Impacts of Applying Artificial Intelligence on Decision-Making Quality: A Descriptive Study in Saudi Arabian Private Sector Organizations

Nermeen Bakheet Aljohani[1], Saja Albliwi[2*]

[1]Business Administration Department, College of Business Administration, Albaha University, Albaha, SAUDI ARABIA.

[2]Business Administration Department, Faculty of Economics and Administration, King Abdulaziz University, Jeddah, SAUDI ARABIA.

*Corresponding Author (Email: salbliwi@kau.edu.sa).

Abstract

Artificial intelligence (AI) is a leading future strategic technology. AI is more advanced as it is integrated into the decision-making (DM) process. Saudi Arabia (SA) is diversifying its economy with the Vision 2030 Initiative. Vision 2030 recognizes digital transformation as an important goal to boost the business sector, support private sector companies, and ultimately reduce the country's reliance on oil revenues through economic diversification. Therefore, this study aims to examine the impacts of applying AI on DM quality in the private sector organizations in SA. The quantitative method was adopted, and the data was collected using the questionnaire distributed to the study subjects (n=170 employees). The findings showed that there was a significant impact of using AI applications in its three dimensions (training and development, appropriateness, and effectiveness) on the DM quality in its three dimensions (the speed of decision-making, the quality of the decision, accepting the decision) in the private sector organizations in SA. Therefore, it could be recommended that private sector organizations should continue to employ AI applications in their businesses, keep abreast of developments, and establish partnerships between the Saudi data AI authority (SDAIA) and international companies to support AI research. Further analysis of different domains of AI in the organizations in SA in both the private and public sectors should be done.

Disciplinary: Business Management.

1 Introduction

Artificial intelligence (AI) is a term first used in 1956 by computer scientist John McCarthy-widely. He defined AI as "the science and engineering of making intelligent machines" (Gherheș & Obrad, 2018). AI researchers, such as Marvin Minsky, Herbert Simon, and Allen Newell, predicted in the early 1960 that the machine would be able to carry out human actions (Giri et al., 2019). During 1990, AI programs were more widely used in many fields, such as medical, logistical, data processing, and many other fields (Kadi & Hida, 2020). Also, AI means "a computer program that can think and learn, and it can perform tasks or thinking processes associated with intelligence in human beings" (Bruun & Duka, 2018). AI is a topic that has a worldwide impact; plentiful has been published about AI in the general media and academic research literature. Despite the plenty of writing on the topic, researchers are always in a challenge with AI, especially considering the current conditions in which the use of AI techniques is increasing. AI is an approach to creating intelligent entities that can match or exceed human intelligence and rationality (Hassan, 2020). As the AI applications continue to increase rapidly, its techniques have begun to contribute greatly to sensitive processes such as decision-making (DM) in various organizations, DM means "the study of identifying and choosing alternatives based on the values and preferences of the decision-maker" (Matsa & Gullamajji, 2019).

The decisions that are made in any organization have important implications for organizational performance. This requires resorting to smart systems to assist in DM, known as AI with all its domains, such as expert systems, neural networks, fuzzy logic, etc (Nayak and Dash, 2020). AI, especially machine learning algorithms, enables the creation of new information and future predictions from existing data, promising quick, precise, and low-cost decisions. It has a sufficient understanding of its strengths and weaknesses and reacts to information the same way a human would. Researchers predict that AI will surpass humans in many activities in the next ten years, and there is a 50% chance of AI surpassing humans in all tasks in 45 years and automating all human jobs in 120 years (Grace et al., 2018).

DM is the most potent skill to shape the future of any organization, and making good decisions is the key to success. AI techniques could bring new opportunities to make high-quality decisions as humans act and maybe better. Recent advances in AI are creating the possibility to experience the interaction in humans with AI to help in DM (Fast & Schroeder, 2020). Organizations are already building AI-driven techniques with human-like capacities, and they have the potential to become widely used in improving task completion (Spetzler et al., 2016).

AI applications play an important role in making decisions, including identifying complex problems and solving them through an accurate and deep understanding of these problems and providing the best results. They can simulate human intelligence. They have become applied in many fields, for instance, computer science applications, software, medicine, human resources, biology, digital marketing, education, etc. (Nayak and Dash, 2020).

SA government has conducted long-term plans to support using AI in future projects. They established a government institute called the Saudi Data and Artificial Intelligence Authority (SDAIA) to raise awareness about AI. In addition, SA is building a smart city called NEOM as a part of its "Vision 2030" program to reduce the country's dependence on oil revenues and turn it into a technology hub. AI-driven companies grow yearly in SA (Ashehri, 2019; Hassan, 2020).

The scope will almost certainly increase after 2030 when AI affects the economy and society. AI in SA will contribute over USD 135.2.2 billion to the economy by 2030. The Kingdom is currently working on establishing all future projects and its cities based on AI technologies and aims to invest in this promising field full of opportunities that will generate high profits. AI was applied to several models, forecasts, decision support, and control systems in such diverse fields in SA as engineering, economics, manufacturing, education, and medicine (Ashehri, 2019). Therefore, this study aims to examine the impact of applying AI on DM quality in the private sector organizations in SA.

Research hypotheses are

H$_{main}$: "AI has a positive impact on DM quality in the private sector organizations in SA".

H$_1$: "There is an effective relationship between training and development and DM quality in the private sector organizations in SA".

H$_2$: "There is an effective relationship between the appropriateness and DM quality in the private sector organizations in SA".

H$_3$: "There is an effective relationship between the effectiveness of AI and DM quality in the private sector organizations in SA".

2 Methodology

A descriptive research design, which aims to provide a picture of a situation as it naturally happens, was adopted for this study (Burns & Grove, 2003). Also, the deductive approach, called the "top-down" approach, develops hypotheses based on existing theories and focuses on verifying theories (Burney & Saleem, 2008). The quantitative strategy was followed to emphasize the quantification measurement and determine the relationship between variables.

All employees in the private sector organizations in SA who applied AI techniques in DM are the target population to collect primary data. This study employed a simple random sampling technique to select the study subjects (Mugenda & Mugenda, 2012).

The primary data was obtained for research purposes through questionnaires inanition to secondary data. The data was collected through a questionnaire. A hand-to-hand questionnaire and an online-based questionnaire through Google Forms were distributed by sharing the link on the internet via social media applications (LinkedIn, WhatsApp, Twitter, Telegram, and E-mails). In the first stage, the questionnaire was distributed to selected individuals for piloting the questionnaire. After verifying the validity and reliability of the tool, the questionnaire was distributed to a large group of targeted participants community. After three weeks of data collection, a total of (193) responses were received, of which the valid ones were (170) responses, with a ratio of (88%).

2.1 Research Instruments

After literature reviews on the impact of AI on DM quality, a questionnaire consisting of four parts was constructed. Part I consists of demographic information (gender, age, education level), and Part II consists of functional information (administrative level, experience, reliance on AI techniques at work, duration of training received to use AI). Part III deals with the first variable of AI applications-independent variable- which has three dimensions, training and development, appropriateness, and effectiveness, with 18 statements. Part 4 of the questionnaire deals with the second variable-DM-the dependent variable, which contains three dimensions, the speed of DM, the quality of the decision, and accepting the decision with 14 statements.

All statements in six dimensions are included in the ordinal scale. Six-Likert scale measurements are used to check the respondent's opinion about the subject of this research: strongly disagree =1, disagree =2, neutral =3, agree =4, strongly agree=5, and not applicable = 6.

The validity of the questionnaire was tested on several levels. Pilot testing of the questionnaire was performed to test validity, where 15 participants were recruited to investigate the ability of the respondents to complete the questionnaire and assess the clarity of the questions and the need to add or delete. To check the construct validity of the questionnaire, Person correlation coefficients were constructed between dimensions and the grand total of the questionnaire. The results showed that all Person correlations are statistically significant at level (α=0.01), and all dimensions correlated with a grand total of the questionnaire. Person correlation coefficients ranged between 0.8-0.94, which means the tool validity is satisfied in this research. For testing reliability, reliability was calculated for each dimension through the Cronbach's Alpha test to estimate the reliability of the questionnaire. The results revealed that the overall reliability is 0.97, which is sufficient to guarantee the reliability of the questionnaire.

2.2 Statistical Analysis

Analysis was achieved through the IBM SPSS software to analyze the data collected to answer the research questions and test the research hypotheses. Means and standard deviations, Cronbach's Alpha test to measure reliability, Pearson's correlation coefficient to measure internal consistency and the relationship between independent and dependent variables, simple linear regression, and ANOVA, analysis of variance were used.

3 Results and Discussion

This study included 170 employees in the private sector organizations in SA who applied AI techniques in DM in their organizations. The highest percentage was male 77.6%, while the rest were females, 22.4%. Category 31-40 years old was the highest percentage of participants (54.1%), while the 51 years and above" was the lowest percentage of the participant (2.9%). Regarding the education level, the bachelor's degree was the highest percentage (62.4%), while the other was the lowest percentage (0.6%).

Concerning the administrative level variable, an employee has the highest percentage

(39.4%), while other has the lowest percentage (4.7%). Regarding their experience, from 11 to 15 years has the highest percentage (27.6%), while less than 5 years has the lowest percentage (21.8%). According to the variable of reliance on AI techniques at work, participants' percentage of less than 10% on using AI techniques at work is the highest (41.8%), while participants' percentage of more than 90% on using AI techniques at work is the lowest (7.6%). Finally, the variable of training that employees received to use AI technique, participants` case that never has the training to use AI technique at work is the highest (45.9%), while participants' percentage who got 6 months of training to use AI technique at work is the lowest (10%) (Table 1).

Table 1: The study participants' demographic and functional information

Characteristics	Frequency (n=170)	Percent (%)
Gender		
Male	132	77.6
Female	38	22.4
Age		
Less than 30 years	40	23.5
31-40	92	54.1
41-50	33	19.5
More than 50 years	5	2.9
Education level		
High school or less	2	1.18
Diploma	2	1.18
Bachelor's degree	106	62.4
Postgraduate degree	59	34.7
Others	1	0.58
Administrative level		
General Manager	19	11.2
Branch Manager	24	14.1
Department Head	52	30.6
An employee	67	39.4
Other	8	4.7
Experience		
Less than 5 years	37	21.8
From 5 to 10 years	46	26.5
From 11 to 15 years	47	27.6
More than 15 years	41	24.1
Reliance on AI		
Less than 10%	71	41.8
10-40%	56	32.9
50 - 80%	30	17.6
More than 90%	13	7.6
Training to use AI techniques at work		
One month	28	16.5
3 months	28	16.5
6 months	17	10.0
More than 6 months	19	11.2
Never	78	45.9

3.1 AI Applications (Independent Variable)

AI Applications as an independent variable have three dimensions training and development, appropriateness, and effectiveness with 18 statements.

3.2 Training and Development

Table 2 shows the rank of training and development statements. The statement "The organization has modern technological devices" comes first with a mean of 4.21±0.998/strongly

agree. In contrast, the statement "Staffs are constantly trained to keep pace with recent technological developments" comes last with a mean of 3.64±1.229/agree. The overall mean for training and development is 3.91±0.836/ agree.

Table 2: Training and development statements

Statement	Mean	SD	Scale
The organization has modern technological devices	4.21	0.998	Strongly agree
The organization constantly updates the systems	3.98	1.161	Agree
Staff performance is constantly evaluated to ensure the quality of work	3.96	1.087	Agree
Staff have the ability to use existing modern technologies	3.93	1.058	Agree
The organization provides many experts for the development of information systems	3.89	1.112	Agree
The organization uses modern and advanced technological software to improve the quality of decisions	3.76	1.164	Agree
Staff are constantly trained to keep pace with recent technological developments	3.64	1.229	Agree
Training and development	3.91	0.836	Agree

Dimensions ranked descending according to their mean

3.3 Appropriateness

Table 3 shows the rank of appropriateness statements. The statement "the applications used are modern and suited to the requirements of the work" comes first with a mean (3.86 ±1.066/ agree). In contrast, the statement "The information provided by AI applications is appropriate to the user's needs" comes last with a mean (3.79±1.251 /agree). The appropriateness overall mean is (3.82 ± 0.991/ agree).

Table 3: Appropriateness statements

Statement	Mean	SD	Scale
The applications used are modern and suited to the requirements of the work	3.86	1.066	Agree
AI applications provide the necessary information that serves the decision-making process	3.81	1.211	Agree
The information that helps decision-makers to make correct decisions is accurate	3.80	1.097	Agree
The information provided by AI applications is appropriate to the user's need	3.79	1.251	Agree
Appropriateness	3.82	0.991	Agree

Dimensions ranked descending according to their mean

3.4 Effectiveness

Table 4 shows the rank of effectiveness statements. The statement "AI applications are modern means to improve and develop decisions and evaluate their effectiveness" comes first with a mean of 4.16±0.977/agree. In contrast, the statement "These systems can predict problems and risks" comes last with a mean of 3.74±1.063/agree. Effectiveness overall mean is 3.96± 0.886/agree.

Table 4: Effectiveness statements

Statement	Mean	SD	Scale
AI applications are a modern means to improve and develop decisions and evaluate their effectiveness	4.16	0.977	Agree
These applications achieve the amount of success for the organization due to the effectiveness of the decisions it takes	4.03	1.034	Agree
Customer transactions are achieved as quickly and accurately as possible due to the superior ability of the technological devices and technologies in the organization	3.98	1.196	Agree
These systems are an excellent tool that helps in achieving correct, accurate, and high-quality results	3.95	1.022	Agree
These applications have a superior ability in identifying and diagnosing problems, developing alternatives for solutions, evaluating them, and proposing	3.95	0.962	Agree
AI applications provide the necessary information that serves the decision-making process	3.92	1.096	Agree
These systems have the ability to predict problems and risks	3.74	1.063	Agree
Effectiveness	3.96	0.886	Agree

Dimensions ranked descending according to their mean

3.5 DM Quality (Dependent Variable)

DM quality dependent variable, which also contains three dimensions the speed of decision, the quality of the decision, and accepting the decision with (14) statements.

3.6 The speed of Decision

Table 5 shows the rank of the speed of decision statements. The statement "AI applications have enabled to shorten the time and reduce effort" comes first with a mean (4.30 ±1.082/ strongly agree), while the statement "The time that AI applications take to process data is relatively adequate" comes last with a mean (3.96 ± 1.168/ agree). The speed of the decision overall mean is (4.10 ± 0.962/ agree).

Table 5: The speed of decision statements

Statement	Mean	SD	Scale
AI applications have enabled to shorten the time and reduce the effort	4.30	1.082	Strongly agree
The Information is stored and retrieved quickly	4.24	1.016	Strongly agree
These applications contributed to the time and planned decision-making	4.03	1.138	Agree
The required information is passed on to the decision-maker as soon as it is requested	3.98	1.151	Agree
The time that AI applications take to process data is relatively adequate	3.96	1.168	Agree
The speed of decision	4.10	0.962	Agree

Dimensions ranked descending according to their mean

3.7 The Quality of the Decision

Table 6 shows the rank of the quality of the decision statements. The statement "AI applications ensure that decisions are made based on accurate information" comes first with a mean (3.95 ±1.051/ agree). In contrast, the statement "The ability of AI technology to make accurate decisions is only in the certainty environment" comes last with a mean (3.21±1.212 /agree). The quality of the decision overall mean is (3.61±0.876/ agree).

Table 6: The quality of the decision statements

Statement	Mean	Std. Deviation	Scale
Decisions made by AI applications achieve the desired goals	3.74	1.018	Agree
The ability of AI applications to make decisions in the risky or uncertain environment	3.55	1.136	Agree
The ability of AI technology to make accurate decisions is only in the certainty environment	3.21	1.212	Neutral
The quality of the decision	3.61	0.876	Agree

Dimensions ranked descending according to their mean

3.8 Accepting the Decision

Table 7 shows the rank of accepting the decision statements. The statement "the decisions made by AI technology are rational and realistic" comes first with a mean of (3.64 ±1.035 / agree). In contrast, the statement "decisions made by AI technology often conform to the personal guesswork of the decision-maker" comes last with a mean of (3.48 ± 1.163/ agree). Accepting the decision overall mean is (3.58 ± 0.943/ agree).

Table 7: Accepting the decision statements

Statement	Mean	SD	Scale
The decisions made by AI technology are rational and realistic	3.64	1.035	Agree
The results of the decisions taken are often met with satisfaction	3.63	1.070	Agree
Decisions are widely accepted and highly reliable	3.59	1.086	Agree
The results of decisions obtained from implementing AI technology are often positive	3.56	1.109	Agree
Decisions made by AI technology often conform to the personal guesswork of decision-maker	3.48	1.163	Agree
Accepting the decision	3.58	0.943	Agree

Dimensions ranked descending according to their mean

3.9 AI Applications (Independent Variable)

Table 8 shows the rank of AI application statements. The statement "the organization has modern technological devices" comes first with a mean (4.21 ± 0.998/ strongly agree), while the statement "staff is constantly trained to keep pace with recent technological developments" comes last with a mean (3.64 ±1.229 /agree). AI application's overall mean is (3.91± 0.728/agree).

Table 8: AI applications statements

Statement	Mean	SD	Scale
The organization has modern technological devices	4.21	0.998	Strongly agree
AI applications are a modern means to improve and develop decisions and evaluate their effectiveness	4.16	0.977	Agree
These applications achieve the amount of success for the organization due to the effectiveness of the decisions it takes	4.03	1.034	Agree
Customer transactions are achieved as quickly and accurately as possible due to the superior ability of the technological devices and technologies in the organization	3.98	1.196	Agree
The organization constantly updates the systems	3.98	1.161	Agree
Staff performance is constantly evaluated to ensure the quality of work	3.96	1.087	Agree
These systems are an excellent tool that helps in achieving correct, accurate and high-quality results	3.95	1.022	Agree
These applications have a superior ability in identifying and diagnosing problems, developing alternatives for solutions, evaluating them, and proposing	3.95	0.962	Agree
Staff have the ability to use existing modern technologies	3.93	1.058	Agree
AI applications provide the necessary information that serves the decision-making process	3.92	1.096	Agree
The organization provides many experts for the development of information systems	3.89	1.112	Agree
The applications used are modern and suited to the requirements of the work	3.86	1.066	Agree
AI applications provide the necessary information that serves the decision-making process	3.81	1.211	Agree
The information that helps decision-makers to make correct decisions is accurate	3.80	1.097	Agree
The information provided by AI applications is appropriate to the user's need	3.79	1.251	Agree
The organization uses modern and advanced technological software to improve the quality of decisions	3.76	1.164	Agree
These systems have the ability to predict problems and risks	3.74	1.063	Agree
Staff are constantly trained to keep pace with recent technological developments	3.64	1.229	Agree
AI applications	3.91	0.724	Agree

Dimensions ranked descending according to their mean

3.10 Decision-Making Quality (Dependent Variable)

Table 9 shows the rank of "decision-making quality" statements, the statement "AI applications have enabled to shorten the time and reduce effort" comes first with a mean (4.3± / strongly agree) and the standard deviation is (1.082). In contrast, the statement "The ability of AI technology to make accurate decisions is only in the certainty environment" comes last with a mean (3.21± 1.212/ neutral). DM quality overall mean is (3.77 ± 0.868/ agree).

Table 9: DM quality statements

Statement	Mean	SD	Scale
AI applications have enabled to shorten the time and reduce the effort	4.30	1.082	Strongly agree
The Information is stored and retrieved quickly	4.24	1.016	Strongly agree
These applications contributed to the time and planned decision-making	4.03	1.138	Agree
The required information is passed on to the decision-maker as soon as it is requested	3.98	1.151	Agree
The time that AI applications take to process data is relatively adequate	3.96	1.168	Agree
AI applications ensure that decisions are made based on accurate information	3.95	1.051	Agree
Decisions made by AI applications achieve the desired goals	3.74	1.018	Agree
The decisions made by AI technology are rational and realistic	3.64	1.035	Agree
The results of the decisions taken are often met with satisfaction	3.63	1.070	Agree
Decisions are widely accepted and highly reliable	3.59	1.086	Agree
The results of decisions obtained from implementing AI technology are often positive	3.56	1.109	Agree
The ability of AI applications to make decisions under risk or uncertain environment	3.55	1.136	Agree
Decisions made by AI technology often conform to the personal guesswork of decision-maker	3.48	1.163	Agree
The ability of AI technology to make accurate decisions is only in the certainty environment	3.21	1.212	Neutral
DM quality	3.77	0.868	Agree

Dimensions ranked descending according to their mean

3.11 Overall Questionnaire Dimensions

From Table 10, "The speed of decision" comes first with a mean of (4.10 ± 0.962/ agree), while the dimension "Accepting the decision" comes last with a mean of (3.58 ± 0.943/agree). DM quality's dependent variable has a mean (3.77 ± 0.868/ agree). The overall questionnaire mean is (3.85 ± 0.742/ agree).

Table 10: Overall questionnaire dimensions statements

Dimension	Mean	Std. Deviation	Scale
The speed of decision-making	4.10	0.962	Agree
Effectiveness	3.96	0.884	Agree
Training and development	3.91	0.836	Agree
Appropriateness	3.82	0.991	Agree
The quality of the decision	3.61	0.876	Agree
Accepting the decision	3.58	0.943	Agree
DM quality	3.77	0.868	Agree
Overall questionnaire	3.85	0.742	Agree

Dimensions ranked descending according to their mean

3.12 Relations between AI Applications and the DM Quality

Pearson correlation analysis was used for testing the relations between the independent variable " AI applications" with its factors (training and development, appropriateness, and effectiveness) against the dependent variable " DM quality" with its factors (the speed of decision-making, the quality of the decision, accepting the decision). Table 11 shows a statistically positive correlation between all independent variables and all dependent variables. Pearson correlation coefficients (r) range (0.60−0.85). All these coefficients have positive and good correlations between independent and dependent variables.

Table 11: Pearson correlations between AI applications and DM quality (n=170)

Independent variables		Dependent Variables			
		The speed of decision-making	The quality of the decision	Accepting the decision	Decision-making quality
Training and development	Pearson correlation	0.62**	0.60**	0.62**	0.64**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
Appropriateness	Pearson correlation	0.72**	0.70**	0.73**	0.64**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
Effectiveness	Pearson correlation	0.79**	0.72**	0.75**	0.81**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
AI applications	Pearson correlation	0.77**	0.69**	0.71**	0.85**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000

**Correlation is significant at the 0.01 level (2-tailed).

3.13 Linear Regression Analysis for DM Quality with the Independent Variable of AI

Table 12 shows that training and development, appropriateness, and effectiveness interpret about 0.41, 0.41, and 0.66 of the dependent variable DM quality variances, with adjusted R^2 = 0.408, 0.41, and 0.658, respectively. AI three factors interpret about 0.72 of the dependent variable DM quality variances, with adjusted R^2 = 0.711.

Table 12: Multiple linear regression analysis for DM quality with the independent variable of AI

Model	R	R2	Adjusted R2
Training and development	0.64 [&]	0.41	0.408
Appropriateness	0.64[&]	0.41	0.411
Effectiveness	0.81[&]	0.66	0.658
AI applications	0.85 [#]	0.72	0.711

[&] Simple linear regression analysis. [#] Multiple linear regression analysis.

3.14 Correlation for DM Quality with the Independent Variable of AI

Table 13 shows a statistically significant influence of training and development factors, appropriateness effectiveness, and AI applications on DM quality (p=0.000).

Table 13: Correlation between DM quality and independent variable of AI.

Model	Sum of Squares	df	Mean Square	F	*p*-value
Training and development	23.717	1	23.717	38.452	0.000
Appropriateness	52.726	1	52.726	118.717	0.000
Effectiveness	84.046	1	84.046	326.138	0.000
AI applications	91.134	3	30.378	139.28	0.000

Regression model using ANOVA.

3.15 Testing of Research Hypothesis

From Table 8, AI has a mean (3.91±0.724/ agree). Also, Table 12 shows a meaningful positive correlation between AI and DM quality since (r=0.85). AI applications interpret about (0.72) of the changes in DM quality. Besides, Table 13 confirms a statistically significant influence of AI applications on DM quality. Therefore, this proves that AI positively impacts DM quality in the

private sector organizations in SA, thus H$_{main}$ is accepted. This result is in line with Kadi & Hida (2020).

On the other hand, Nadikattu (2021) revealed that AI has great importance in the sports industry, where it has a significant effect in ensuring evolves of the sports sector from traditional to modern ways, the sports businesses are growing fast with the awareness created through this technology.

Moreover, Abuzaid (2017) study aimed to identify the role of expert systems in the quality of senior management decisions in the Palestinian Ministry of Health in southern governorates. The results showed that expert systems at the Palestinian Ministry of Health were high, and the quality DM senior management was high. Also, the study results showed that there was a positive relationship between expert systems and the quality of DM in senior management in the Palestinian Ministry of Health.

: "There is an effective relationship between training and development and DM quality in the private sector organizations in SA".

Table 10 shows that training and development has a mean (3.91± 0.836 /agree). Also, Table 12 shows a meaningful positive correlation between training and development and DM quality since (r=0.64), the training and development factor interprets about (0.41) of the changes in DM quality. Table 13 confirms a statistically significant influence of training and development on DM quality. Therefore, H$_1$ is accepted indicating an effective relationship between the use of training and development and DM quality in the private sector organizations in SA. The results straight forward with Alshawabkeh (2017).

From Table 10, appropriateness has a mean (3.82± 0.991/agree). Also, Table 12 shows a meaningful positive correlation between appropriateness and DM quality since (r=0.64), the appropriateness factor interprets about 0.41 of the change in DM quality. Also, Table 13 confirms a statistically significant influence of appropriateness on DM quality. Thus, H$_2$ is accepted proving an effective relationship between appropriateness and DM quality in the private sector organizations in SA. This study's findings are straightforward with Raqeeq (2015).

From Table 10, effectiveness has a mean (3.96± 0.884/ agree). Also, Table 12 shows a meaningful positive correlation between effectiveness and DM quality since (r=0.81), the effectiveness factor interprets about 0.66% of the change in DM quality. Additionally, Table 13 confirms a statistically significant influence on the effectiveness of (DM quality). Therefore, H$_3$ is accepted showing an effective relationship between the effectiveness of using AI and DM quality in the private sector organizations in SA. This agrees with Nayak and Dash (2020).

Therefore, an effective relationship has been assumed between the use of training and development, the appropriateness, and the effectiveness of DM quality in the private sector organizations in SA. According to the findings of the current study, the results indicated that AI applications and effectiveness have the highest impact with 0.72, and 0.77, respectively, on DM

quality, as in the case, both training and development and appropriateness have a moderate impact (0.41) on DM quality, see Figure 1.
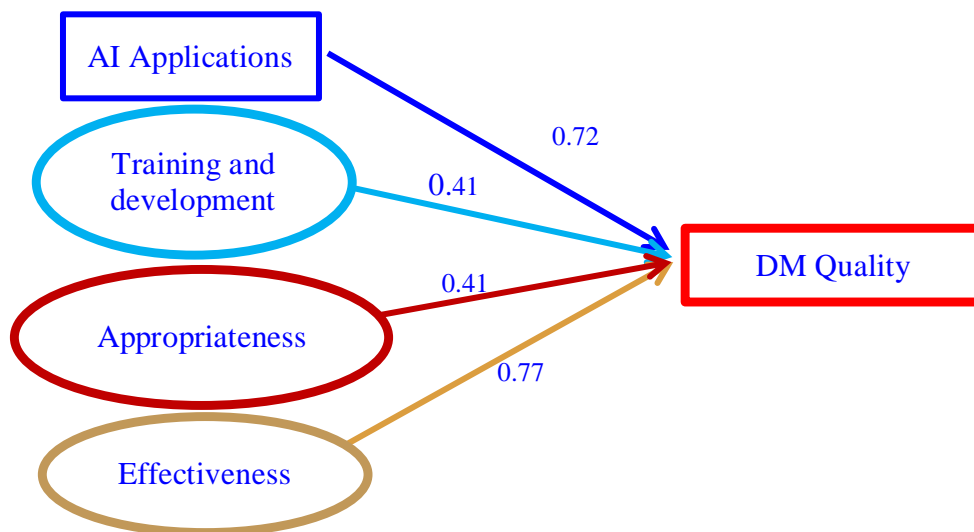

Figure 1: Summary of the relationship between AI applications (training and development, appropriateness, and effectiveness) and DM quality

4 Conclusion

The current study highlights the impact of applying AI on DM quality in the private sector organizations in SA. Data for the present study were collected using a questionnaire distributed to a random sample of 170 employees of private sector organizations in SA that use AI applications. The current study results showed that AI applications have a 0.72 impact on DM quality in the private sector organizations in SA. There is an effective positive relationship between training and development and appropriateness with 0.41 on DM quality. While an effective relationship with an influence of 0.77 between the effectiveness and DM quality in the SA private sector organizations.

Based on the findings of this study, it could be recommended that private sector organizations should continue to apply AI applications in their businesses. Besides, keep abreast of developments, directing the attention of researchers to conduct more studies on this topic by expanding the subject's size to achieve more accurate results. The researcher also recommended establishing partnerships between the SDAIA and a group of international companies to support this aspect in the private and public sector organizations. Moreover, it encourages cooperation between SADIA and organizations in training programs and improves expertise to obtain globally competitive AI applications that effectively support DM in education, health, finance, and social affairs. SADIA should support AI research with experts and financial support to launch specialized research.

This research includes actual data and real examples of private sector organizations in SA that are currently using AI techniques. AI applications have improved the speed of response in DM and improved the quality of the private sector business organizations. In addition, it increased the organization's awareness of the need to move forward and rely on advanced technologies, depart

from the traditional way of making decisions, and resort to everything modern to advance the national economy in general and the private sectors.

5 Availability of Data and Material

Data can be made available by contacting the corresponding author.

6 References

Abuzaid, A. (2017). *The role of expert systems in the quality of decision-making of senior management in the Palestinian Ministry of Health*. Academy of Management and Politics for Graduate Studies. MS.c Thesis.

Alshawabkeh, A. (2017). The role of AI applications as "expert systems" on decision making in Saudi banks in the Taif governorate. *Taif University Journal for Human Sciences*, 4, 15.

Ashehri, R. (2019). Governance of artificial intelligence in KSA (Neom as model). *International Journal of Advanced Studies*, 9(1), 64-81.

Bruun, E. P., & Duka, A. (2018). Artificial intelligence, jobs and the future of work: Racing with the machines. *Basic Income Studies*, 13(2):1-16.

Burney, S.M.A. & Saleem, H., (2008). Inductive & Deductive Research Approach. Lecture delivered on 06-03-2008 at Auditorium of Faculty of Arts and Science, University of Karachi, Karachi, Pakistan.

Burns, N., & Grove, S. (2003). Understanding nursing research. 3rd Ed. Philadelphia, W.B. Saunders Company.

Fast, N. J. & Schroeder, J. (2020). Power and decision making: new directions for research in the age of artificial intelligence. *Current Opinion in Psychology*, 33, 172-176.

Gherheş, V., & Obrad, C. (2018). Technical and humanities students' perspectives on the development and sustainability of artificial intelligence (AI). *Sustainability*, 10(9), 3066.

Giri, A., Chatterjee, S., Paul, P. & Chakraborty, S. (2019). Determining the Impact of Artificial Intelligence on 'Developing Marketing Strategies' in Organized Retail Sector of West Bengal, India. *International Journal of Engineering and Advanced Technology*, 8, 3031-3036.

Grace, K., Salvatier, J., Dafoe, A., Zhang, B., & Evans, O. (2018). When will AI exceed human performance? Evidence from AI experts. *Journal of Artificial Intelligence Research*, 62, 729-754.

Hassan, O. (2020). Artificial intelligence, neom and Saudi Arabia's economic diversification from oil and gas. *The Political Quarterly*, 91(1), 222-227.

Kadi, S. & Hida, S. (2020). *The use of artificial intelligence applications in improving the decision-making process in the Economic Corporation (Adrar Electricity and Gas Production Company)*. MSc Thesis, Université Ahmed Draia.

Matsa, P. and Gullamajji, K. (2019). To study impact of artificial intelligence on human resource management. *International Research Journal of Engineering and Technology*. 6 (08): 1229-1238.

Mugenda, O., & Mugenda, A. (2012). Research methods dictionary. Nairobi: Applied Research and training services.

Nadikattu, R.R. (2020). Implementation of new ways of artificial intelligence in sports. *Journal of Xidian University*. 14(5): 5983-5997.

Nayak, M.M. & Dash S.K. (2020). Role of artificial intelligence in market decision-making: knowledge-based framework. *International Journal of Advanced Research in Engineering and Technology*. 11(11): 1926-1933.

Raqeeq, A. (2015). *The use of artificial intelligence applications in managing the activities of the institution, a case study of a group of economic institutions*. Master's Thesis, Oum El Bouaghi University.

Spetzler, C., Winter, H., & Meyer, J. (2016). *Decision quality: Value creation from better business decisions*. John Wiley & Sons.
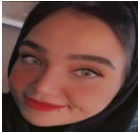
Nermeen Bakheet Aljohani is a lecturer at Al Baha University, Faculty of Business Administration, Department of Business Administration. She holds a Master's degree in Business Administration from the Faculty of Economics & Administration, King Abdulaziz University. Nermeen's areas of research are Decision-Making, Quality, and Applications of Artificial Intelligence.

Dr.Saja Ahmed Albliwi is an Assistant Professor in the field of Lean Six Sigma at King Abdulaziz University, Faculty of Economics & Administration, Department of Business Administration. EFQM assessor. She received a Ph.D. degree from the School of Social Sciences, Heriot-Watt University, UK and a Masters's degree in 2012 from the School of Management and Languages, Heriot-Watt University.