

The E-Government and its role in Reducing Unemployment in the Arab countries during the period (2003-2020)

الحكومة الرقمية ودورها في الحد من البطالة في الدول العربية خلال الفترة
(2020-2003)

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Received: 15th/04/2024

Accepted: 10th/06/2024

Abstract:

This study aimed to analyze and measure the role of e-government in reducing unemployment in Arab countries (17 countries) during the period (2003-2020). To achieve this goal, the study relied on the methodology of cross-sectional time series data (panel models) and used the R programming language.

The study found a significant negative impact of e-government development on unemployment rates in Arab countries. Specifically, a 10% increase in the e-government development index would lead to a 45% decrease in unemployment rates in Arab countries. This indicates that the development and advancement of e-government is an effective means to mitigate unemployment in Arab countries.

Keywords: E-Government; Unemployment phenomenon; Arab Countries; Panel Models.

Jel Classification Codes : O33; J64; O53; C23.

الملخص:

هدفت هذه الدراسة إلى تحليل وقياس دور الحكومة الرقمية في الحد من مشكلة البطالة في الدول العربية (17 دولة) خلال الفترة (2003-2020)، ولتحقيق هذا الهدف تم الاعتماد على منهج بيانات السلاسل الزمنية المقطعية (نماذج البانل) وعلى برنامج R.

توصلت الدراسة إلى وجود تأثير سلبي ومعنوي كبير لتنمية الحكومة الرقمية على معدلات البطالة في الدول العربية، بحيث إذا ارتفع مؤشر تنمية الحكومة الرقمية بـ 10 بالمائة فإن معدل البطالة

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في الدول العربية سينخفض بنسبة قدرها 45 بالمائة، ما يعني أن تطوير وتنمية الحكومة الرقمية يعتبر من الوسائل الفعالة التي تساهم في الحد من البطالة في الدول العربية.

الكلمات المفتاحية: الحكومة الرقمية؛ ظاهرة البطالة؛ الدول العربية؛ نماذج البائل.

تصنيف JEL: O33؛ J64؛ O53؛ C23.

1. Introduction:

There has been growing interest recently in e-government, also known as digital government, a new concept that relies on the use of information and communication technology and digital transformation in delivering government services. Its main aim is to improve the efficiency of government work and facilitate the provision of government services more quickly and effectively. E-government is also considered a significant development in the field of digital transformation, and with the advancement and proliferation of technology, e-government is expected to continue to evolve and improve to achieve more benefits, such as improving access to information, simplifying government procedures, enhancing community participation, as well as improving efficiency and resource provision.

On the other hand, unemployment is a major challenge facing all countries worldwide, including Arab countries. This problem directly affects individuals and societies, increasing poverty and inequality, and also undermines social stability. Here, the importance of e-government as an effective tool and means to reduce the problem of unemployment becomes evident, by providing employment opportunities. It enables individuals to apply for jobs online, receive notifications of available job opportunities, and search for training and professional development opportunities. Additionally, e-government also provides a significant environment for entrepreneurship, all of which directly contribute to reducing unemployment.

In this context, and given the importance of governmental digital transformation for Arab countries on one hand, and the problem of unemployment on the other hand, the main problem of this study crystallizes as follows:

Does e-government contribute to reducing unemployment in Arab countries?

From the aforementioned problem, we can deduce the following hypothesis:

"Increasing governmental digital transformation in Arab countries and the development of digital government platforms significantly helps in reducing unemployment in these countries".

In the same context, our study aims to analyze and measure the impact of e-government in Arab countries on unemployment rates during the period (2003-2020) using panel data models.

Research Significance:

The problem of unemployment represents a significant challenge in Arab countries, negatively affecting individuals and societies. Digital transformation in government presents an opportunity to overcome this issue by improving governmental services and creating job opportunities. Understanding the role of digital transformation in addressing unemployment can guide policies and strategies towards building a more sustainable future for Arab communities.

Objectives:

Among the most important objectives of the study are:

- Analyzing the impact of e-government on unemployment rates in Arab countries;
- Assessing the temporal impact and identifying the evolution of unemployment due to digital transformation;
- Analyzing the factors influencing unemployment reduction and identifying the specific role of e-government;
- Providing effective recommendations that contribute to enhancing digital transformation and improving job opportunities.

Previous Studies:

In the field of studying the impact of e-government on unemployment rates in Arab countries, it can be said that available sources are very limited. These scholarly works consist of a small number of studies and research exploring this relationship, typically focusing on the digital transformation of governments and its effects on the labor market and unemployment rates in Arab countries. These scholarly works focus on analyzing government policies related to developing digital infrastructure, how technology is used to improve government services, promote economic growth, and create job opportunities. Moreover, these studies rely on economic and statistical models to analyze the effects of e-government development on unemployment.

2. General Concepts about E-Government:

In this section of our study, we will define the concept of e-government, highlight its advantages, and identify its main objectives.

2.1. Concept of E-Government:

E-government is defined as advanced knowledge in developing administrative knowledge, its application techniques, and professional skills. It enriches administrative thought with concepts related to electronic knowledge and information and communication technologies (Qaidoun & Muammar, 2017, p. 50).

Additionally, according to the World Bank, e-government refers to the use of information technologies such as wide area networks, the internet, and mobile computing, through the interactive relationships between citizens, institutions, government entities, and other stakeholders, aimed at achieving a range of objectives including improving the provision of government services to citizens, enhancing interaction with the business sector and industry, improving accessibility levels, and achieving more efficient government management (Gustova, 2017, p. 4).

2.2. Advantages of E-Government:

The e-government system offers multiple advantages, including (Al-Rafai, 2009, p. 309):

- Expedited processing: Electronic transaction processing does not require as much time as traditional methods (traditional government);
- Increased precision: Electronic services are more accurate and precise than manual execution in traditional government;
- Cost reduction: Electronic service provision leads to a reduction in the number of employees required to work in administration compared to traditional government, as well as through streamlining procedures, work stages, and reducing the use of paper and office supplies in service provision;
- Simplification of procedures: Electronic government can eliminate bureaucracy and its negative consequences, which lead to wasting effort, time, and money. Through e-government, procedures are simplified and facilitated via the information network, accomplishing work quickly and easily, saving time, effort, and reducing expenses;

- Administrative transparency: When transactions are conducted electronically without direct contact between the citizen and the designated employee, instances of bribery and forgery are reduced.

2.3. Objectives of E-Government:

Among the most important objectives of e-government are (Al-Alaq, 2004, p. 32):

- Providing services better and faster to individuals and the business sector;
- Providing an encouraging investment climate and removing obstacles for local and foreign investors;
- Providing accurate and continuously updated information for citizens, businesses, or other government institutions;
- Improving the efficiency of government agencies, supervision, and monitoring methods;
- Saving money and time by shortening traditional transactions, i.e., there will be control over citizens and institutions;
- Activating the role of citizens in development;
- Increasing transparency and credibility in government transactions.

3. General Concepts about Unemployment:

In this section, we will address both the concept of unemployment and its causes in the Arab world.

3.1. Concept of Unemployment:

Unemployment is defined as the absence of work in a society for those willing and able to work, meaning the condition of being unemployed. However, there are individuals who are not able to work, such as children, the sick, the elderly, and those who have retired. On the other hand, there are those who are able to work but cannot be considered unemployed, such as students in secondary and tertiary education. Additionally, those who are financially wealthy and not actively seeking work, as well as individuals with a job seeking another with a higher salary, who register themselves as unemployed, are excluded (Salman & al, 2000, p. 237).

For an individual to be considered unemployed, a set of conditions must be met, which can be summarized in the three basic conditions of unemployment (Jacques, Vanhove, & Longatte, 2004, p. 71):

- Lack of work: Meaning there is no paid employment available, or there is no work in self-employment. This criterion is the most important in determining whether someone is unemployed or not;
- Actively seeking work: Meaning taking steps to obtain paid employment, demonstrating a genuine desire and effort to work;
- Willingness and readiness to work, whether for a salary or for self-employment.

The International Labour Organization defines unemployment as including all individuals of working age who are willing and able to work, actively seeking work but unable to find employment during the reference period, which is typically a week or two (Dawood, 2010, p. 183).

3.2. Causes of Unemployment in the Arab World:

There are various reasons that have contributed to the exacerbation of the unemployment problem in the Arab world, varying from one country to another depending on the specificity and nature of the country's economy. Some of these reasons are (Arab Banks Union, 2023):

3.2.1. Economic and Political Reasons:

- Limited size of the private sector in most Arab countries and its inability to create sufficient job opportunities, due to direct and indirect restrictions on investment, the absence of suitable economic and political environments, and government control over the economy hindering the expansion of the private sector and its effective role in driving development and providing employment opportunities;
- Slowdown in economic growth rates in most Arab countries and the failure of their economic policies to provide jobs;
- Failure of economic development plans and economic planning programs in Arab countries, leading to a worsening debt crisis and the flight of Arab capital abroad;
- Lack of systematic economic planning and mismatch between education programs and the needs of the labor market;
- Implementation of poorly planned privatization programs leading to sudden layoffs in the public sector;

- Institutions shifting towards using technological capital in line with technological advancements, leading to decreased demand for human labor;
- Dominance of the public sector in economic activities, generating employment opportunities and offering high wages;
- Some Arab countries suffering from direct and indirect effects of wars and political problems, with most of these countries increasing military spending at the expense of investment spending, which creates job opportunities.

3.2.2. Social Reasons:

- High population growth rates in the Arab world leading to increased population and inability to integrate them into the production process, exacerbating the problem of unemployment;
- Dominance of certain social values and customs exacerbating unemployment. For example, some affluent societies and aristocratic classes prefer their children to be unemployed rather than working with their hands. Additionally, biased views towards women's work, with some societies preventing women from exercising their right to work, resulting in underutilization of women as a human resource, which could be utilized in the future to drive development, especially in sectors compatible with prevailing social values, such as banking, healthcare, education, and social work;
- Mismatch between education and the labor market, as education levels in most Arab countries do not align with the needs of the labor market. Many indicators show that the social and economic returns of education are very low in Arab countries;
- Decrease in the percentage of skilled and competent labor, making it difficult to replace inefficient labor, leading to increased density of unskilled labor and the prevalence of hidden unemployment.

4. Study Data Presentation:

4.1. Study Methodology:

The study employed a quantitative approach utilizing panel data models. Additionally, statistical software R was used for various statistical tests and model estimations.

4.2. Sample and Study Period:

The study covered the period from 2003 to 2020 and included a sample of 17 Arab countries, namely: Algeria, Tunisia, Morocco, Egypt, Libya, Jordan, Sudan, Lebanon, Iraq, Mauritania, Saudi Arabia, United Arab Emirates, Bahrain, Qatar, Oman, Kuwait, and Comoros.

4.3. Data Sources:

Multiple international sources were utilized to gather the data for this study, including:

- United Nations reports on e-government;
- World Bank database (World Bank, 2023).

4.4. Study Variables:

In the initial stage, we will provide a detailed presentation of all the variables used, as depicted in the following table:

Table number (1): Variables Constituting the Study Model

Variable Code	Variable Name	Variable Nature	Variable Data	Source
CHOM	Unemployment Rate	Dependent Variable	Percentage of Total Labor Force	World Bank data base
EGDI	Digital Government Development Index	Main Independent Variable	A scale ranging from 0 to 1	United Nations reports on e-government
CR	Economic Growth Rate	Independent Variable	Annual growth in per capita GDP	World Bank data base
PP	Population Growth Rate	Independent Variable	Annual population growth rate	World Bank data base
DP	Government Expenditure Rate	Independent Variable	Percentage of government final consumption	World Bank data base

			expenditure to GDP	
INVE	Foreign Direct Investment Index	Independent Variable	Percentage of foreign direct investments to GDP	World Bank data base
INF	Inflation	Independent Variable	Annual inflation rate	World Bank data base

Source: Prepared by the researcher

5. Study Model:

To measure the role of digital government in reducing unemployment in Arab countries, we constructed a model containing a dependent variable represented by the unemployment rate, and a set of explanatory variables that we deemed necessary and important. These variables include: the Digital Government Development Index as the main independent variable, economic growth rate, population growth rate, government expenditure rate, foreign direct investment index, in addition to the inflation rate.

The mathematical formula for the model can be written as follows:

$$CHOM=f(EGDI,CR,PP,DP,INVE,INF)$$

This model was chosen for several key economic reasons to ensure comprehensive analysis and accuracy of results when studying the impact of digital government on unemployment in Arab countries. Therefore, we will present and explain the reason for choosing each independent variable and how it can contribute to explaining the unemployment rate.

5.1. Digital Government Development Index (EGDI):

- **Economic Importance:** The EGDI represents the extent to which digital technology is used in government to improve public services. This indicator is important because it reflects governments' ability to enhance public administration efficiency, facilitate government procedures, and increase transparency.
- **Expected Impact:** Improving digital government is expected to reduce operational costs, increase job opportunities in the technology sector, and facilitate the process of starting and running businesses, thereby contributing to lower unemployment rates.

5.2. Economic Growth Rate (CR):

- **Economic Importance:** The economic growth rate reflects the overall performance of the economy. A growing economy typically creates new job opportunities, increases national income, and improves living standards.
- **Expected Impact:** As economic growth increases, the demand for labor rises, leading to lower unemployment. Therefore, including this variable helps isolate the impact of economic growth on unemployment.

5.3. Population Growth Rate (PP):

- **Economic Importance:** Population growth affects the supply of available labor. In the case of rapid population growth, pressure on the labor market may increase if sufficient job opportunities are not available.
- **Expected Impact:** A high population growth rate can increase the unemployment rate if it is not matched by an increase in job opportunities. Therefore, it is essential to include this variable to fully understand labor market dynamics.

5.4. Government Expenditure Rate (DP):

- **Economic Importance:** The rate of government expenditure reflects investments in infrastructure and public services. Government spending can be an economic stimulus, creating direct and indirect jobs.
- **Expected Impact:** Increased government spending can stimulate the local economy and create job opportunities, contributing to lower unemployment rates.

5.5. Foreign Direct Investment Index (INVE):

- **Economic Importance:** Foreign direct investment brings capital, technology, and new expertise, which can boost productive sectors of the economy.
- **Expected Impact:** Higher foreign direct investment is expected to create new job opportunities, thereby reducing the unemployment rate.

5.6. Inflation Rate (INF):

- **Economic Importance:** The inflation rate reflects changes in price levels. Moderate inflation can be an indicator of a growing economy, while high inflation can reduce purchasing power and negatively impact economic activity.

- **Expected Impact:** High inflation can lead to a decrease in demand for goods and services, which may reduce job opportunities and increase unemployment.

In conclusion, this model was chosen because it combines traditional factors (such as economic growth and inflation) with modern factors (such as digital government), providing a comprehensive and integrated picture of unemployment dynamics in Arab countries. Together, these factors help in providing a detailed and accurate analysis of how digital government, along with other economic variables, affects unemployment rates, enabling the formulation of effective and scientifically-based economic policies.

6. Stability Study of Model Variables:

In this step, we test the stability of all variables comprising the study model. This is done relying on two tests that are among the most renowned tests for detecting the presence or absence of a unit root in panel variables, namely:

- (Levin-Lin-Chu Unit-Root Test, 2002);
- (Im-Pesaran-Shin Unit-Root Test, 2003).

Table number (2): Results of Unit-Root Tests on Study Variables

Variable	Levin-Lin-Chu Unit-Root Test	Im-Pesaran-Shin Unit-Root Test	Decision
CHOM	0.5982	0.9994	Unstable
EGDI	0.01092	0.3817	Unstable
CR	1.071e-08	4.67e-06	Stable
PP	< 2.2e-16	5.979e-16	Stable
DP	0.5521	0.9383	Unstable
INVE	< 2.2e-16	< 2.2e-16	Stable
INF	< 2.2e-16	< 2.2e-16	Stable

Source: Prepared by the researcher based on R software

Using R software, we obtained Table 2, through which we observe the following:

- Variables (CR), (PP), (INVE), and (INF): In both tests, the statistical value was smaller than the critical value at 5%, indicating their stability at a significance level of 5%.

- Variables (CHOM), (EGDI), and (DP): In either one or both tests, the statistical value was greater than the critical value at 5%, indicating their instability at a significance level of 5%.

In the same context, we conducted first-order differences on the unstable variables (CHOM), (EGDI), and (DP). Upon reperforming the aforementioned tests, we obtained Table 3, through which we observe that all variables under examination are stable at the first level of testing.

Table number (3): Results of Unit Root Tests on First Differences of Unstable Variables

Variable	Levin-Lin-Chu Unit-Root Test	Im-Pesaran-Shin Unit-Root Test	Decision
CHOM	0.04639	0.033	Stable
EGDI	< 2.2e-16	< 2.2e-16	Stable
DP	< 2.2e-16	< 2.2e-16	Stable

Source: Prepared by the researcher based on R software

7. Model Estimation:

Panel data analysis relies on estimating three models, namely the Pooled OLS (Ordinary Least Squares) model, the Fixed Effects model, and the Random Effects model. Then, the best model among them is selected through various tests that assist in this process.

Based on the proposed study model, which consists of only stable variables regardless of their stability level, and using R software, we obtained the summarized results in the following table:

Table number (4): Results of Panel Data Models Estimation

Dependent Variable: CHOM		Pooled Regression Model	Fixed Effects Model	Random Effects Model
Explanatory Variables	Constant	12.8737243 (***)	-	9.263741 (***)
	EGDI	-10.8368933 (***)	1.522120	1.209692
	CR	-0.0069612	-0.016424	-0.016525
	PP	-0.8732968 (***)	-0.064481	-0.079637
	DP	0.1592892 (**)	-0.036477	-0.032145
	INVE	0.0700318	-0.104725 (*)	-0.103318 (*)
	INF	0.0660221 (**)	0.030138 (**)	0.030550 (**)

Source: Prepared by the researcher based on R software

7.1. Panel Model Comparison Tests:

After estimating the three models for panel data, we will conduct a series of tests to compare between the three panel models. Specifically, we will compare the Pooled OLS model on one hand with the Fixed Effects and Random Effects models on the other hand. The results obtained are summarized in the following table:

Table number (5): Results of Panel Model Comparison Tests

Test Type	P-Value	Decision at 5% significance level
Lagrange Multiplier Test (Breusch-Pagan)	0.2562	Pooled OLS model is the preferred model
Fisher Test	0.5344	Pooled OLS model is the consistent model

Source: Prepared by the researcher based on R software

Based on the results obtained from R software, where the probability value is greater than 5% in the tests conducted as shown in the previous table, this indicates that the Pooled OLS model in this study is consistent and represents the preferred model compared to both the Fixed Effects and Random Effects models. Therefore, the Pooled OLS model will be chosen as the preferred model among the panel models.

2.7. Tests for Detecting Major Problems in the Estimated Model:

In the previous stage, we concluded that the Pooled OLS model is the optimal model for the study among the three panel models. However, it is essential not to stop here, but rather to ensure that this model is free from major problems in econometrics, such as the problem of linear correlation between variables, the problem of autocorrelation of errors, and the problem of heteroscedasticity.

Table number (6): Results of Tests for Detecting Major Problems in the Pooled OLS Model

Problem	Test Type	P-Value	Decision at 5% Significance Level
Linear correlation between variables	Breusch-Pagan LM test for cross-sectional	< 2.2e-16	There is a cross-sectional correlation between variables
	Pesaran CD test for cross-sectional	0.0006092	
Autocorrelation of errors	Breusch-Godfrey/Wooldridge test for serial correlation	2.259e-16	There is autocorrelation of errors
Heteroskedasticity	Breusch-Pagan test against heteroskedasticity	0.4056	There is no heteroskedasticity

Source: Prepared by the researcher based on R software

Based on the tests conducted and shown in Table 6, we conclude the following regarding the estimated Pooled OLS model:

- There is a problem of significant linear correlation between variables in the estimated model, which is negative;
- There is a problem of significant autocorrelation of errors in the estimated model, which is negative;
- There is no significant heteroscedasticity in the estimated model, which is positive.

Thus, we conclude that the estimated Pooled OLS model contains two fundamental problems from econometric issues. To address these problems, we need to re-estimate the Pooled OLS model using the feasible generalized least squares (FGLS) method.

7.3. Re-estimation of the Pooled OLS Model:

After re-estimating the Pooled OLS model using the feasible generalized least squares (FGLS) method, we obtained the results shown in Table 7:

Table number (7): Results of Estimating the Pooled OLS Model using Feasible Generalized Least Squares (FGLS) Method

Dependent Variable	EGDI	CR	PP
	-4.5013323 (***)	-0.0101096	-0.4861091 (***)
	DP	INVE	INF
	0.0958294 (***)	-0.0027650	0.0303637 (**)

Source: Prepared by the researcher based on R software

7.4. Coefficient of Determination for the Estimated Final Model:

When estimating the aggregate regression model using the Feasible Generalized Least Squares (FGLS) method, we obtained a determination coefficient of 32.08%. Although it is less than 50%, this percentage is considered acceptable, especially given the utilization of the Feasible Generalized Least Squares method in estimation. This confirms the significance of both the proposed and estimated model.

8. Study Results:

Based on the results obtained from estimating the aggregate regression model using the Feasible Generalized Least Squares (FGLS) method, we conclude the presence of statistically significant effects for the majority of independent variables. Consequently:

- If the Digital Government Development Index increases by 10%, the unemployment rate in Arab countries will decrease by 45%;
- If the economic growth rate increases by 10%, the unemployment rate in Arab countries will decrease by 0.1%;
- If the population growth rate increases by 10%, the unemployment rate in Arab countries will decrease by 4.86%;

- If government spending increases by 10%, the unemployment rate in Arab countries will increase by 0.96%;
- If foreign direct investment increases by 10%, the unemployment rate in Arab countries will decrease by 0.03%;
- If the inflation rate increases by 10%, the unemployment rate in Arab countries will increase by 0.3%.

Based on the above, we can conclude that the development and advancement of digital government in Arab countries have a significantly negative impact compared to other indicators on the unemployment rate. This implies that the development of digital government in Arab countries has a substantial positive effect on reducing unemployment and creating job opportunities. This can be interpreted as digital government being one of the most important tools that can be utilized to mitigate unemployment and create employment opportunities by simplifying and enhancing the efficiency of government services, such as managing recruitment electronically to reduce arbitrariness, regulate hiring processes, promote transparency, and ensure equality among individuals in the case of unemployment.

Moreover, electronically filing tax returns through government platforms is also a prominent aspect of improving public service, as it reduces bureaucracy, saves effort and time for individuals and institutions, and protects them from corruption that they may encounter in traditional services. All of this contributes to increasing economic activity, enhancing employment opportunities, and reducing unemployment.

In the same context, digital government can encourage entrepreneurship and innovation among individuals by creating digital government platforms that organize, encourage, and simplify the establishment of small enterprises and promote innovation among individuals. Additionally, distance education and training provided by the government can help develop and enhance the skills of individuals with innovative projects, assisting them and enhancing the success opportunities of innovative projects, all of which contribute to reducing unemployment, especially among youth, which characterizes the Arab world, the majority of whose population consists of youth.

9. Conclusion:

In this study, we have measured the role of digital government in mitigating the issue of unemployment in Arab countries. To uncover the extent and nature of this role, we relied on panel data, estimating three panel models and

selecting the best model among them. Through the results we obtained, it became evident that there is a significant negative impact of digital government development on the unemployment rate in Arab countries. Specifically, if the Digital Government Development Index increases by 10%, the unemployment rate in Arab countries will decrease by 45%. Thus, we have confirmed the validity of the proposed hypothesis, which emphasizes the significant role of digital government in Arab countries in mitigating the phenomenon of unemployment.

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

- Strengthening digital government transformation in Arab countries;
- Developing the technical capabilities of government employees by training them on the use of modern technology through the provision of programs and training courses in this field;
- Enhancing and developing the telecommunication infrastructure capable of meeting the requirements of modern digital government;
- Promoting Arab cooperation in the field of digital government transformation and benefiting from the experience of leading Arab countries in the field of digital government.

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