

Achieving Governmental Innovation through Artificial Intelligence Adoption

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Abstract - The study aimed to identify the role of readiness for artificial intelligence (AI) requirements (technical infrastructure, data sets, administrative and organizational readiness, laws and legislations, AI ethics, and societal challenges) in government innovation from the point of view of the employees in Jordanian government agencies. (342) valid questionnaires were collected from employees working at information technology departments of Jordanian government agencies.

After analyzing the data, the study concluded that the level of availability of artificial intelligence in Jordanian government agencies is moderate, and the degree of availability of the sub-dimensions of artificial intelligence was moderate, except for two dimensions data sets and legislation, which came within high level. The availability of government innovation is high. The study also found there is a significant effect of artificial intelligence on government innovation in Jordanian government agencies and explained 62% of the variance in government innovation.

The study recommended the need to pay attention to the development of artificial intelligence requirements because of continuous development in technology and environment, and to make this a continuous process. In addition, government agencies need to cooperate with public and private sector organizations, build partnerships with them for the benefit of both in developing artificial intelligence, and thus government innovation, and making artificial intelligence and government innovation on the ladder of their priorities and strategic plans.

Keywords: Artificial intelligence, Government innovation, Government agencies, Jordan.

IMPACT STATEMENT: Artificial Intelligence (AI) is one of the advanced technologies that has become widely used in the business and public sector organizations. It contributes to achieving innovation, which in turn leads to the excellence of the products and services provided, present creative ideas, increases the efficiency of decision-making, efficiency of internal and external processes, and provides everything that is

distinguished and new. However, recent research has shown its limited use in public sector organizations, and that public sector organizations have not prepared the necessary infrastructure to adopt AI applications and benefit from them appropriately. This paper discusses the most important requirements for adopting AI, measuring its reality in public sector organizations, and the impact of AI applications on innovation in these organizations.

I. INTRODUCTION

In light of the scarcity of resources that have become one of the main determinants of governments and organizations worldwide, the intense competition that characterizes the contemporary global business environment, the need to build renewable national capabilities that go beyond relying on primary sources that are scarce and obsolete, in addition to its increasing environmental impacts and declining values revenue from them, the increase in the volume of government services and the increasing pressures to improve their quality. With the tremendous development in information and communication technology. Not to mention the huge increase in the volume of data and the ability to analyze and benefit from it; it has become necessary to increase attention to the outputs of the technical revolution. The most important of which is artificial intelligence (AI) and its adoption by all sectors, a revolution that prepared the entry to the digital economy that depends on renewable information and knowledge as the basis for it [1], which calls to build and accumulate it as a basic resource that enables survival, growth and continuity, in addition to building the necessary capacities to absorb and deal with it [2].

The term "artificial intelligence" emerged because of the development in the computer industry in the mid-twentieth century, where scientists discovered that computers could perform tasks that are more complex. Scientists began exploring a new approach to build intelligent machines based on recent discoveries in neuroscience, building new information mathematical theories, the development of cybernetics, and the invention of the digital computer, which led to the invention of a machine that could simulate the

computational thinking process in humans [3]. AI achieved major successes in the 1980s, 1990s, and early 2000s [4]. The focus of scientists and researchers on this field has increased to form a revolution in the world of technology used in different areas of life, and this success is due to several factors, as: the great power of computers and softwares, and the creation of new relationships between the field of AI and other fields. The rapid technological developments in AI and the potential value associated with it have gained increasing importance in the governmental context. Many developed countries in this field, led by China and the United States, have recognized the value of AI for the public sector and its role in achieving its competitiveness in the global economy [5]. Studies indicate that AI is expected to add approximately (15) trillion dollars to the global economy by 2030 [6], the largest proportion of this revenue goes to the North developed countries, while the countries of the South, including the Arab countries, stand at the back end in terms of benefiting from the developments of the Fourth Industrial Revolution, the most important of which is AI. The same studies that developed an indicator to measure the readiness of governments to benefit from AI applications indicated that the Hashemite Kingdom of Jordan ranks (79) out of (172) countries within this measure in the year (2020) [7], which is a Modest number compared to the human capabilities and competencies owned by the Kingdom.

So in Jordan, whose resources are scarce, with the availability of qualified human resources capable of bringing about transformation based on the outcomes of the industrial revolution [8]; AI plays a major role in achieving this. Through its contribution to the provision of various innovations that generate knowledge that has become the backbone of the global economy during this era, and through its added value that contributes in building knowledge capital, which contributes to the development and improvement of the quality of products and services provided. The government sector is not isolated from this, as many countries have begun to integrate AI into their works [9], this requires providing the necessary requirements for its success and maximizing benefit from it, which has not yet been adequately studied. Therefore, the current study seeks to find out the availability of these requirements and their impact on innovation in the Jordanian government agencies.

II. IMPORTANCE OF THE STUDY

Theoretically, the importance of this research comes from the lack of studies related to AI in the public sector at the world level and their scarcity in Arab countries, and the lack of a comprehensive view of the applications based on AI and the challenges they face in the public sector AI [10]. This requires conducting studies that clarify the concept of AI in

the public sector and the concepts related to it, in addition to know the most important challenges facing its application in the public sector. So, this research comes as a modest contribution to bridge this gap in the studies about AI application in public sector [9][11].

In practical terms, the importance of the study stems from studying the readiness of the Jordanian public sectors to adopt AI applications, and the role they play in innovation in the public sector, which constitutes a guide for those who build up and follow up plans and policies for AI in government agencies. To benefit from the applications of AI and creating the necessary requirements for it legislatively, technically and organizationally. As a number of researchers indicated that supporting e-government tools with AI technology increases efficiency and improves innovation and provision of government services [12].

III. PROBLEM OF THE STUDY

The commitment of governments to AI is represented by issuing national AI strategies and policies that define their strategic vision and approach towards AI, including AI-related priorities, goals and a roadmap for achieving them. These strategies can help governments build foundation for the successful adoption of AI, as well as align the capabilities, standards, and structures of relevant AI actors. Many countries around the world have adopted a national strategy for AI, such as Britain, Canada and Sweden, and issued special strategies for it [13]. Many Arab countries also, such as Saudi Arabia and the United Arab Emirates, have followed suit in adopting policies and initiatives to adopt AI in government agencies. Like other countries interested in AI, Jordan has adopted great ambitions and policies aimed for transforming the Kingdom into a digital economy, believing in its importance in strengthening national capabilities and achieving the desired goals, taking advantage of the great developments made by the Fourth Industrial Revolution, the most important of which is AI, to occupy its role in government innovation, which its impact extends to all sectors. But studying the readiness of government sectors to adopt AI applications and the effects and benefits of its application in the public sector; especially the study of its effect on innovation has not been done sufficiently so far. Therefore, the problem of this study is to answer the following main question: **What is the role of AI in achieving innovation in Jordanian government agencies?**

IV. THEORETICAL FRAMEWORK

Artificial intelligence is a multidisciplinary field that has recently gained special importance in society, economy, and the public sector, opening up new opportunities for the public and private sectors [14]. Studies confirm that the speed of development of automation and AI will fundamentally affect

how to perform business during coming Years [13]. Studies also indicate that AI will lead to significant changes and benefits in the government sector in terms of virtual workforce, intelligent automation of tasks, and capital increase, as AI will complement the skills of the existing government workforce, lead to cost reduction and increased efficiency of operations [15].

AI also offers unprecedented opportunities to eradicate poverty and halt environmental degradation. AI is rapidly transforming many aspects of the daily lives of individuals and societies. The public sector is not isolated from this and is in fact responsible for setting national priorities, investments, and legislations related to AI. There are also many factors that motivate public sector institutions to adopt AI, including the desire to improve productivity, efficiency, improve the quality of services provided, and to increase the competitiveness of the public sector in global indicators. In addition to rapid growth of data, as the volume of global data is expected to reach 163 zettabytes by 2025, after reaching 16 zettabytes in 2016 [16], there is a growing need to understand and analyze these data to achieve strategic results or to make decisions in real time, and this is facilitated by AI. AI experts stress that discussions about the effects of AI in society should not be limited to professionals, and that every government, organization, academic institution, civil society organization and every one of us should consider how AI affects our present and future [17].

Therefore, it seems clear that the way public institutions provide services is evolving. In many cases, customers do not realize that they are interacting with AI systems, but the technology will greatly raise customers' expectations. Across the Middle East and Africa, AI has already fundamentally changed the way banks, telecoms companies, and government entities serve customers [13]. So if organizations are determined to achieve their digital transformation goals and remain relevant in a changing digital economy, they must take a proactive approach in identifying AI use cases that are most beneficial to them.

Artificial intelligence is defined as the ability to interact, learn, adopt and use information accumulated from previous experiences, and the ability to deal with cases of uncertainty in a way that simulates human capabilities ([18]. Many researchers also provided several definitions of AI, most of which indicated that AI represents the ability of the machine to simulate the human mind and the way it works, such as its ability to think, discover and benefit from previous experiences. Which is the general field that covers everything related to making machines "intelligence", for by using algorithms that can detect patterns and generate ideas from the data that is presented to them for apply them in decision-

making processes and future predictions. That avoids the need to program the steps in a custom way for each possible action on its own [19] [20] [21] [22] [9].

A) Requirements for the Adoption of AI in Public Sector

The World Economic Forum [23] indicated that the adoption of AI in public sector organizations is less and slower than in private sector organizations, due to the size of the impact that applications of AI can have on the public sector. There are many opportunities to apply and implement AI technology in the public sector. There are also many requirements for the application, implementation and use of AI applications in the public sector, many researchers pointed to this, such as [9] [14] [11] [24]. The most important of these requirements are:

1. Implementation of AI technology & data sets [22].
2. Laws and legislation related to AI. They refer to the general governance of AI, and they relate to the overall ability to manage and control AI technology and its social and economic impacts [25].
3. The ethics of AI, including considerations of whether the development and use of applications of AI and its consequences are morally justified [26].
4. Societal challenges: refers to the social challenges associated with transformation of social life and daily human interactions resulting from AI [27].
5. Organizational & administrative readiness: It represents the availability of the appropriate organizational structure, supportive organizational culture, and the readiness and training of workers & senior management to adopt solutions based on AI.

B) Artificial Intelligence Applications

By reviewing the literature and studies, it was found that many public sector organizations apply AI in their work, but they have not reached the level of efficiency that is applied in the private sector. However, it is not difficult to transfer the experiences, knowledge and expertise of the private sector to the public sector in a way that enables the improvement of services provided by the public sector to citizens [28] [29][30] [31]. Among the most important applications of AI in the public sector are:

1. AI-Based Knowledge Management Software.
2. Virtual Agents: Programs that can perform tasks for people.
3. Identity Analytics.
4. Machine learning: Machine learning is the process of creating a statistical model from different types of data.
5. Neural networks: a fact that represents AI systems that rely on simulating connected "neural units", through

loose modeling that simulates the way neurons interact in the brain [31].

6. Expert Systems Applications & Robots.

C) Uses of Artificial Intelligence in the Public Sector

There are many uses and examples of AI applications in government organizations including [32] [33] [34]:

1. Allocating resources.
2. Dealing with big data with the possibility of merging multiple data sets to provide a broader perspective on it.
3. Doing repetitive tasks where the inputs or outputs are specific and repetitive.
4. Improving public services.
5. Contribute in achieving public sector objectives.
6. Improving the process of communication and interaction between individuals and public organizations.
7. Supporting government intelligence, investigation, defense, and national security.

Researchers pointed out that the real value of AI lies not in the applications and smart models themselves, but rather in the ability of public sector organizations to harness and exploit them optimally [31]. To enable the successful use of AI in the public sector, leaders must promote governance and policies that encourage building a skilled workforce that collaborates with academia, private sector, risk management frameworks, and new technologies [35] [36].

D) Innovation

The concept of creativity began at the end of the thirties of the last century, the first contributor to this field was the American economist Schumpeter, where he defined Innovation from an economic perspective as “a transformation made by jumping from the old to the new” [37]. Moreover, Peter Druker defined it, as a continuous replacement of the old by the new, by presenting new thing, or presenting it in a better way [38]. Al-Amyan, [39] believes that innovation is the first implementing of new processes, products, and services and early use of an idea [40].

Because of its many advantages, studies agreed about the importance of innovation to organizations. Organizations are found to provide goods and services to consumers according to their changing and renewable needs and desires over time, and to create value in the product for them [41]. It can be said that the best organizations are the ones that have the ability to innovate according to the prevailing foundations in the environment in which it operates. And the best managers are those who have the ability to help members of the organization to fully use their creative talents, by providing technologies, information and knowledge necessary for

innovation, and innovation has become today one of the multiple criteria that are adopted to measure and evaluate organization performance, and its ability to achieve efficiency and effectiveness through it. Dvir & Pasher indicated that the organization must be creative and be an initiative for creativity before circumstances force it to do so as a reaction [42]. Malkawi & Mohailan [43] Daft [44] Dreger [45] Suliman [46] Mckie [47] indicate that creation takes place on several levels: creativity at the individual level, at the group level, and at the organization level.

The great developments and changes brought about by the Fourth Industrial Revolution led to redefining the relationship between the state and the citizen [48] [49] and adopting a mentality of innovation and creativity based on AI helps provide creative solutions needed by both government agencies and citizens. In a way that contributes in achieving the efficiency and effectiveness of public sector institutions, regardless of whether they work in the field of health care, education, central or local government. The potential for innovation in the public sector is great; however, the challenges faced by governments are also great. Solving new and complex challenges and responding to the future citizen requires new ways of doing things that bring together advanced knowledge, capabilities, people and technologies to help public sector organizations innovate, AI contributes significantly to this. A UK Digital Efficiency Report [50] indicated that the average cost of central government digital transactions is about 20 times lower than the cost of a telephone and 50 times that of face-to-face interactions. The report also indicated that more than 67% of European citizens said that it is necessary for governments to provide more services through digital channels in the future, this confirms the importance of AI in supporting creativity and entrepreneurship in the public sector [48] [51]. Several studies [52] [53] [54] [55] have identified five main areas -adopted in this study- in which AI contributes in public sector innovation (Improving the ability to present creative ideas, Improving the effectiveness and efficiency of internal processes, Improving the effectiveness and efficiency of external processes, Improving the decision-making process, Improving the quality of services provided).

V. PREVIOUS STUDIES

Suhaymat, [56] study found that there is an impact of AI on the quality of administrative decision in Jordanian government agencies, and recommended the need to take policies and procedures that increase the level of workers' awareness of the importance of AI. Also Al-Baqmi and Al-Bishtawi [57] study concluded the importance of applying expert systems in commercial banks for their role in maintaining the banks' assets and files that contain

information and data about the bank’s work, and reducing the risks related to service delivering procedures. In a study conducted by Mittal [58] during the years 2016-2018 on (3000) managers around the world, it was found that AI improves 44% of the quality of services and products, 42% of the efficiency of external processes, improves the decision-making process by 35%, 31% of the efficiency of internal processes, and 31% of the innovation process. Tambe study [59] showed that there is a large gap between ambition and the reality of AI in human resource management. [9] Study also showed the presence of four challenges to AI represented in infrastructure, data management, societal challenges, and laws and legislation. [3] Study showed that overcoming the impact of AI and automation on the labor market requires keeping pace with technological development in order to enable individuals to work alongside technology or adapt them to other jobs. Moreover, Malkawi [60] study found that decision support systems in the Jordan University Hospital are available at high level, and business intelligence came at a medium, and indicated that there is an impact of decision support systems and business intelligence on the decision-making process.

VI. METHODOLOGY

A) Study Objectives

1. Identifying the level of AI requirements readiness in Jordanian government agencies.
2. Measuring the level of innovation in the Jordanian government agencies.
3. Measuring the impact of AI on innovation in Jordanian government agencies.

B) Study Variable

Figure (1) shows the variables and model of the study



Figure 1: Study Model

C) Study Hypotheses

The main hypothesis: There is a statistically significant effect at the significance level ($\alpha \geq 0.05$) of AI on innovation in the Jordanian government agencies, which is divided into:

1. There is a statistically significant effect at ($0.05 \geq \alpha$) of AI technical infrastructure readiness on innovation in the Jordanian government agencies.
2. There is a statistically significant effect at ($0.05 \geq \alpha$) of data sets readiness on innovation in the Jordanian government agencies.
3. There is a statistically significant effect at ($0.05 \geq \alpha$) of AI organizational and administrative environment readiness on innovation in the Jordanian government agencies.
4. There is a statistically significant effect at ($0.05 \geq \alpha$) of laws and legislations related to AI on innovation in the Jordanian government agencies.
5. There is a statistically significant effect at ($0.05 \geq \alpha$) of the AI prevailing ethics in the Jordanian government agencies on innovation.
6. There is a statistically significant effect at ($0.05 \geq \alpha$) of the societal challenges associated with AI on innovation in the Jordanian government agencies.

D) Study Population and Sample

The study population consists of all employees working at information technology departments at the Jordanian government agencies. A simple random sample of (384) was selected according to the Krejcie & Morgan equation for simple random samples, the questionnaires were distributed electronically to the sample through coordination with the agencies they work with, (342) valid questionnaires were recovered, with a response rate of (89%).

Determining the study variables and questionnaire items were based on a number of studies, AI readiness was determined based on: [9] [12] [61] [62]. [32] [49] [33] [63] [64] and others, innovation variables are based on [54] study. To test the phase validity of the study tool, the questionnaire was presented to (16) experts specialized in information technology, public administration and business administration from university professors, and the five-level Likert scale was adopted to measure the availability of questionnaire's items. To test the stability of the tool, the questionnaire was distributed to a pilot sample consisting of (24) individuals to extract the Cronbach-alpha coefficient for study variables, Table (1) shows that the all values higher than the agreed minimum for reliability (0.70).

Table 1: Cronbach-Alpha

Variable	Items	α
AI	39	0.872
Innovation	5	0.814
Total	44	0.806

VII. RESULTS

Demographic characteristics of the study sample: Table (2) shows this.

Table 2: Demographic Characteristics (N = 342)

variables	Categories	Frequency	%
gender	Male	211	62%
	female	131	38%
total		342	100%
age	Less than 30 years	81	24%
	30- 40	166	49%
	More than 40	95	27%
total		342	100%
Educational level	bachelor	263	77%
	High studies	79	23%
total		342	100%
experience	Less than 5 years	98	29%
	5-10	106	31
	More than 10	138	40%
total		342	100%

A) Study Variables Availability

To judge the degree of availability of the study variables, the following arithmetic mean weights were adopted: (less than 2.34) low, (2.34-less than 3.67) medium, (3.67 -5.00) high availability. Table (3) shows this.

Table 3: Arithmetic means and standard deviations

Variables		Mean	Standard div.
Artificial Intelligence	Technical infrastructure	3.63	0.662
	Data sets	3.95	0.631
	Administrative and organizational environment	3.60	0.671
	Laws and legislations	3.79	0.745
	AI Ethics (Cultural)	3.38	0.635
	Societal challenges	3.45	0.536
AI Total		3.623	0.811
Innovation		4.13	0.642

Table (4) shows that AI is available in a moderate level in Jordanian government agencies with arithmetic mean (3.623). Sub dimensions of AI (technical infrastructure, administrative and regulatory environment, prevailing AI ethics, and societal challenges) also in a moderate level, while (data sets, AI laws and legislation) in a high level. This means that the interest in AI requirements and maximizing their benefit is still below the required level, this may be due to lack of funding and a lack of awareness of the economic value resulting from AI and its role in improving the quality of services. In addition to the bureaucracy in the government agencies, which may does not want to integrate AI into their businesses for various reasons. This is consistent with many studies [9] [12]. Moreover, the role that AI plays in innovation from the point of view of the study sample in the same table is available in a high degree, with arithmetic mean (4.13), and convergent standard

deviation that indicates the agreement of the study sample on that. This corresponds with many studies such as [54].

B) Hypothesis Testing

To test hypotheses of the study, the normal distribution of the data was tested. The results of the Kolmogorov-Smirnov test analysis showed that all study data are subject to normal distribution, where the significance more than 5%; Table (4).

Table 4: Kolmogorov-Smirnov

Variable	Kolmogorov-Smirnov	Degrees of freedom	Sig.
AI	0.067	341	0.16
Innovation	0.083	341	0.18

Moreover, to test the suitability of the study data (model) for linear regression analysis; a multicollinearity analysis was performed for the study variables. Table (5) shows this, as the values of (VIF Variance Inflation Factor) for all study variables were less than (5). And this is considered an indication of the absence of a linear relationship between the independent variables, as indicated by many studies in this field that confirmed, the problem of double collinearity appears when the inflation factor values exceed (5) (If $VIF \geq 10$). Table (5) indicates that the highest value for (VIF) is (3.882) for the variable (administrative and organizational readiness), so we say that the data is free from the problem of high multicollinearity.

Table 5: Multicollinearity

Model	Coefficients ^a						Collinearity Statistics	
	Coefficients zed	Unstandardi Std.	Coefficients Beta	t	Sig.	Tolerance	VIF	
								B
Constant	2.546	0.261		7.26	0.000			
Technical infrastructure	0.066	0.072	0.067	0.780	0.000	0.484	2.167	
Data sets	0.012	0.063	-0.063	0.672	0.001	0.278	3.502	
Administrative and organizational readiness	-0.057	0.069	0.064	0.770	0.000	0.258	3.882	
Laws and legislations	0.388	0.065	0.054	0.870	0.000	0.384	2.704	
prevailing AI ethics	-0.141	0.0571	0.075	0.940	0.000	0.687	1.486	
Societal Challenges		0.218	-0.682	5.140	0.170	0.342	2.735	

a. Dependent Variable: Innovation

To test the main hypothesis and minor-hypotheses of the study, a multiple linear regression model was used to find out the effect of each dimension of AI requirements and the overall effect of AI on innovation, Table (6) shows this.

Table 6: Results of multiple linear regression between AI requirements and innovation

Variables	Innovation								
	model parameters	standard error	T test		R	R ²	F		Sig.
			calculated	Sig.			calculated	Sig.	
Multiple regression constant	α	1.414	0.261	7.26	0.00				
technical infrastructure	β	0.067	0.072	0.780	0.00			43.2	0.001
Data sets	β	-0.063	0.063	0.672	0.01				
Administrative readiness	β	0.064	0.069	0.770	0.00	0.79	0.62		
laws	β	0.054	0.065	0.870	0.00				
AI ethics	β	0.075	0.057	0.940	0.00				
societal	β	-0.068	0.021	5.140	0.00				

**Significance (0.01)

By taking the absolute value of (β) and considering the other values, the results of table (6) show:

1. There is a statistically significant effect of AI technical infrastructure in the Jordanian government agencies on innovation, where the values of (β , T) are (0.067, 0.780), respectively, and significant at ($\alpha \leq 0.01$), this means that the first sub-hypothesis is accepted. And confirms the importance of technical infrastructure as a basic variable that affects the readiness and excellence of AI, and its ability to influence innovation, and calls for the need to pay attention to it, this is consistent with [60] [58] Studies.
2. There is a significant effect of data sets in Jordanian government agencies on innovation, where the values of (β , T) are (0.063, 0.672) respectively, and significant at ($\alpha \leq 0.01$). This means that the second sub-hypothesis is accepted, and reflects the importance and quality of data as a prerequisite for AI and its role in achieving innovation; this contradicts [3] Study.

3. There is a significant effect of AI administrative and organizational readiness in the Jordanian government agencies in innovation, where the values of (β , T) reached (0.064, 0.770), respectively, and at ($\alpha \leq 0.01$). This means that the third sub-hypothesis is accepted. Where administrative and organizational environment is the incubator for AI and able to enhance its role in achieving innovation if it is properly prepared.
4. There is a significant effect of the AI laws and legislations in Jordanian government agencies in innovation, where the value of (β , T) is (0.054, 0.870), respectively, and significant at ($\alpha \leq 0.01$). This means that the fourth sub-hypothesis is accepted, explained by the interest of government in preparing laws, legislation and regulations for the adoption of AI in government agencies, in recognition of the role that this variable plays in reinforcing AI and governed its use.
5. There is a significant effect of AI ethics in Jordanian government agencies in innovation, where the value of (β , T) reached (0.075, 0.940), respectively, and significant at ($\alpha \leq 0.01$). Which means that the fifth sub-hypothesis is accepted.
6. There is no effect for the societal challenges facing Jordanian government agencies when adopting AI in innovation, where the value of (β , T) reached (0.682, 5.140), respectively, and not significant at ($\alpha \leq 0.01$). This means that the sixth sub-hypothesis is rejected.
7. By looking at AI dimensions, we found that five out of six dimensions of AI (technical infrastructure, data aggregates, administrative and organizational readiness, laws and legislation, AI ethics) affect innovation. Moreover, there is no effect of (community challenges) dimension in innovation. Thus, the total of AI dimensions become composed of five dimensions that have been proven to have an effect. By taking the total impact of these five dimensions combined, it is clear from the same table that there is a total effect of it on innovation at ($\alpha \leq 0.01$). Where it ($R=0.79$) ($R^2=0.62$), and significant at ($\alpha \leq 0.01$), which means that it explains 62% of variance in innovation, and the calculated ($F = 43.2$) significant at ($P = 0.001$).

VIII. DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

This study measured the level of availability of AI requirements, and tested the role of AI requirements in innovation in Jordanian government agencies from the point of view of the first-class employees in those agencies, and the applied study proved that, as it has concluded that:

1. AI is available in a moderate level at Jordanian government agencies with an arithmetic mean (3.62).

The dimensions of AI requirements (technical infrastructure, administrative and organizational readiness, AI ethics, and societal challenges) also came to a moderate level, while dimensions (data sets, laws and legislation) came in high level. This is consistent with many studies such as [9] [64] [60]. This result may be explained by the insufficient financial capabilities allocated to AI, and the lack of plans to integrate AI into the work of government agencies, which directly affects the readiness of AI. Not to mention the slow pace of keeping pace with legislation and policy formulation related to AI, where no comprehensive strategy for AI was developed in Jordan until the end of the year [66], and no enough time has passed yet to feel its positive effects.

2. Innovation came with a high level of availability and an arithmetic mean (4.13), explained by the availability of educated, trained and qualified human competencies, and the accumulated experiences over the years in these agencies. In addition to the fact that the attention in innovation precedes the introduction of intelligence applications. All this made innovation in the high level that still needs more, as innovation is obsolete in its nature and needs continuity and keeping pace with developments. AI applications help in this, which was confirmed by many studies such as [64] [67] [39] [49] [48] [56].
3. The results of the sub-hypothesis test showed that five out of six dimensions of AI (technical infrastructure, data aggregates, administrative and organizational readiness, laws and legislation, AI ethics) affect innovation in Jordanian government agencies, and there is no effect of the dimension (societal challenges). The effect value of these five dimensions combined was significant and explained (62%) of innovation. This confirms the role that AI plays in innovation in government agencies. which means that attention to the AI and innovation variables is necessary to bring them to competitive levels, as the fourth industrial revolution technologies particularly AI will determine the ability of any organization on innovation and transformation towards the requirements of the twenty-first century. This is what is supported by the results of this study and consistent with many studies such as [58].
4. The results of the research proved that the availability of AI requirements is one of the important indicators that Jordanian government agencies should pay more attention to, as AI has a significant effect on innovation. The results of this study directly support that, it is also supported by many theoretical indicators and applied studies, such as [9] [12] [62] [32] [49] [33] [64] [65] [54] [67] [68][69][70]. Which is considered a modest

contribution of this research, especially in light of the limited studies in public sector, especially Jordanian.

Therefore, the study recommends:

- Enhancing the requirements of AI and constantly raising their level, whether technical, organizational or legislative requirements, because this is a renewable subject whose requirements are continuously changing and evolving. In addition, the level of availability obtained by AI with its dimensions in the Jordanian government agencies came within the medium level.
- Continuous supporting of innovation with AI to maintain its high level in these agencies and make this a sustainable and continuous process, by enhancing the level of availability of AI requirements and directing them towards innovation. As the nature of innovation is obsolete and needs to be a continuous and renewable process, which is indicated by many theories such as [44] [45].
- Building real partnerships between public organizations and private sector, which contribute to the benefit of both parties and what is reflected in the development of AI and thus innovation, and placing AI and innovation on the top of their strategic priorities. In addition to integrating government agencies together and benefiting from the capabilities available to each of them in this field and with what is available in the private sector.
- Increasing support for research and development in AI techniques, by attracting expertise and encouraging researchers and various research centers in the Kingdom and universities to research in the field of AI and its various applications and providing financial support for that.

IX. LIMITATION AND FUTURE RESEARCH

1. The newness of using AI at Government agencies.
2. No enough data about using AI its consequences.
3. No enough cooperation from Government agencies for collecting the data.
4. No previous studies about using AI in this sector.

In the context of future research related to AI in public sector institutions, the researchers point out that the analysis of the environment indicates the assumption that the use of AI applications will increase in public sector institutions. Public administration will shift to more digital transformation and E-government. Therefore, the researchers recommend conducting more research and studies on government agencies depending on our research variables or others, and for other institutions such in public and private sector, to be a source for national plans aimed at adapting to the requirements of the 21st century.

CONFLICT OF INTEREST

No financial, professional, personal interest or benefits from the direct applications of our research.

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