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Article

Enhancing operational performance: The impact of smart algorithms in Saudi Arabian sports facilities

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Abstract: The objective of this study was to examine the impact of utilizing smart algorithms on enhancing the operational performance of sports facilities in the Kingdom of Saudi Arabia. These algorithms, based on principles and concepts of artificial intelligence, aim to achieve functions such as learning, decision-making, data analysis, pattern recognition, planning, and problem-solving. The study aimed to identify the extent to which smart algorithms are utilized in sports facilities, assess the level of operational performance, explore the correlation between the use of smart algorithms and operational performance, and predict the level of operational performance based on the use of smart algorithms. The study employed a descriptive approach, specifically utilizing a survey study method. Participants included chairmen and members of boards of directors, executive directors, sports directors, administrators, specialists, and members of various committees. The study sample was intentionally selected from different categories within the study population. Two questionnaires were used to collect data from 325 participants. The findings revealed a lack of utilization of smart algorithms in sports facilities in the Kingdom of Saudi Arabia, indicating a low level of operational performance. Additionally, a correlation was observed between the use of smart algorithms and operational performance, suggesting that the level of operational performance can be predicted based on the utilization of smart algorithms. The study concludes that the implementation of intelligent algorithms can enhance the operational performance of sports facilities in the Kingdom of Saudi Arabia. It provides valuable insights into the effects of utilizing smart algorithms on improving operational performance.

Keywords: smart algorithms; operational performance; sports facilities

1. Introduction

The use of digital transformation has resulted in increased fan engagement and financial efficiency for sports teams, clubs, facilities, and organizations (Al Ahmed and Hassan, 2022). The quantity of digital transformation management in sports facilities and both competitive and productive performance are statistically significant in the literature (Elnour et al., 2022). Sports clubs in the Kingdom of Saudi Arabia can reap the benefits of knowledge management by employing its foundations and concepts, which can assist them in strengthening their strengths and overcoming their flaws (Saati, 2023). Therefore, smart algorithm development and improvement as well

as digital transformation can be advantageous for the sports facilities of the Kingdom of Saudi Arabia (Alsheikhy et al., 2023). Even though they haven't yet realized their full potential, intelligent algorithms have significantly impacted many facets of our daily lives. They have been used in electronic systems and procedures that quickly and effectively automate work. They are also used in artificially intelligent robots and computers that use the same method for data entry and storage. Therefore, to satisfy the demands of implementing and employing clever algorithmic strategies as well as adopting the newest software and programs, institutions from a variety of industries must modify their methods and approaches at different phases of their operations (Bolton et al., 2018). In the context of websites, internet-based platforms, and contemporary services that are essential to corporate operations and relations with institutions, this is especially pertinent (Mirela and Dutescu, 2021).

These algorithms are useful for developing safe and efficient training plans that target many performance factors because they provide collective intelligence and flexibility to a changing environment (Fister et al., 2019). Furthermore, sports have been profoundly affected by artificial intelligence and machine learning technologies, which have changed how we watch, play, compete, and prepare (Rajšp and Fister, 2020). Constructed with cutting-edge ideas and technological tools, intelligent sports platforms maximize the sharing and integration of sporting resources, supporting the long-term growth of sports (Gong, 2023). The relevance of smart algorithms in sports has been further demonstrated by the application of nature-inspired metaheuristic algorithms to intelligent task-solving in the field of smart sports training (Fister, 2021).

Researchers and professionals have approached smart algorithms from various perspectives. Some view them purely as technical tools (Kaplan and Haenlein, 2019), while others see them as decision-making support systems (Fernandez, 2019). Intelligent algorithms are a profound embodiment of knowledge that represent the pinnacle of human ingenuity and inventiveness. A witness to the rapid evolution of these technologies is the present wave of advancements in robots, cloud storage networks, expert systems, and the Internet of Things, all of which are geared at meeting human needs (Atiku, 2021). But worries about the possible loss of employment due to the displacement of human workers continue. As a special kind of IT resource, intelligent algorithms have the capacity to simultaneously empower and displace people (Jatobá et al., 2019). Experts and visionaries continue to draw attention to the direct and indirect implications of the proliferation of software and smart algorithm applications, as technological breakthroughs expand rapidly on a global scale (Plastino and Purdy, 2017). These consequences include difficulties in guaranteeing the development of trustworthy and safe machines and robots, the possibility that smart algorithms will replace human intervention in hiring procedures, and the difficulty of creating efficient connections between various applications that use smart algorithms (Popkova and Sergi, 2020). Nonetheless, performance levels should improve when smart algorithm technologies are incorporated into contemporary company models. The faster development of intelligent algorithms is expected to accelerate global GDP growth by 14%, or $15.7 trillion, by 2030 (Marian and Piotr, 2019).

Research on the efficiency of intelligence-based algorithms and function of the sports institution is vividly on the rise. Natural intelligence algorithms' computational

intelligence algorithms, inspired by the nature, are used for seeking solutions to different sports performance problems, such as training plans and assessment standards (Elnour et al., 2022). AI and ML techniques have recently been adopted for sports facilities not only in designing the swimming pools but also to optimize the operation and management and for moving forward to sustainability (Zhang and Yang, 2023). Besides, having intelligent data transmission algorithms and fuzzy neural networks in public sports performance management is also put forward for the better public sports project values, in which the value of sports projects will be maximized (Pan, 2022). In this connection, use of artificial intelligence (AI) sensors has been studied for athlete training with high matching accuracy for various actions (Song and Tian, 2022). The studies (Alsheikhy et al., 2023; Amirteimoori et al., 2023; Fister, 2021; Zhang and Yang, 2023) reveal how smart algorithms could be used in sporting facilities to give the right answers needed for decision making, good interaction and information computation for performance management.

Operational performance is a development and improvement plan that includes the knowledge of how to evaluate an organization's total performance (Hashim and Mohammed, 2019). In this case, performance evaluation standards highlight two important factors. The first is objective and focuses on things like work style, pace, and reaching objectives. The second component focuses on behavior and illuminates how people behave inside the organization (Bento and Tontini, 2018). Regardless of the industry, an organization's capacity to succeed and last depends heavily on its workforce. Employees that carry out their assigned responsibilities in an efficient and effective manner help the organization survive, grow, expand, and accomplish its goals (Salah, 2020). Because it frequently promotes short-term benefits at the price of long-term improvement, relying only on financial performance indicators is insufficient for assessing overall performance (Zhou et al., 2018). Because of these factors—technological improvements, competitive advantage, and the appreciation of intangible assets like connections and human skills—there is now a greater need for operational performance indicators. Organizations looking for guidance and company expansion might benefit from the standardization of operational performance indicators (Bendickson and Chandler, 2019). Operational performance measurements also provide real-time information regarding performance and are less prone to manipulation. Additionally, they fit the organization's strategy and are simple to track, making it possible to take quick remedial action (Anwar and Abdullah, 2021).

1.1. Problem statement

In order to thrive in a cutthroat market, businesses are searching for more inventive methods to leverage technology to create value. Growing prevalence of intelligent algorithms and machine-learning techniques has had a profound effect on numerous industries. As a result, companies are giving technological advancements more importance and dedicating funds to the use of machine learning and intelligent algorithms in order to boost revenue, enhance operational efficiency, and enhance customer service. The rapid advancement of technology in several industries is driving the digital revolution, necessitating a comprehensive review of business practices across several enterprises (Gungor, 2020). Sports facilities need to implement work

schedules that keep up with new advances in technology and techniques. To be competitive in the technology-driven business world, sports facilities need to have work policies that align with new advances and techniques in the field. Sports venues must set up work schedules that reflect new technologies and methods to satisfy the expectations of the tech-driven commercial world. Individuals working in this setting need to constantly learn new skills and develop their management of the many fast-changing external variables. The use of clever algorithms and programs has thus come to serve as the cornerstone of contemporary management techniques. To attain performance excellence, organizations nowadays rely on the information that is readily available to them due to the dominance of the information and communication revolution.

1.2. The significance of the research

The significance of this study lies in its examination of the utilization of smart algorithm applications in sports facilities and their impact on operational performance. Through the theoretical framework presented in this study, it aims to assess the current use of smart algorithms in sports facilities in the Kingdom of Saudi Arabia, with the goal of leveraging them to enhance performance. Additionally, the study aims to provide valuable insights for facility managers, helping them understand the relationship between intelligent algorithms and operational performance, and addressing any shortcomings to improve overall performance. Furthermore, the study aims to maximize the benefits of sports facilities by harnessing the potential of smart algorithm techniques and their positive effects on operational performance. This aligns with the Kingdom's Vision 2030 and the focus of international bodies and professional organizations on smart algorithm technologies and their impact across various fields. The study also emphasizes the importance of regulatory and professional support in this domain, considering the increasing number of international initiatives and successful experiences of other countries in utilizing smart algorithm technologies.

1.3. Objectives

The objective of this study is to assess the impact of utilizing smart algorithms on enhancing the operational performance of sports facilities in the Kingdom of Saudi Arabia. The study aims to determine whether there is a statistically significant relationship between the use of smart algorithms and the improvement of operational performance in sports facilities. Additionally, the study will evaluate the feasibility of implementing smart algorithms to enhance the operational performance of sports facilities in the Kingdom of Saudi Arabia.

1.4. Literature review

The findings of the studies conducted by Davenport et al. (2019) and Amirteimoor et al. (2023) support the notion that smart algorithms significantly enhance the performance of administrative methods across various tasks. However, Bitkina et al. (2020) found through regression analysis that as the complexity of tasks increases, the perceived confidence and expected performance of intelligent algorithms tend to weaken. The findings of the studies conducted by De Bellis and

Venkataramani Johar (2020), Gacanin and Wagner (2019), and Seranmadevi and Kumar (2019) further support the benefits of utilizing smart algorithm applications in directing customers and making decisions on their behalf. These studies also highlight the ability of smart algorithms to automate business activities. Additionally, the study by Balducci and Marinova (2018) emphasizes the importance of employing smart algorithm techniques in processing big data. Furthermore, the study by Bargarai et al. (2020) demonstrates that the adoption of various technologies relying on smart algorithms positively impacts companies' ability to perform diverse administrative tasks.

The findings of the study conducted by Mohamed and Rashed (2021) revealed a significant positive influence of comprehensive social responsibility, specifically its three components (commitment, operational excellence, documentation), on performance from a strategic perspective. Additionally, the study by Kummar (2014) confirmed that delivery is a key competitive priority for organizations and plays a crucial role in enhancing operational performance dimensions. The findings of the study conducted by Santa et al. (2010) indicated that quality is a significant factor influencing the enhancement of operational performance in organizations. Additionally, the study by Hallgren and Olhager (2009) confirmed that operational performance serves as a crucial indicator reflecting an organization's ability and level of achieved success. Furthermore, the study by Chavez et al. (2015) highlighted that the effectiveness of operational performance is an indicator used to measure workers' performance in their assigned tasks and their readiness for future responsibilities. The study by Khanchanapong et al. (2014) emphasized the challenges faced by organizations in improving their operational dimensions, including quality, flexibility, delivery, cost, and creativity. Lastly, the study by Arana-Solares et al. (2019) confirmed that the effectiveness of operational performance is influenced by the environmental context in which the organization operates and competes.

1.5. Research questions

There is a dearth of literature that particularly addresses how intelligent algorithms might improve operational performance in Saudi sports facilities, even though the research offers significant views on intelligent algorithms and operational performance in numerous situations. Further study is required to completely comprehend this subject and its implications for operational performance. This study aims to investigate the extent to which the application of smart algorithms affects operational performance in Saudi sports facilities. Based on the literature on smart algorithms and operational performance, the axes of the independent variable (smart algorithms) and the dependent variable (operational performance) were selected. Six axes were selected for intelligent algorithms: Five operational performance axes were used in the construction of the study model, as **Figure 1** illustrates.

Based on our expertise, we posed several questions to diagnose and assess smart algorithms as well as operational performance in Saudi sports facilities. Opinion polls have been used to try to pinpoint its shortcomings. (Q1, Q2) was created with reference to the state of smart algorithm application and the degree of operational performance in Saudi Arabian sports facilities. Similarly, it is increasingly crucial to comprehend

the relationship between utilizing smart algorithms and enhancing operational efficiency in Saudi Arabian sports facilities. Thus, we might view the application of intelligent algorithms as a technical instrument for data analysis and more precise and efficient decision-making. It follows that conducting in-depth research into each smart algorithm and its effect on raising the standard of operational performance in Saudi sports facilities is necessary. As Q3 illustrates, the correlation between the use of smart algorithms and improving operational performance in sports facilities can be represented in how these technical tools are used to analyze data and improve decision-making processes. This is the study's primary focus, and it also answers the following research questions:

Q1—What is the status of utilizing smart algorithms in sports facilities in the Kingdom of Saudi Arabia?

Q2—What is the level of operational performance in sports facilities in the Kingdom of Saudi Arabia?

Q3—Is there a statistically significant correlation between the use of smart algorithms and the improvement of operational performance in sports facilities in the Kingdom of Saudi Arabia?

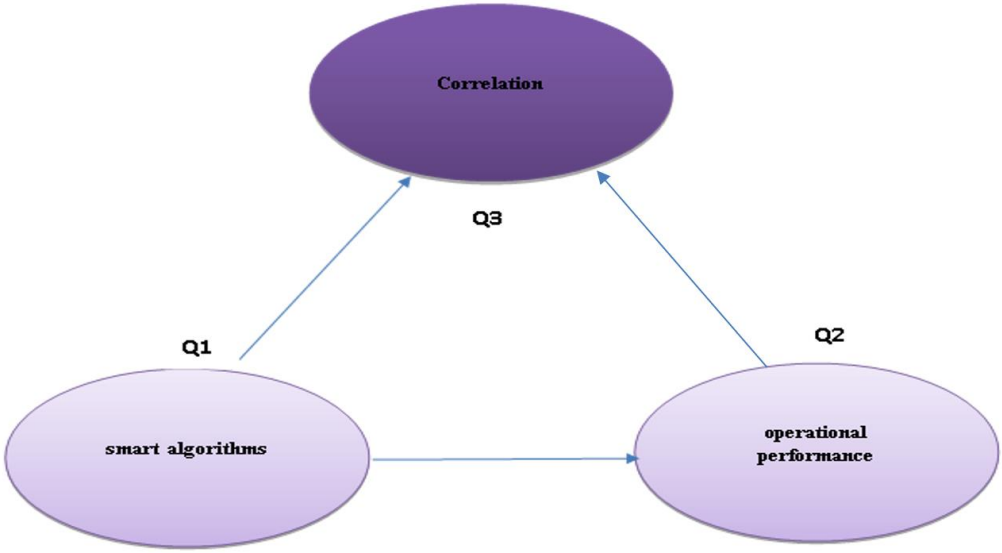

Figure 1. Study framework.

2. Materials and methods

2.1. Research community

The study focuses on the community of sports facilities in the Kingdom of Saudi Arabia, which includes cities, sports centers, popular squares, sports stadiums, covered halls, swimming pools, sports stadiums, youth hostels, and permanent youth camps. The study population consists of 143 establishments within this community. The research methodology employed a descriptive approach using surveys, and **Table 1** provides a description of the study population.

Table 1. Description of the study population.

No.	Facilities	The sample	Basic sample	Percentage
1	Cities and sports centers	143	15	10.49%
2	Popular (public) squares		22	15.38%
3	Sports stadiums		32	22.38%
4	Covered gyms		13	9.10%
5	Swimming pools		26	18.18%
6	Sports stadiums		16	11.19%
7	Youth hostels		12	8.39%
8	Permanent youth camps		7	4.89%

2.2. Research sample

Participants in the study include people who work at sports facilities in the Kingdom of Saudi Arabia as chairman and board members, executive directors, sports directors, administrators, specialists, and members of other committees. Quantitative data was gathered using self-administered questionnaires to answer the study questions. As shown in **Table 2**, the sample consisted of all workers (n = 325) from 143 sports facilities in Saudi Arabia. Questionnaires with thorough instructions on how to complete them were sent to every employee. It was entirely voluntary to participate. The questionnaire was made available in Arabic in addition to other languages in order to guarantee participant independence and improve response rates. There were two sections to the questionnaire, each with questions specifically related to the study questions.

Table 2. Description of the study sample.

No.	Categories	The sample	Basic sample	
1	Chairmen and members of boards of directors	325	49	15.10%
2	The two executive directors		36	11.10%
3	Athletic directors		32	9.85%
4	Administrators		73	22.46%
5	Specialists		64	19.69%
6	Members of the various committees		71	21.85%

2.3. Research instruments

In order to evaluate the application of smart algorithms and operational performance at sports facilities in the Kingdom of Saudi Arabia, the researchers used two questionnaires in this study. The first survey, which had 31 statements, was designed to assess how these facilities were currently using smart algorithms. Responses were measured using a three-point Likert scale: "yes" = 3 points, "to some extent" = 2 points, and "no" = 1 point. Expert systems, artificial neural networks, robotics, consumer comprehension, data analysis, and training and development were the six dimensions this questionnaire addressed (for more information, see Appendix A). The purpose of the second questionnaire was to evaluate the real state of operational performance in Saudi Arabian sports facilities. It had 26 statements and

asked respondents to rate their agreement on a three-point Likert scale ("yes" = 3 points, "to some extent" = 2 points, and "no" = 1 point). Five dimensions were included in this questionnaire: cost, quality, flexibility, continuous improvement, and work organization (for further information, refer to Appendix B). Both surveys included parts pertaining to demographic data and inquiries that were in line with the research hypotheses. As shown in **Figure 1**, the questionnaire framework was created using accepted research practices. To guarantee content validity, scales were tested and question items were taken from a pilot survey. To rate participant responses, a three-level Likert scale was used, which provides a balanced method of successfully collecting their opinions. Cronbach's alpha was used to calculate internal consistency coefficients, which were used to determine the validity and reliability of the surveys. The reliability coefficient, comprising the overall scores for the first questionnaire was 0.73 and for the second questionnaire was 0.76. The subject of these data is the correctness of this type of a study, and the coefficients ensure good correlation to it. The study was performed during a period from 9 May to 13 July 2023.

2.4. Statistical analysis

Based in Chicago, Illinois, USA, 26.lnk.ibmsspstatistics.com is in charge of several IBM applications, including SPSS, which generates the Statistical Package for the Social Sciences. Several statistical techniques, such as relative weight, average responses, percentages, chi-squares, Pearsons, and Cronbach correlation coefficients, were used to assess the statistically relevant data. In order to run the statistical coefficients and report the significance level, which was set at 0.05, the Statistical Program for the Social Sciences (SPSS 26) analysis approach was used in this investigation.

3. Results

Figure 2 illustrates the average response to a questionnaire assessing the current utilization of smart algorithms in sports facilities in the Kingdom of Saudi Arabia.

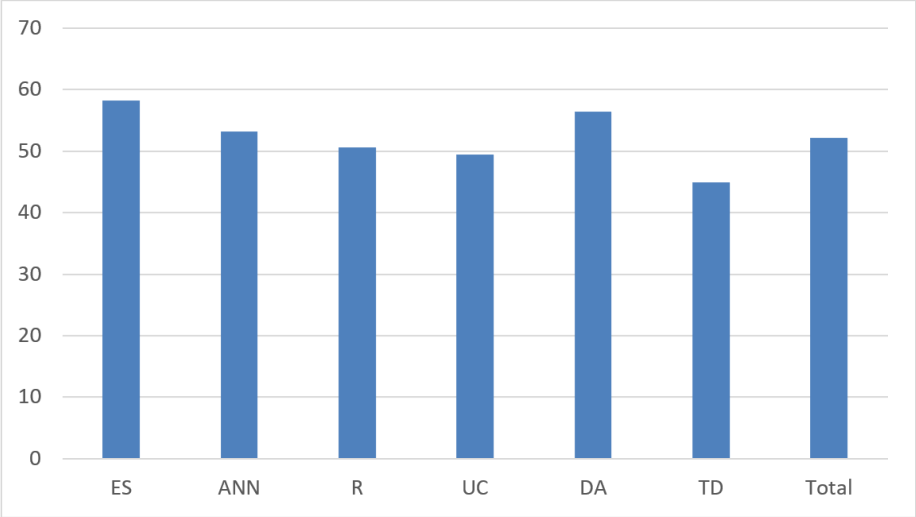

Figure 2. Response averages for the use of smart algorithms in sports facilities.

Table 3 presents the responses and chi-square values (X^2) for a questionnaire evaluating the current utilization of smart algorithms in sports facilities in the Kingdom of Saudi Arabia.

Table 3. Relative weight, average response, and X^2 of the reality of using smart algorithms for sports facilities in the Kingdom of Saudi Arabia (N = 325).

No.	Item	Response			Relative weight	Average response	X^2
		Yes	To some extent	no			
The first axis: expert systems (ES)							
1-	There are specialized companies to provide workers with information about expert systems	49	25	251	448	45.95	284.48
2-	Security means are available to protect systems software	95	110	120	625	64.10	2.92
3-	All departments and units of the facility are connected to the fiber optic network	80	65	180	550	56.41	72.15
4-	Computers designed for systems are characterized by keeping pace with technological development	94	88	143	601	61.64	16.81
5-	Specialized companies do periodic software updates	96	102	127	619	63.49	4.99
The average response of the axis						58.31	
The second axis: artificial neural networks (ANN)							
6-	Techniques based on self-education are invested to carry out administrative work	93	89	143	600	61.54	16.71
7-	Artificial neural networks are available that are able to predict risks	83	89	153	580	59.49	27.79
8-	The future prediction values are found to the limit of the standard error in the obtained results	26	24	275	401	41.13	384.63
9-	Advanced programming languages are being developed in order to continuously develop the business	32	40	253	429	44.00	290.07
10-	Technical services for artificial neural networks are being developed	83	94	148	585	60.00	22.34
The average response of the axis						53.23	
The third axis: robots (R)							
11-	Robots are used to achieve added value through operational processes	79	69	177	552	56.62	65.75
12-	Safe and reliable machines and robots are ensured	59	77	189	520	53.33	91.59
13-	Chatbots are available that take on the role of customer service	30	29	266	414	42.46	344.20
14-	Transactions and account balances are continuously monitored by bots	37	51	237	450	46.15	230.13
15-	Robots that take care of the elderly are available	78	54	193	535	54.87	101.91
The average response of the axis						50.68	
The fourth axis: understanding customers (UC)							
16-	Ads are targeted to customers using cookie data	40	44	241	449	46.05	243.77
17-	Customer proposals are evaluated and evaluated by smart algorithms	85	70	170	565	57.95	53.69
18-	The customer profile is analyzed using cookies and visits	45	40	240	455	46.67	240.15
19-	There are systems for analyzing market fluctuations, predicting trends and analyzing customer behavior	47	16	262	435	44.62	331.39

Table 3. (*Continued*).

No.	Item	Response			Relative weight	Average response	X2
		Yes	To some extent	no			
20-	Services are provided and made available to customers through applications of smart algorithms	75	34	216	509	52.21	168.26
The average response of the axis						49.5	
The fifth axis: data analysis (DA)							
21-	Social network monitoring tools are available that analyze social networks	97	139	89	658	67.49	13.32
22-	Business intelligence, support and decision-making systems are available	37	48	240	447	45.85	240.60
23-	Technical systems are available to analyze customer behavior and measure their satisfaction with services	96	102	127	619	63.49	4.99
24-	There are tools and methods necessary to verify the validity and quality of data	65	74	186	529	54.26	83.90
25-	Advanced data analysis and forecasting techniques are available to enhance business intelligence systems	66	44	215	501	51.38	159.77
The average response of the axis						56.49	
The sixth axis: training and development (TD)							
26-	Human capital is relied upon by developing the pillars of knowledge	19	42	264	405	41.54	337.96
27-	The necessary work team is available in the field of smart algorithms	34	44	247	437	44.82	266.70
28-	There is continuous development of plans and programs that support smart algorithms	55	35	235	470	48.21	224.00
29-	The technical services needed for intelligent algorithms are managed and developed	24	47	254	420	43.08	296.24
30-	Awareness programs are available for applications of smart algorithms	33	27	265	418	42.87	340.01
31-	Follow practices to manage smart algorithms projects	63	30	232	481	49.33	216.78
The average response of the axis						44.97	
The average response to the questionnaire						52.19	
Confident = (0.62); The Pinnacle of Culture = (0.72)							

The value of (X^2) is a function at a significance level (0.05) = 5.99.

The survey results showed the average level of smart algorithms used in sports facilities: mean response scores were located around 58.31 on the responding scale. It showed that the artificial neural networks had a mean response of response around 53.23 while the average value for the robot's response was about 50.68. Furthermore, as the average customer familiarity response was around 49.5, the data analysis response was around 56.49, and the training and development response was around 44.97, the average response of different aspects is approximately. In summary, the results of this study gave a powerful image and exact information about the current condition of smart algorithms in sports facilities in the Kingdom of Saudi Arabia.

Figure 3 illustrates the average response to a questionnaire assessing the level of operational performance in sports facilities in the Kingdom of Saudi Arabia.

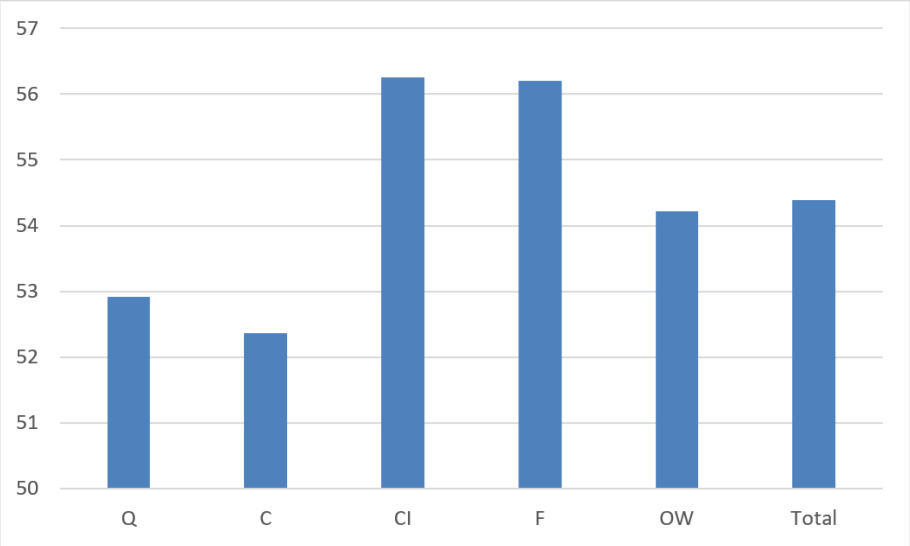

Figure 3. Averages of response to the level of operational performance of sports facilities.

Table 4 presents responses as well as (X^2) to the questionnaire on the level of operational performance of sports facilities in the Kingdom of Saudi Arabia.

Table 4. Relative weight, average response, and X^2 for the questionnaire on the level of operational performance of sports facilities in the Kingdom of Saudi Arabia (N = 325).

No.	Item	Response			Relative weight	Average response	X^2
		Yes	To some extent	no			
The first axis: quality: the establishment works on (Q)							
1-	Process control by statistical and technical methods of quality control	87	54	184	553	56.72	84.30
2-	Availability of quality maps to ensure that production processes are under control	98	89	138	610	62.56	12.56
3-	Availability of quality assurance standards and specifications in all its facilities, facilities and services	47	49	229	468	48.00	201.62
4-	Determine the factors that lead to deviations in performance or weakness in the quality of service	58	79	188	520	53.33	89.91
5-	Conducting surveys on a regular basis to determine customer requirements	32	40	253	429	44.00	290.07
The average response of the axis						52.92	
The second axis: cost: the establishment works on (C)							
6-	Managing available resources and developing products in a way that reduces costs	60	78	187	523	53.64	87.18
7-	Using the most appropriate costing systems and entrances to the nature of the facility and the nature of the environment	63	94	168	545	55.90	53.73
8-	Providing services at lower prices than competing services	62	80	183	529	54.26	78.69
9-	Reducing costs and eliminating unnecessary activities	42	100	183	509	52.21	92.72
10-	Work on the method of economies of scale	37	48	240	447	45.85	240.60
The average response of the axis						52.37	

Table 4. (*Continued*).

No.	Item	Response			Relative weight	Average response	X^2
		Yes	To some extent	no			
The third axis: continuous improvement: the facility works on (CI)							
11-	Commitment to the timing of the implementation of works and activities according to a specific time	64	86	175	539	55.28	63.77
12-	Excellence in an organizational culture directed to continuous improvement of all services provided	94	105	126	618	63.38	4.88
13-	Reliance on performance evaluation results as a basis for continuous improvement	61	35	229	482	49.44	204.73
14-	Inferring services quality indicators and comparing them with the services actually provided	91	88	146	595	61.03	19.69
15-	Training courses commensurate with the needs of those in charge of the work	68	48	209	509	52.21	142.16
The average response of the axis						56.26	
The fourth axis: flexibility: the establishment works on (F)							
16-	Respond to changes in the volume of demand for services through the production systems used	81	60	184	547	56.10	81.31
17-	The ability to switch from one product to another within the production mix at one time	98	102	125	623	63.90	3.92
18-	Introducing basic modifications to its products and services in response to customer requests	40	50	235	455	46.67	222.62
19-	Availability of flexibility in controlling the volume of production of its services in line with market requirements	60	130	135	575	58.97	32.46
20-	Easily increase its production capacity and capabilities whenever required	69	77	179	540	55.38	69.44
The average response of the axis						56.20	
The fifth axis: organization of work: the establishment works on (OW)							
21-	Adopting administrative systems that lead to distinguishing its position among its competitors from other establishments	44	92	189	505	51.79	100.73
22-	Availability of specific measures for the performance of work organization steps on an ongoing basis	64	92	169	545	55.90	54.58
23-	Making changes in the technological techniques used in business performance	86	64	175	561	57.54	63.77
24-	Reducing administrative waste by using the scientific methodology in processing administrative operations	76	70	179	547	56.10	69.31
25-	Staying away from routine business for the success of administrative work	70	54	201	519	53.23	120.08
26-	A specific arrangement for effective work procedures during the performance of the business	61	48	216	495	50.77	161.29
The average response of the axis						54.22	
The average response to the questionnaire						54.39	
Confident = (0.62); The Pinnacle of Culture = (0.72)							

The value of (X^2) is a function at a significance level (0.05) = 5.99.

The study's results demonstrated that 52.92 constituted a definite average response to the quality axis, and 52.37, likewise, revealed a good average response to the cost axis. Apart from that, employees also showed an average familiarity with the continuous improvement axis of about 56.26 and the flexibility axis of about 56.20,

but an average lack of understanding regarding the work organization axis of about 54.22. Moreover, afterward, a statistical measurement was reached, which peaked at 54.39. The significance level was specified as 0.05. In general, this research reveals the whole array of criteria that help in the level of efficiency of sports facilities in Saudi Arabia and information that shows standards, cost, continuous improvement, adoptability, and workflows in this context.

Table 5 shows the correlation coefficients between the use of smart algorithms and the development of the operational performance of sports facilities in the Kingdom of Saudi Arabia.

Table 5. Correlation coefficients between the use of smart algorithms and the development of the operational performance of sports facilities in the Kingdom of Saudi Arabia (N = 325).

Smart algorithms		**Operational performance**				
		Q	**C**	**CI**	**F**	**OW**
1	ES	0.59	0.60	0.72	0.62	0.70
2	ANN	0.66	0.72	0.62	0.64	0.71
3	R	0.68	0.63	0.59	0.73	0.65
4	UC	0.57	0.62	0.71	0.72	0.67
5	DA	0.71	0.68	0.67	0.68	0.59
6	TD	0.55	0.67	0.69	0.67	0.72

The tabular value of (t) at the level of significance (0.05) and the degree of freedom (323) = 0.113.

It can be seen from **Table 5**. There is a strong direct relationship at the level of statistical significance (P = 0.001) between the use of smart algorithms and the development of the operational performance of sports facilities in the Kingdom of Saudi Arabia. The correlation coefficients in table represent the relationship between the use of smart algorithms and the development of operational performance in sports facilities in the Kingdom of Saudi Arabia. There is a positive correlation between the use of expert systems and the operational performance dimensions. The correlation coefficients range from 0.59 to 0.72. There is a positive correlation between the use of artificial neural networks and the operational performance dimensions. The correlation coefficients range from 0.66 to 0.72. The correlation coefficients range from 0.63 to 0.73. There is a positive correlation between the use of smart algorithms to understand customers and the operational performance dimensions. The correlation coefficients range from 0.57 to 0.72. There is a positive correlation between the use of data analysis techniques and the operational performance dimensions. The correlation coefficients range from 0.67 to 0.71. There is a positive correlation between the use of smart algorithms for training and development and the operational performance dimensions. The correlation coefficients range from 0.55 to 0.72. Overall, the results indicate that the use of smart algorithms, including expert systems, artificial neural networks, robots, understanding customers, data analysis techniques, and training and development, is positively correlated with the development of operational performance in sports facilities. This suggests that incorporating smart algorithms can contribute to improvements in various dimensions of operational performance.

4. Discussion

Table 3 shows the agreement of the study sample on the weakness of the attempts made by these sports facilities to instill a culture of work towards the practice of smart algorithms techniques, the lack of awareness programs towards work for smart algorithms, and the lack of a comprehensive and declared plan for training leaders and workers to practice smart algorithms, as well Some officials in charge of departments, as well as some workers, neglect the importance of smart algorithms, and that the nature of work within these does not depend on providing the facilities' applications and programs in providing services and activities, and is not considered a basic axis and an important source of income, the consensus among the study participants regarding the inadequate efforts made by sports facilities to promote a work culture that embraces the use of smart algorithms techniques.'

Officials responsible for decision makers in those establishments must develop an integrated methodology for managing smart algorithms by setting clear and declared policies to provide leaders and workers to raise their knowledge and increase their ability to practice smart algorithms well, so that they can implement information technology projects in all administrative units, which is consistent with the results and study (Bargarai, 2020) that the employment of various technologies based on the use of smart algorithms positively affects the ability of companies to perform various administrative tasks. As in the findings of studies conducted by De Bellis and Venkataramani Johar (2020), Gacanin and Wagner (2019). Additionally, the study by Seranmadevia and Kumara (2019), Balducci and Marinova (2018) highlighted the significance of utilizing smart algorithm techniques in data analysis, ns. Furthermore, the studies conducted by De Bellis and Venkataramani Johar (2020), Gacanin and Wagner (2019), and Seranmadevi and Kumar (2019) all support the notion that the utilization of smart algorithm applications contributes to guiding beneficiaries and making decisions on their behalf is not helpful.

Considering the outcomes listed in **Table 4**. Regarding the poor operational performance in sports facilities, the study sample is in agreement. The use of cost-cutting measures without sacrificing the necessary quality makes this clear. Eliminating improper and pointless activities that conflict with the objectives of the organization is also not given enough attention. The present findings are consistent with a research study carried out by Kummar (2014), Khanchaanapong et al. (2014), which underscored the significance of costs as a fundamental competitive objective for establishments and the critical factor in enhancing operational performance. Additionally, it emphasized the difficulties institutions face in enhancing the operational characteristics of quality, flexibility, delivery, cost, and inventiveness. As mentioned in the researches of Garry et al. (2022), and Sandra (2022), rules and human resources play a huge role in the performance of employees. This is a role that they play in the improvement of companies operations, which is important for the firms to achieve their targeted goals and generally perform better. The data, nevertheless, reveals the inefficiency in the management principles of the individuals who are responsible of the management of the sports institutions with an intent of enhancing their levels of competition. It can be done by making the most of the institution's assets

what are everything that include its abilities, competencies, etc., and that are strength points.

Likewise, as per Ukhonova (2023), Gao et al., (2022) operational efficiency is one of the major gauges of an organization's capability and degree of success. Such is the extent of agreement with what they said. While it is very hard to meet all the client's demands and expectations when one does not have a proper guide on this kind of iteration, it is even more difficult to improve the ongoing performance. Thus, we can also see that as Paul (2023) has mentioned, there is no way out of it that customer expectations should be met. Beneficiary and customer satisfaction levels must be raised which also would lead to the customers having the impression about the offered sports services and activities.

Table 5 demonstrates that the application of smart algorithms is the very source of meeting the high levels of operational performance in sports facilities that can be easily tracked. There is a consistent pathway between the deployment of smart algorithms of this type and better operational performance in these institutions ($p < 0.05$). They are in line with Davenport et al. (2020), De Bellis and Venkataramani Johar (2020), and Gacanin and Wagner (2019) who concluded that most processes within are driven by intelligent algorithms that deliver better results. These apps will not only transform how people interact, but will also be able to assist businesses in automating various business activities. Moreover, the research paper written by Balducci and Marinova states that the use of intelligent algorithmic techniques in data analysis is also a key factor in this area. It has already been acknowledged that a combination of sports and business activities has been conducted on several social media sites. Therefore people managing sports facilities should try to grasp the elements of technology and know the skills that are supposed to be utilized to achieve the expected behavioral change. This idea also corresponded with the works of Bargarai (2020), which identified the information and communication innovations created by intelligent algorithms and highlighted speed of its managerial decision-making process.

Hence, there is a correlation between labor productivity growth based on artificial intelligence technology and employee engagement analyzes regarding operational performance based on the smart algorithm, and it is proved by the following studies such as by Lazaroiu and Rogalska (2023), Nica et al. (2023), and Cramarenco et al. (2023). As a result, the intelligent algorithms should be a subject of scrutiny that will help the scientific and technological world overcome modern constraints. This is valid with the findings of a study by Bargarai (2020), reported this about different technologies that use smart algorithms to be able to perform various administrative tasks in a better way. What is more, according to Davenport et al. (2020), smart algorithms were reported effective in various APS including everyday office management work, which turned out to be result-oriented and efficient.

5. Conclusions

The study aimed to assess the impact of utilizing smart algorithms on enhancing the operational performance of sports facilities in the Kingdom of Saudi Arabia. A total of 325 participants were involved in the study, utilizing two questionnaires for

data collection. The results indicated limited utilization of advanced algorithms and operational efficiency in sports facilities. Nonetheless, a notable relationship was observed between the adoption of advanced algorithms and the enhancement of operational efficiency in these facilities. These algorithms were successful in optimizing service delivery, leading to increased operational capacity and understanding of customer behaviors. Additionally, they offered improved opportunities for efficient operational management and assisted in defining the organization's goals and future trajectory. Through the utilization of cutting-edge technologies and analysis of customer data, advanced algorithms enabled precise targeting of beneficiaries and facilitated the allocation of essential financial and human resources. Consequently, this contributed to elevating the overall operational performance of sports facilities. To boost operational efficiency, it is essential to leverage innovative technologies like advanced algorithms. These algorithms can deliver clear and dependable insights to all stakeholders, thereby reducing errors and ensuring streamlined operations.

Limitations, future directions

Although significant, this study has certain drawbacks. The ability of generalizing the study results is limited by the very small sample size. Yet, the use of questionnaires, which might have influenced certain respondents and limited the breadth of some indicators, is another restriction that needs to be considered. The work does, however, provide a strong basis for future research in this field despite these drawbacks. These points can be the subject of future research: investigating the effects of intelligent algorithms on the effectiveness of operations at sporting venues. researching the degree to which sports organizations use intelligent algorithms to improve decision-making. Investigating the role of smart algorithms in enhancing operational effectiveness and strategic planning in sports organizations, as well as using them to evaluate data and enhance performance in these groups. The utilization of smart algorithms in sports facilities and institutions in the Kingdom of Saudi Arabia can be better understood with the help of these prospective study avenues.

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Appendix A. The appendix includes a questionnaire on the use of smart algorithms for sports facilities in the Kingdom of Saudi Arabia

Table A1. An applied study on the use of smart algorithms.

No.	Item	Response		
		Yes	**To some extent**	**No**
The first axis: expert systems (ES)				
1-	There are specialized companies to provide workers with information about expert systems			
2-	Security means are available to protect systems software			
3-	All departments and units of the facility are connected to the fiber optic network			
4-	Computers designed for systems are characterized by keeping pace with technological development			
5-	Specialized companies do periodic software updates			
The second axis: artificial neural networks (ANN)				
6-	Techniques based on self-education are invested to carry out administrative work			
7-	Artificial neural networks are available that are able to predict risks			
8-	The future prediction values are found to the limit of the standard error in the obtained results			
9-	Advanced programming languages are being developed in order to continuously develop the business			
10-	Technical services for artificial neural networks are being developed			
The third axis: robots (R)				
11-	Robots are used to achieve added value through operational processes			
12-	Safe and reliable machines and robots are ensured			
13-	Chatbots are available that take on the role of customer service			
14-	Transactions and account balances are continuously monitored by bots			
15-	Robots that take care of the elderly are available			
The fourth axis: understanding customers (UC)				
16-	Ads are targeted to customers using cookie data			
17-	Customer proposals are evaluated and evaluated by smart algorithms			
18-	The customer profile is analyzed using cookies and visits			
19-	There are systems for analyzing market fluctuations, predicting trends and analyzing customer behavior			
20-	Services are provided and made available to customers through applications of smart algorithms			
The fifth axis: data analysis (DA)				
21-	Social network monitoring tools are available that analyze social networks			
22-	Business intelligence, support and decision-making systems are available			
23-	Technical systems are available to analyze customer behavior and measure their satisfaction with services			
24-	There are tools and methods necessary to verify the validity and quality of data			
25-	Advanced data analysis and forecasting techniques are available to enhance business intelligence systems			

Table A1. (*Continued*).

No.	Item	Response		
		Yes	**To some extent**	**No**
The sixth axis: training and development (TD)				
26-	Human capital is relied upon by developing the pillars of knowledge			
27-	The necessary work team is available in the field of smart algorithms			
28-	There is continuous development of plans and programs that support smart algorithms			
29-	The technical services needed for intelligent algorithms are managed and developed			
30-	Awareness programs are available for applications of smart algorithms			
31-	Follow practices to manage smart algorithms projects			

Appendix B. The appendix includes a questionnaire on the level of operational performance of sports facilities in the Kingdom of Saudi Arabia

Table B1. An applied study on the level of operational performance.

No.	Item	Response		
		Yes	To some extent	No
The first axis: quality: the establishment works on (Q)				
1-	Process control by statistical and technical methods of quality control			
2-	Availability of quality maps to ensure that production processes are under control			
3-	Availability of quality assurance standards and specifications in all its facilities, facilities and services			
4-	Determine the factors that lead to deviations in performance or weakness in the quality of service			
5-	Conducting surveys on a regular basis to determine customer requirements			
The second axis: cost: the establishment works on (C)				
6-	Managing available resources and developing products in a way that reduces costs			
7-	Using the most appropriate costing systems and entrances to the nature of the facility and the nature of the environment			
8-	Providing services at lower prices than competing services			
9-	Reducing costs and eliminating unnecessary activities			
10-	Work on the method of economies of scale			
The third axis: continuous improvement: the facility works on (CI)				
11-	Commitment to the timing of the implementation of works and activities according to a specific time			
12-	Excellence in an organizational culture directed to continuous improvement of all services provided			
13-	Reliance on performance evaluation results as a basis for continuous improvement			
14-	Inferring services quality indicators and comparing them with the services actually provided			
15-	Training courses commensurate with the needs of those in charge of the work			
The fourth axis: flexibility: the establishment works on (F)				
16-	Respond to changes in the volume of demand for services through the production systems used			
17-	The ability to switch from one product to another within the production mix at one time			
18-	Introducing basic modifications to its products and services in response to customer requests			
19-	Availability of flexibility in controlling the volume of production of its services in line with market requirements			
20-	Easily increase its production capacity and capabilities whenever required			
The fifth axis: organization of work: the establishment works on (OW)				
21-	Adopting administrative systems that lead to distinguishing its position among its competitors from other establishments			
22-	Availability of specific measures for the performance of work organization steps on an ongoing basis			
23-	Making changes in the technological techniques used in business performance			
24-	Reducing administrative waste by using the scientific methodology in processing administrative operations			

Table B1. (*Continued*).

No.	Item	Response		
		Yes	**To some extent**	**No**
25-	Staying away from routine business for the success of administrative work			
26-	A specific arrangement for effective work procedures during the performance of the business			