30	200	67.10
3	0	0	33	135	32	200	69.90
4	0	4	34	123	39	200	69.70
5	0	8	59	117	16	200	64.10

Fourthly: Information Technology Field: The information technology consists of five items, as shown in Table (8), which also illustrates the sample individuals' responses to each of the five items. It also indicates the relative significance of each item.

Table (7)
It shows the items of the information technology field

Item No.	Never	Rarely	Sometimes	Often	Always	Total	The relative significance
	10	30	50	70	90		
1	0	20	40	60	80	200	70.00
2	0	10	50	70	70	200	70.00
3	5	15	25	75	80	200	71.00
4	0	0	40	72	88	200	74.80
5	0	0	25	84	91	200	76.60

Fifthly: Process Automation Field: The process automation field consists of five items, as shown in Table (9), which also illustrates the sample individuals' responses to each of the five items. It also indicates the relative significance of each item.

Table (8)
It shows the field of process automation items

Item No.	Never	Rarely	Sometimes	Often	Always	Total	The relative significance
	10	30	50	70	90		
1	106	91	3	0	0	200	65
2	109	83	8	0	0	200	67
3	122	74	2	2	0	200	66
4	138	53	6	3	0	200	64
5	126	64	7	3	0	200	68

Discussions

"The scientific progress witnessed by the world has become a characteristic of this era, due to its speed and the multiple horizons it opens in various fields, including sport field" (14). Based on the above results, it is evident that the responses of the study sample, which were concentrated between (always and often), as the relative importance of expert systems relying on rare experiences in solving complex problems, with a percentage ranging from 80% to 84%. This shows the extent to which expert systems rely on rare experiences in solving complex problems with (always), indicating that the majority of the sample group well recognize that the reliance on expert systems will permanently contribute to solving complex administrative problems in the departments of sports and school activities in the general directorates of education in Baghdad province. Regarding the perspective

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of virtual reality in presenting and analyzing data related to the contribution of virtual reality in acquiring diverse skills for employees and enhancing administrative and technical performance, it is noticed that the majority of the study sample (195 individuals) distributed their responses between (sometimes, often, and always). The relative importance of these responses ranged from (63% -74%), as illustrated in Figure (12). Meanwhile, Figure (13) shows the expected level of contribution of virtual reality technologies in the sports and school activity departments in the general directorates of education in Baghdad province in acquiring various and multiple skills for employees, as well as enhancing their administrative and technical performance, and the level value is (sometimes).

The study sample indicated that (175) individuals (88%) believe that intelligent agent technology assists senior management in making the right decisions based on their stored knowledge base. Meanwhile, (25 individuals) (12%) of the study sample indicated (always), and the relative importance ranging from (64-70%), and these results indicate (often) that the intelligent agents will help senior management in sports and school activity departments in making correct decisions based on their stored knowledge base.

The information technology perspective is summarized by presenting and analyzing data related to providing useful methods of information technology methods that facilitate the collection, storage, analysis, and efficient and effective utilization of information in organizing work and making decisions. it is noted that the majority of the study sample distributed their responses between (sometimes, often, and always), with a relative importance of (70%). The expected degree of contribution of information technology in the departments of sports and school activities in the general directorates of education in Baghdad governorate is to provide useful methods for facilitating the collection, storage, analysis, and efficient and effective utilization of information in organizing work and making decisions, and the level value was (always).

Conclusions:

Based on the presentation and analysis of the results, the following conclusions can be drawn:

1) The sports sector in the Republic of Iraq, in particular, suffers from poor planning and the absence of the artificial intelligence technology applications in sports management.

2) Iraqi sports organizations desperately need to raise awareness about the importance of the artificial intelligence technology applications in managing high-performance sports organizations.

3) The study found that the most important smart applications in the artificial intelligence are: expert systems, virtual reality, intelligent agents, information technologies, and process automation.

4) The scale of artificial intelligence technology applications consists of five aspects and twenty-five items.

Based on the above conclusions, the following recommendations can be made:

1) The need to adopt a comprehensive policy to raise awareness about the importance of applying artificial intelligence technologies in managing Iraqi sports organizations.

2) It is necessary to develop a culture of literature review research and especially systematic review in Iraqi universities in general and colleges of physical education and sports sciences in particular.

3) The need to adopt a scale for artificial intelligence technologies in Iraqi sports institutions to enhance their performance towards excellence.

Author's declaration:

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We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical-Clearance: this manuscript approved by local ethical committee of physical education and sport sciences college for women on (February /2023)

Author's contributions:

All contributions of this study were done by the researchers (A.H. and N.Z.) who give the main idea and make all procedures and conclusions with number of experts, Isam Mohammed Ridha in Statistics, Huda Shamil in revision, Inaam Ghalib in translating, Huda Shihab in proofreading

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Appendix 1

(The final questionnaire in its format for measuring the applications of artificial intelligence in sports and school activity departments in the General Directorates of Education in Baghdad Governorate)

Seq.	Fields	Never	Rarely	Sometimes	Often	Always
A	**The Expert Systems:**					
1	Expert systems rely on the rare experiences available in the sports and school activity departments to solve complex problems.					
2	Expert systems function as consulting experts for senior management in the sports and school activity departments, contributing to making the right decisions.					
3	Expert systems help support electronic archiving by storing and organizing information and data in the sports and school activity departments.					
4	Expert systems contribute to the acquisition of knowledge in various sports fields that support the decisions of senior management and the abilities of employees.					
5	Expert systems help senior management by providing it with information and data to find solutions, alternatives, optimal conclusion and decision-making.					
B	**The Virtual Reality:**					
1	Using virtual reality in sports and school activity departments contributes to acquiring diverse skills for employees and enhances both administrative and technical performance.					
2	The sports and school activity departments possess technologies and devices that provide effective use of virtual reality for employees in all their tasks.					
3	Working with virtual reality technologies in the					

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	sports and school activity departments provides a comprehensive visualization of the nature of the work to be accomplished.					
4	The virtual reality technologies used in sports and school activity departments offer scientific, practical, and entertaining methods to accomplish the required tasks.					
5	Virtual reality technologies allow employees in the sports and school activities departments to closely link the planned time to accomplish tasks with the actual time.					
C	**Intelligent Agents:**					
1	Intelligent agents assist senior management in sports and school activity departments in making the right decisions based on their stored knowledge base.					
2	Intelligent agents reduce the time spent by employees on administrative tasks to achieve the desired goal.					
3	Intelligent agents in sports and school activity departments perform administrative tasks and duties on behalf of employees and assist them in specific cases.					
4	Intelligent agents contribute to reducing costs and expenses in sports and school activity departments by using them as a substitute for human resources.					
5	Intelligent agents' software help to improve and develop the administrative and technical performance of employees.					
D	**Information Technology:**					
1	The sports and school activity sections have technologies that facilitate the collection, storage, analysis, publication, and efficient and effective use of information.					
2	Human resources in sports and school activity departments undergo continuous training and development in using technology and information.					
3	The sports and school activity sections employ information technology in their administrative tasks and activities.					
4	The sports and school activity departments use information systems characterized by efficiency and speed in accomplishing administrative tasks, which serve multiple purposes and are constantly updated.					
5	The software in the sports and school activity departments is suitable for completing the required administrative tasks and functions, and is regularly updated.					
E	**Process Automation:**					
1	The departments of sports and school activities aim to improve their technical performance through administrative process automation.					
2	The departments of sports and school activities possess the financial and technical capabilities that allow them to prepare for the automation of					

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	operations in managing their various activities.					
3	The departments of sports and school activities have specialized human resources that contribute to enhancing their role in transitioning towards business automation and moving away from traditional management.					
4	Sports and school activity departments prioritize the automation of internal and external procedures through their website to provide easy and fast services to beneficiaries, aiming to improve the working environment.					
5	The sports and school activities departments use cloud-based business automation applications, such as linking between social media and email.					

بناء مقياس لإدارة المنظمات الرياضية عالية الأداء باستخدام تقنيات الذكاء الاصطناعي

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مستخلص البحث

تناولت الدراسة الحالية واحدة من أهم المشاكل التي تعاني منها المنظمات الرياضية عالية الاداء وهي عدم الاستفادة القصوى من تطبيقات تقنيات الذكاء الاصطناعي، فلقد تمثلت مشكلة البحث الأساسية في معرفة أثر تطبيق تقنيات الذكاء الاصطناعي في ادارة المنظمات الرياضية عالية الأداء وما مدى مساهمة تطبيقات تقنيات الذكاء الاصطناعي في تشخيص ومعالجة المعوقات الادارية والتقنية في اقسام النشاط الرياضي والمدرسي في المديريات العامة للتربية في محافظة بغداد للتوجه نحو الاداء العالي وفي هذا السياق، فلقد تمثل هدف الدراسة الرئيس في بناء مقياس للاطار المفاهيمي لتطبيقات تقنيات الذكاء الاصطناعي في المنظمات الرياضية عالية الاداء -اقسام النشاط الرياضي والمدرسي في المديريات العامة للتربية في محافظة بغداد أنموذجاً. ولغرض تحقيق أهداف الدراسة اتبعت الباحثتان المنهج الوصفي بالأسلوب التحليلي لملامته لطبيعة المشكلة كذلك القيام بدراسة استطلاعيه غير مقننه في اقسام النشاط الرياضي والمدرسي وكانت الاستبانة هي الأداة المستخدمة في ذلك، وتوصلت الدراسة إلى بناء مقياس رصين لتطبيقات تقنيات الذكاء الاصطناعي في المنظمات الرياضية عالية الاداء ومكون من خمس محاور وهي النظم الخبيرة والواقع الافتراضي والوكلاء الاذكياء وتقنيات المعلومات واتمتة العمليات وقد جاء اختيار حجم العينة مساويا للمجتمع لتلام طبيعة البحث، وقد تم اثبات صدق وموثوقية هذا المقياس من خلال الوسائل الإحصائية كمعامل الفا كرو نباخ بمقدار 89,7، لقد احتوت محاور المقياس الخمسة على خمسة وعشرون عبارة، ولقد تراوحت الأهمية النسبية لهذه العبارات ما بين (63-84)%، وكانت اعلى قيمه للأهمية النسبية تبلغ 84% لعباره الثانية من محور النظم الخبيرة وهي (تعمل النظم الخبيرة كخبير استشاري للإدارة العليا في اقسام النشاط الرياضي والمدرسي لتسهم في اتخاذ القرارات الصحيحة)، بينما كانت اقل قيمة للأهمية النسبية لعبارة الأولى من محور الواقع الافتراضي وهي (استخدام الواقع الافتراضي في اقسام النشاط الرياضي والمدرسي يسهم في اكتساب مهارات متنوعة للموظفين ويعمل على تطوير الاداء الاداري والتقني).

الكلمات المفتاحية | **المنظمات الرياضية عالية الأداء، تقنيات الذكاء الاصطناعي**