

Harnessing Technology and Artificial Intelligence:

Policy Paper

An Opportunity for Jordan to Boost Productivity

March 2024





منتدى الاستراتيجيات الأردني JORDAN STRATEGY FORUM

The Jordan Strategy Forum (JSF) is a not-for-profit organization, which represents a group of Jordanian private sector companies that are active in corporate and social responsibility (CSR) and in promoting Jordan's economic growth. JSF's members are active private sector institutions, who demonstrate a genuine will to be part of a dialogue on economic and social issues that concern Jordanian citizens. The Jordan Strategy Forum promotes a strong Jordanian private sector that is profitable, employs Jordanians, pays taxes and supports comprehensive economic growth in Jordan.

The JSF also offers a rare opportunity and space for the private sector to have evidence-based debate with the public sector and decision-makers with the aim to increase awareness, strengthening the future of the Jordanian economy and applying best practices.

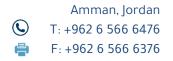
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in Jordan Strategy Forum



Policy Papers: A policy paper is a research piece which focuses on a specific issue or problem and provides clear recommendations for policy makers.

To evaluate the study



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Introduction:

The Economic Modernization Vision, which was launched by His Majesty King Abdullah II in June 2022, will be implemented through eight economic growth drivers including "Future Services". This driver is comprised of six sectors including "ICT Services / Digital Economy".

Within the context of the launch of the Modernization Vision, and in view of the increasing importance of the concept of artificial intelligence and its tools in global economies, the Jordan Strategy Forum (JSF) has decided to publish this paper to raise awareness of the concepts related to artificial intelligence and digital transformation, and to assess Jordan's position on the world map, in terms of adopting artificial intelligence concepts and tools. Naturally, the objective of this effort is to come up with some recommendations whose objective is to enhance productivity at the macro and micro levels of the Jordanian economy.

To achieve the objectives of the paper, the JSF examines a Staff Discussion Note **(Gen-AI: Artificial Intelligence and the Future of Work)** which was published by the International Monetary Fund (IMF) on the 14th of January 2024. In this Note, the IMF examines the potential impact of AI on the global labor market.

In addition, the JSF analyzes the **"Government AI Readiness Index 2023"** which was published by Oxford Insights¹ on the 6th of December 2023. The objective of this effort is to assess Jordan's readiness to deal with artificial intelligence, compared to the 193 countries which are included in the Index.

The objectives of the Policy Paper are threefold:

- **1.** To outline a few definitional issues related to Artificial Intelligence in general.
- **2.** To outline the main findings of the IMF's paper which examines the potential impact of AI on the global labor market.
- **3.** To outline the framework of the "Government AI Readiness Index 2023", and outline where Jordan ranks in this Index.
- **4.** To propose some recommendations whose objective is to enhance Jordan's productivity.

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¹ Oxford Insights: A consulting firm that advises organisations and governments on strategic, cultural and leadership opportunities arising from digital transformation.

Disclaimer: Within the framework of this paper's theme, the JSF used several artificial intelligence tools while preparing it. These include research, translation, design, and international comparisons. Indeed, while these tools are able to support the process of reviewing the literature and save time and effort, they also enhance the productivity and efficiency of the output. Within this context, it must be stated that the use of Al tools requires researchers to assume their scientific, literary, and ethical responsibilities about the content, sources of information and references used in the research. They are also required to scrutinize the information to ensure validity, accuracy, and attribution to their main sources. This does not replace in any way the in-depth analysis considering the specificities of the required research.

1. Artificial Intelligence: Main Concepts

A simple definition of artificial intelligence (AI) is a "field, which combines computer science and robust datasets, to enable problem-solving" (IBM). Similarly, AI is a "branch of computer science that focuses on the creation of intelligent machines that can think and learn like humans" (Eaton Business School).

Relative to the above-mentioned definitions, it is interesting to note that they contain two related concepts, and these are "Digital Transformation" and "Artificial Intelligence".

1. Digital transformation "refers to the process of leveraging technology to transform and improve the way organizations operate. This involves implementing new technologies, processes, and business models to increase efficiency, productivity, and customer satisfaction"².

2. Artificial intelligence "is a subset of digital transformation that involves the use of intelligent machines that can learn, reason, and perform tasks that typically require human intelligence. Al technologies include machine learning, natural language processing, and robotics"³.

Based on these two definitions, AI is an important component of digital transformation. AI can automate repetitive tasks, analyze huge amounts of data, and provide insights that can lead to informed decisions. For example, the use of AI Chatbots enables machines to answer frequently asked questions, take and track orders, and even direct calls.

² Digital Transformation & Artificial Intelligence (AI), Rajoo Jha, 2023

³ Digital Transformation & Artificial Intelligence (AI), Rajoo Jha, 2023

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It has become too obvious that Artificial Intelligence has turned into a rapidly advancing technology which has huge potential to revolutionize almost all existing industries. Al is widely used in healthcare, finance, education, manufacturing, transportation, and many more. Al helps improve business performance and productivity by automating processes or tasks that used to be done manually. Robotic assistants, self-driving cars, auto correction or text editors, surgical robots are some of the many examples of Al.

Al is divided into two major categories: Capabilities (Type 1) and Functionalities (Type 2).

As far as Artificial Intelligence based on capabilities is concerned, there are 3 types: Narrow AI, General AI, and Super / Strong AI.

Types of Capability-Based Al:



1. Narrow or Weak Al: "Can perform a single or narrow task faster and better than a human mind can. However, it cannot perform outside of its defined task" (IBM). Some examples include digital voice assistants such as Siri and Alexa, google and other search engines, and chatbots

2. General Al: "Artificial General Intelligence (AGI), also known as Strong Al, is today nothing more than a theoretical concept. AGI can use previous learnings and skills to accomplish new tasks in a different context without the need for human beings to train the underlying models. This ability allows AGI to learn and perform any intellectual task that a human being can

3. Super Al: Like AGI, super Al is theoretical. "If ever realized, Super Al would think, reason, learn, make judgements and possess cognitive abilities that surpass those of human beings" (IBM).

Source: IBM 2024, the Jordan Strategy Forum team translated this format using the Copilot AI tool, with further scrutiny and refinement from the Forum team.

As far as Artificial Intelligence based on functionalities is concerned, there are 4 types: Reactive Machines, Limited Memory, Theory of Mind, and Self-Awareness.

Types of Functional-Based Al:

1. Reactive Machines:	2. Limited Memory: "This	
Reactive machines are AI	form can recall past events	
systems with no memory	and outcomes and monitor	
and are designed to	specific objects or	
perform a very specific	situations over time.	
task. "Reactive AI stems	Limited Memory AI can use	
from statistical math and	past- and present-moment	
can analyze vast amounts	data to decide on a course	
of data to produce a	of action most likely to help	
seemingly intelligence	achieve a desired	
output" (IBM). Some	outcome". Some examples	
examples include IBM's	such as ChatGPT, virtual	
chess-playing	assistants and chatbots	
supercomputer AI and	such as Siri, Alexa, and	
Netflix Recommendation	Google Assistant, and Self-	
Engine.	driving cars.	

3. Theory of Mind: While unrealized form of Al today, "Al with Theory of Mind functionality would understand the thoughts and emotions of other entities. This understanding can affect how the Al interacts with those around them" (IBM).

4. Self-Awareness: Like theory of mind Al. Self-Aware Al is theoretical. "If ever achieved, it would have the ability to understand its own internal conditions and traits along with human emotions and thoughts. It would also have its own set of emotions, needs and beliefs" (IBM).



Source: IBM 2024, the Jordan Strategy Forum team translated this format using the Copilot Al tool, with further scrutiny and refinement from the Forum team



2. The Impact of Artificial Intelligence on the Global Labor Market

Based on the IMF's 2024 Note (Gen-AI: Artificial Intelligence and the Future of Work) which examines the potential impact of AI on the global labor market, we outline a few conclusions.

1. "Almost 40 percent of global employment is exposed to Al".

2. "In advanced economies, about 60 percent of jobs may be impacted by AI. Roughly half the exposed jobs may benefit from AI integration, enhancing productivity. For the other half, AI applications may execute key tasks currently performed by humans, which could lower labor demand, leading to lower wages and reduced hiring. In the most extreme cases, some of these jobs may disappear".

3. "In emerging markets and low-income countries, by contrast, AI exposure is expected to be 40 percent and 26 percent, respectively. These findings suggest emerging markets and developing economies face fewer immediate disruptions from AI. At the same time, many of these countries don't have the infrastructure or skilled workforces to harness the benefits of AI, raising the risk that over time the technology could worsen inequality among nations".

4. "Al could also affect income and wealth inequality within countries. We may see polarization within income brackets, with workers who can harness Al seeing an increase in their productivity and wages—and those who cannot falling behind. Research shows that Al can help less experienced workers enhance their productivity more quickly. Younger workers may find it easier to exploit opportunities, while older workers could struggle to adapt".

5. The effect on labor income will largely depend on the extent to which Al will complement high-income workers. If Al significantly complements higher-income workers, it may lead to a disproportionate increase in their labor income. Moreover, gains in productivity from firms that adopt Al will likely boost capital returns, which may also favor high earners. Both phenomena could exacerbate inequality.

6. In most scenarios, AI will likely worsen overall inequality, a troubling trend that policymakers must proactively address to prevent the technology from further stoking social tensions. It is crucial for countries to establish comprehensive social safety nets and offer retraining programs for vulnerable workers. In doing so, we can make the AI transition more inclusive, protecting livelihoods and curbing inequality.

7. "College-educated workers are better prepared to move from jobs at risk of displacement to high complementarity jobs; older workers may be more vulnerable to the Al-driven transformation".

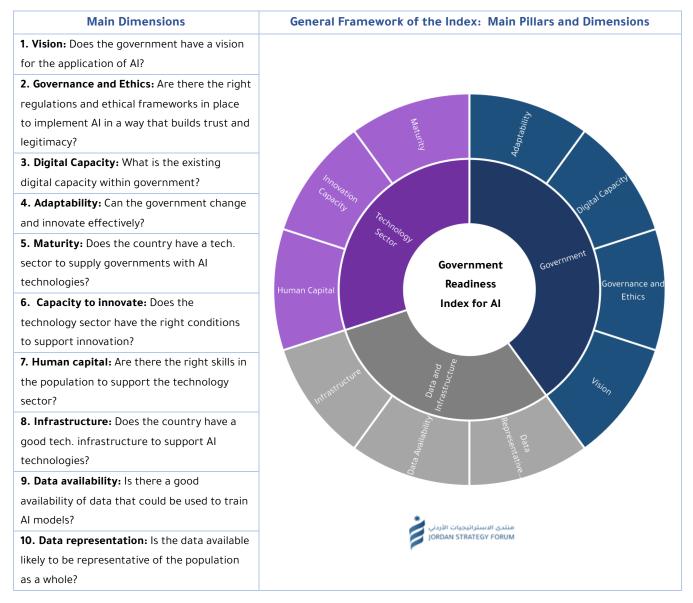
8. "In most countries, women tend to be employed in high-exposure occupations more than men. Because this share is distributed approximately equally between low- and high-complementarity jobs, the result can be interpreted to mean that women face both greater risks and greater opportunities".



9. "Advanced and more developed emerging market economies should invest in Al innovation and integration... For less prepared emerging markets and developing economies, foundational infrastructural development and building a digitally skilled labor force are paramount".

3. Government Al Readiness Index: The Framework & Results

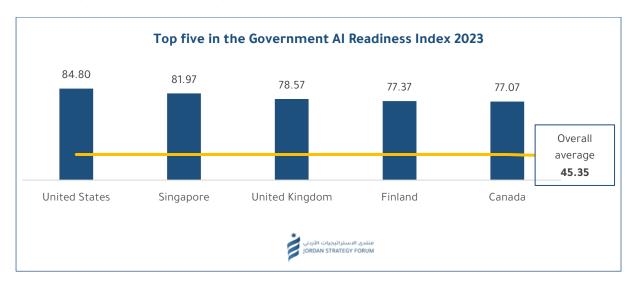
On the 6th of December 2023, Oxford Insights published its **"Government AI Readiness Index 2023".** This index assesses the AI readiness of 193 governments across the world. The Index rests on three Pillars: **Government / Technology Sector / Data & Infrastructure.** A total of 39 indicators are used to measure the 10 dimensions.



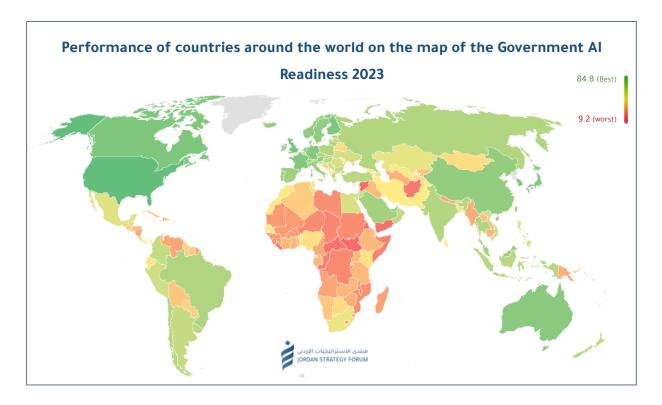
Source: Designed by the Jordan Strategy Forum based on the 2024 Oxford Insights Report.

1. Results of the Government AI Readiness 2023

• At the International Level: With a score of 84.80, the United States of America (USA) tops the 193 governments across the world. Singapore, Ukraine, Finland, and Canada come in 2nd to 5th respectively. Within this context, it is useful to note that the overall average of the participating countries is 45.35 points.



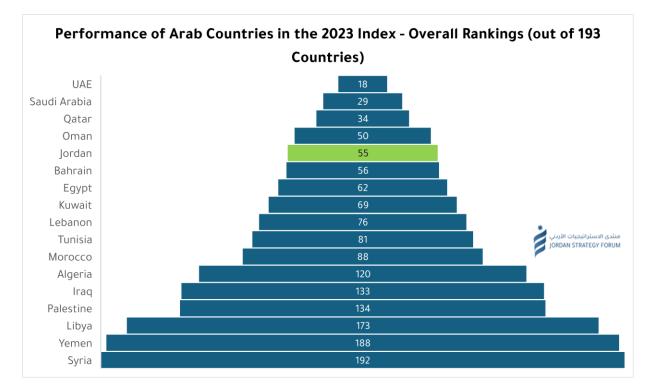
Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.



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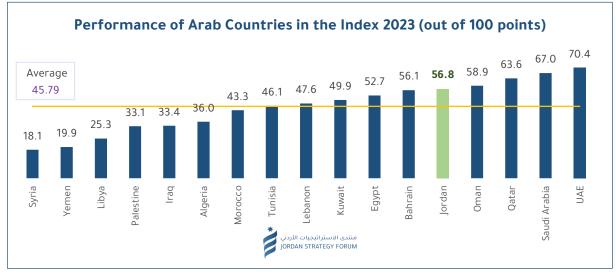


 At the Regional Level: With a score of 70.42, the United Arab Emirates (UAE) tops the Arab countries and comes in 18th out of 193 economies. With a score of 56.85, Jordan comes in 5th regionally, and 55th globally.



Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

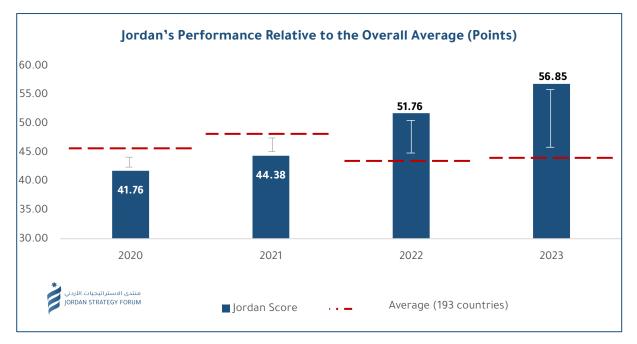
• The performance of the Arab countries in terms of their scores is large. This difference is probably due to the political and economic instability that some of the Arab countries have been experiencing.



Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

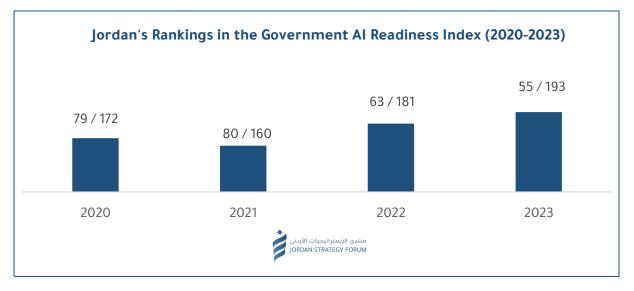


- 2. Jordan's Performance in the Government AI Readiness Index Over Time (2020-2023)
- Jordan has made remarkable progress during the past four years in its Index's score.
- Jordan's performance in the Index's score was lower than the overall average in 2020 and 2021. In 2022 and 2023, however, Jordan's scores have become higher than the overall average.



Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

• Jordan has made remarkable progress during the past four years in its rankings. While in 2020 and 2023, Jordan's rank has improved 50% of countries to the top 30%.

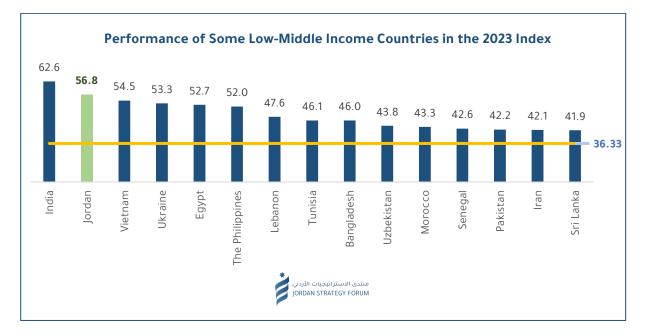


Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

- Among the Arab countries, Jordan has moved up from 9th in 2020 to 5th in 2023.
- Jordan's score exceeded the overall average of the Arab countries by 11.1 points in 2023. In 2020, Jordan's score was below the average.



 Jordan ranked 2nd after India among the middle-low-income countries (20.5 points above the overall average).

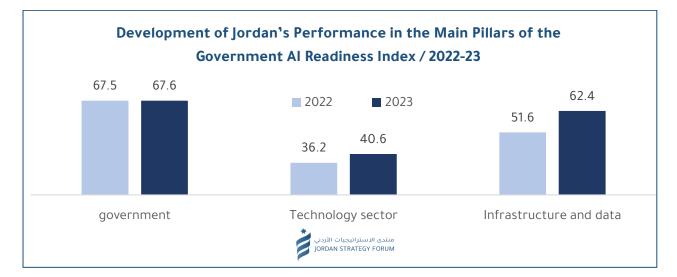


Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

Jordan's Performance in the Government AI Readiness Index 2023

A. Jordan's performance at the level of the main pillars:

- Jordan's performance in 2023 increased by 5.1 points from 2022. This improvement is the result of progress in "Infrastructure and Data" (10.8 points) and "Technology Sector" (4.4 points).
- While Jordan's score in "government" is the highest (67.6), the score improved marginally (by 0.1 point).

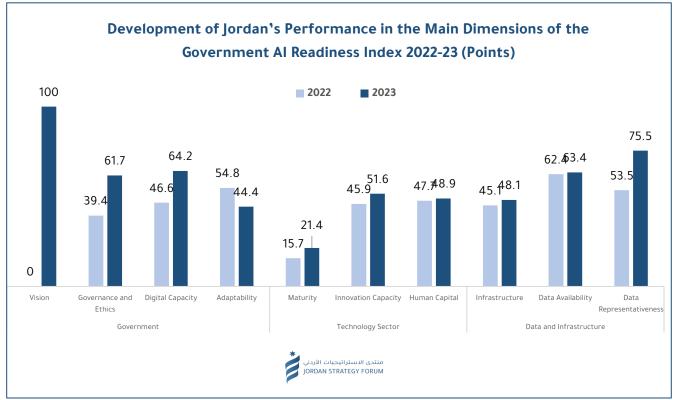


Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

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- At the level of the main dimensions of the index during the past four years, Jordan's progress was highest in the "government" pillar (by 32.4 points between 2020 and 2023). This progress came as a result of Jordan's improved performance in three main dimensions of this pillar: the "vision" dimension due to the launch of the "Jordan Strategy for Artificial Intelligence and the Executive Plan 2023-2027". Jordan is among only 65 participating countries with a national Al strategy. It also recorded progress in the dimensions of "Governance and Ethics" by 22.3 points, and "Digital Capabilities" by 17.6 points. Jordan witnessed a decline in the "adjustment" dimension, which is the only dimension in which it declined among the ten dimensions of the index.
- In the "Infrastructure and Data" pillar, Jordan recorded clear progress in the dimension of "data representation" (by 22 points between 2020 and 2023). Jordan's performance in the "innovative capabilities" dimension within the "technology sector" pillar was the most advanced (5.7 points).



Source: Designed by the Jordan Strategy Forum based on Oxford Insights data / 2024.

B. Jordan's performance at the level of sub-indicators:

To provide a more detailed explanation of Jordan's performance in the sub-indicators (due

to the lack of such data in the previous reports for the years 2020-2022), JSF conducted relative comparisons between the performances in the sub-indicators with their counterparts from the top two countries in the region (UAE) and middlelow-income countries (India). The objective of this exercise is to identify the subindicators with the weakest or relatively stronger performance.

Note:

The comparison between Jordan, the UAE and India depends on evaluating the relative performance of each country in the sub-indicators according to the performance of these countries in the same sub-index, and not between the values of the sub-indicators of each country.

Therefore, an appreciation of the index may not be considered a good performance relative to the comparator countries.

The results show that Jordan:

- Performs well in indicators such as AI strategy, ethical principles, time spent dealing with government regulations, female science and technology graduates, fifth-generation architecture, and the gender gap in internet access.
- Performs poorly in encouraging government investment in emerging technologies, trade in ICT services (per capita), value of trade in ICT goods (per capita), ICT skills, communications infrastructure, and mobile phone subscriptions.
- Performs poorly in the "Data Protection and Privacy Laws". However, the Index was published before Jordan introduced its "Personal Data Protection Law of 2023" which came into force thereafter.



Comparisons Between Jordan, UAE and India in the

Al Government Readiness Index 2023 (Sub-Indices)

Al strategy100100100Good2. Data protection and privacy laws5050100Weak3. Cybersecurity70.9698.0697.5Weak4. Regulatory quality53.270.649mediur5. Ethical principles100100100Good6. Accountability34.227.451Weak7. Online services65.9490.1479.34Weak8. Foundational IT infrastructure80.392.293.5Good9. Government Promotion of Investment in Emerging Technologies46.2884.3435.5mediur10 Government Effectiveness53.87657.4Weak11 Government responsiveness to change57.4278.5555.87mediur12 Procurement Data221142mediur13 Number of Al Unicorns log transformation000-14 Number of non-Al Unicorns log transformation34.9268.1941.34Weak15 Value of trade in ICT services (per capita) log transformation34.9268.1941.34Weak16 Value of trade in ICT goods (per capita) log transformation42.6682.6836.08mediur17 Computer software spending29.422.9323.35Good18 Time spent dealing with government regulations99.693.798.1Good19 VC availability212531Weak	's 'e
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35 Mobile-cellular telephone subscriptions 52 100 62 Weak	
36Households with internet access90.110036.39mediur	
37 Statistical Capacity 62.01 59.67 70.37 medium	
38 Cost of cheapest internet-enabled device (% of monthly GDP per capita) 53.02 96.82 63.07 Weak	
39Gender gap in internet access989489Good	

*Note: The performance evaluation of the sub-index is based on the relative comparison between the three countries, and not between the values of all the sub-indicators of the same country.



4. JSF Recommendations:

The importance of employing artificial intelligence to enhance the productivity of economic sectors is undeniable. This is indeed what many governments around the world including Jordan, are seeking. Jordan looks at the digital transformation process as a strategic priority in the economic and administrative modernization tracks.

Today, countries are working on integrating technology and artificial intelligence to deliver public services and to improve their efficiency and raise the level of satisfaction of their recipients. The private sector is also seeking to develop new business models that use technology to enhance the efficiency and productivity of its operations. These trends may pose a threat to some workers, which also requires individuals, institutions and countries to keep abreast of technology and its developments, and to provide the appropriate infrastructure to enhance access to it. Building skills capable of employing them effectively to complement the tasks they perform, ensuring increased productivity and economic return on individuals, activities and countries.

However, the most important question remains: To what extent are governments willing to employ artificial intelligence in providing public services to their citizens, and encourage economic sectors and activities to adopt them, without experiencing their negative impact on employment rates?

The following is a matrix (recommendations - indicators) that will help Jordan to employ artificial intelligence effectively and improve its performance in the global indicators related to this field:

Recommendation	Target Sub-Indicator
Prepare a periodic survey from the concerned authorities to assess the readiness of public and private institutions to adopt artificial intelligence technologies in their production operations (service and commodity). The objective is to determine the level of awareness and knowledge of artificial intelligence, degree of readiness and willingness to adopt them, challenges and concerns associated with them, and the opportunities and benefits expected from them.	 4. Regulatory quality 10. Government Effectiveness 11. Government responsiveness to change 32. Adoption of Emerging Technologies
Employ the results of the surveys to formulate appropriate public policies that balance technological development and employment on the one hand, and economic and social development, and the creation of rewarding employment opportunities on the other.	5. Ethical principles6. Accountability9. Government Promotion of Investment in Emerging Technologies
Concerted efforts between the various stakeholders (academic, public, private, and civil society) to launch a national awareness campaign and training workshops in the concepts of artificial intelligence, importance of integrating it into the production	3. Cybersecurity 7. online Services 27. ICT Skills

process, as well as the importance of ethical, legal and security controls that govern dealing with them. These campaigns will target individuals of all age groups, private companies, and public institutions.	36. Households with an Internet access
Begin to integrate artificial intelligence tools in primary, secondary and university education levels to provide well-skilled learning outcomes to the labor market. Enhance talent and outstanding students in development and uses by providing them with grants and specialized training courses.	23. Graduates in STEM or computer science 25. Female STEM Graduates 26. Quality of Engineering and Technology Higher Ed 27. ICT Skills
Encourage investment in IT infrastructure and emerging artificial intelligence technologies and attract major international companies working in this field.	 8. Foundational IT infrastructure 19. VC availability 21. Company Investment in Emerging Technology 29. Supercomputers log transformation 30. Broadband quality 31. 5G infrastructure
Support scientific, technical and applied research in the field of artificial intelligence and emerging technologies and encourage partnerships between local and international universities to prepare specialized research and publications. Enhance the link between industrial and technological companies to direct specialized studies and research in this field towards supporting the production process.	 22. Al research papers log transformation 24. GitHub Activity log transformation 32. Adoption of Emerging Technologies
Target to increase the level of spending on research and development in the state budget in the coming years to enhance the efforts in accelerating digital transformation.	20. R&D Spending log transformation
Enhance the access of all regions in the Kingdom, and various segments of society, to fast, effective, and affordable communication and Internet services. This should promote local development, digital inclusion, and productivity, and reflect positively on employment opportunities and wages.	 28. Telecommunications Infrastructure 30. Broadband quality 31. 5G infrastructure 33. Open Data 34. Data Governance 35. Mobile-cellular telephone subscriptions
Activate the stock market in its both primary and secondary aspects and encourage the inclusion of startups in the financial market, to facilitate the availability of venture capital, and to ensure the process of venture investment in startups.	19. VC Availability

The Artificial Intelligence: Some Indicators & Observations



Top five countries in the Government Al Readiness Index 2023



The potential impact of Al on the future of jobs

40% 60%

of global employment is of jobs in advanced economies exposed to Al. may be impacted by Al.

26%

of jobs in low-income countries is expected to impact by Al

Date: March 2024

Source: Government AI Readiness Index 2023 published by Oxford Insights, and Gen-AI: Artificial Intelligence and the Future of Work issued by World Bank



Performance of Arab Countries in the 2023 Index - Overall Rankings (out of 193 Countries)



Remarkable progress in Jordan's performance in the index



Development of Jordan's Performance in the Main Dimensions of the Government Al Readiness Index (Points)



Date: March 2024

Source: Government AI Readiness Index 2023 published by Oxford Insights, and Gen-AI: Artificial Intelligence and the Future of Work issued by World Bank

JSF Recommendations to Employ

Artificial Intelligence





Prepare a periodic survey to assess the readiness of public and private institutions to adopt artificial intelligence technologies and employ the results of the surveys to formulate appropriate public policies.



Begin to integrate artificial intelligence tools in primary, secondary and university education levels.



Enhance the access of all regions in the Kingdom, and various segments of society, to fast, effective, and affordable communication and Internet services.



Encourage investment in IT infrastructure and emerging artificial intelligence technologies and attract major international companies working in this field.



Support scientific, technical, and applied research in the field of Al and emerging technologies and encourage partnerships between local and international universities, as well as the link between industrial and technological companies.



Provide an enabling environment to encourage venture capital companies to invest in startups and develop the capital market to encourage the inclusion of startups in the financial market.



launch a national awareness campaign and training workshops in the concepts of AI, importance of integrating it into the production process, as well as the importance of ethical, legal and security controls.



To evaluate the study



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