EVALUATING DIGITAL INVESTMENT INDICATORS IN RELATION TO FINANCIAL POLICY VARIABLES IN IRAQ

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Abstract

The recent global financial fluctuations and crisis, information technology has rapidly developed in the 19th century and plays a vital role and significant transformations in all business communications, particularly in the economic sectors. Traditionally, investments relied on physical effort, machinery, and raw materials. However, in today's technology-driven and information-centric society, economic power is entrenched in knowledge rather than physical individual efforts, as highlighted by economist. The purpose of this study to evaluate the digital investment indicators in relation to financial policy indices in Iraq. Using data on financial policy indices in the Iraqi economic environment during the period from 2004 to 2022, the study reached several findings, and the most important being that the digital economy has the full potential to maximize returns from the technological advancements of the scientific and information revolution. The study concluded with a set of recommendations, emphasizing the importance of focusing on the digital economy due to its ability to enhance returns from technological advancements, perform various tasks efficiently, and ensure participation in previously unreachable events and activities. Keywords: Digital Investment, E-Commerce, E-Marketing, Public Revenues, Public Expenditures

INTRODUCTION

Information and communications technology, along with the rapid developments in the global economy, is expanding its role across all economic sectors. This trend is considered one of the most important transformations of the twenty-first century, as the technology sector has become the universal language of global interactions and the main foundation for economic activities. It has elevated levels of progress and development, keeping pace with rapid changes that have shortened the time gap in communication and operations. The importance of this research lies in the critical role informatics plays across all economic sectors, particularly in transforming investment from its traditional nature to innovative investments. These modern investments protect contemporary advancements and are primarily based on knowledge and human capital (highly and medium-skilled individuals). Traditionally, investments relied on physical effort, machinery, and raw materials. However, in today's technology-driven and information-centric society, economic power is rooted in knowledge rather than muscle effort, as highlighted by economist Paul Romer's theory of endogenous growth, which views technology as an internal variable in the production function. This shift leads to increased public revenues and GDP growth.

The research reached several conclusions, the most important being that the digital economy has the full potential to maximize returns from the technological advancements of the scientific and information revolution. It facilitates all tasks and ensures participation in events and activities that were previously inaccessible under the traditional economy. The study concluded with a set of recommendations, emphasizing the importance of focusing on the digital economy due to its ability to enhance returns from technological advancements, perform various tasks efficiently, in addition, ensure participation in previously inaccessible events and activities.

LITERATURE REVIEW

In (Talib Sultan, 2020), the research explores the reasons behind the digital economy in Iraq lagging and being neglected compared to advanced countries in this field. It also proposes suitable solutions through the formulation of an innovative applied methodology and encourages reliance on digital financial services in the Iraqi economy.

In (Zainab Hadi, 2022), the paper presents fundamental changes in the structure of the global economy are based on information and communication technology, producing a new type of economy known as the digital economy. This has become the main driver of global economic growth as it relies on scientific knowledge that has increased production efficiencies. This, in turn, has intensified economic competition, with scientific progress becoming a crucial element in gaining a competitive edge.

In (Wafa Jaafar, 2022), the paper discusses how digital work has recently shaped the Iraqi model for the digital labor market, considering intellectual and institutional trends capable of absorbing all new economic phenomena and variables.

In (M. Ghaida, 2022), this research addresses numerous indicators of comprehensive development, with education, in all its strategic connotations, being a primary driver of economic growth. The ultimate goal of economic development and the basis for sustaining human resources for a state striving towards digital transformation is technological advancement, which results from the development of human knowledge, capabilities, and the growth of the knowledge base.

In (Wisan Mashaal, 2022), the research aims to demonstrate the indicators of the digital economy in sustainable development in the United Arab Emirates. It started from the hypothesis that there is a positive relationship between the development of the digital economy through its indicators and the extent of sustainable development. The research also found that the estimated parameters reveal a direct relationship between the independent variables (information technology, communications, innovation) and the dependent variables (GDP, number of students, carbon dioxide emissions).

THE CONCEPT OF DIGITAL INVESTMENT

The emergence of this type of economy is due to the developments witnessed by the new economy, a term that has recently emerged to explain the phenomenon that brought the American economy into the circle of global productivity and continuous growth, making it the largest economy in the world. The digital economy has deep roots dating back to 1921 in the United States, when economist Frank Knight presented his first study on the information economy. In 1954, economist Marshall published his study entitled "An Economic Theory of Organization and Information." However, it was McCulloch who took a pioneering position with his analysis of the information economy. He described the patent system as just one part of investment in education, research, and technical development. His second study in 1958 on the industry and distribution of knowledge in the United States revolutionized traditional economies in the digital space, fulfilling economist Derek Price's prophecy that information would replace money in the digital economy. Over time, technology has significantly influenced its shape and texture (Metwally, 1995: 46-50). The term "digital companies" or "digital sectors" refers to companies or sectors whose primary business segments involve digital data, platforms, or technologies, such as online publishing, social media platforms, and some enterprise manufacturing industries that use sensors connected to digital networks. Conversely, "non-digital companies" and "traditional" companies and sectors refer to those whose primary

business is not related to digital data, platforms, or technologies, such as mining, retail, transport, and construction (Gestrin, 2018: 7).

The digital economy refers to the economy built on the Internet and the Web. It deals with digital or digital information, including digital customers, digital companies, digital technology, and digital products. It is based on ideas and creativity rather than physical goods (Al-Din, 2018: 336). The most important applications of the digital economy are (Ministry of Economy report, undated: 3):

- E-commerce: Using information and communications technology to exchange goods, services, and information.
- E-marketing: Achieving marketing goals through direct communication networks, computer communication, and digital interactive means using information and communications technology.
- Digital investment: Utilizing the capabilities of networks and the information they provide for making investment decisions, especially in the field of financial markets.

IMPORTANCE OF INVESTING IN THE DIGITAL ECONOMY

Investing in the digital economy is one of the most important investments that has proven effective across various economies. It is linked to all sectors, including services, health, education, industry, and administration, at both private and public levels. Therefore, it is a fundamental requirement for different economies to be able to operate effectively and efficiently. Due to the information and knowledge it provides, strategies and requirements must be developed to adopt these investments. The importance of investment and its management methods has increased in the third millennium due to the spread and expansion of globalization, information technology, and Internet usage. Information and communication technology has facilitated cost reduction by shortening financial and commercial transactions, providing data and information, offering ways to store them in the required quantity and quality, and transitioning the traditional economy toward a knowledge economy where the human element plays a fundamental role in influencing economic project decisions (Al Shabib, 2012: 19).

Government and private sector investment in the digital economy plays a crucial role in the knowledge economy, as information has become an economic commodity. This creates a greater positive impact on economic activity and bridges the digital gap with large, industrialized countries (Alawi, 2009: 20). Such investments contribute to the continued existence and growth of companies, thus improving their performance and achieving their established goals. Significant sums of investment in the digital economy are required, so investments should be

made strategically, considering costs and learning from the experiences of other economies to understand the impact of such investments on institutions (Al-Hadithi, 2016: 88).

The digital economy has economic impacts and a strategic role in the rate of economic growth, as well as in various economic, social, and financial fields. Government investments in the digital economy, particularly in areas such as e-government services, help provide better service to citizens and improve living standards (Information, 2015: 90). It is a basic requirement for institutions to operate efficiently and effectively due to the information and knowledge they provide, which contribute to the growth and continuity of the institution, improve its performance, and achieve the desired goals (Hajjaj and Bouabdli, 2016: 97).

DIGITAL INVESTMENT INDICATORS

First: Fixed-Line Phone Users

The data presented in Table 1 indicate a weakness and relative quiescence in the performance of the fixed telephone index during the period from 2004 to 2022 in the Iraqi economic environment. The number of fixed-line telephone users reached its lowest level in the years 2020-2022, amounting to about 0.01% per 100 people, and its highest level in 2017, amounting to about 8.72% per 100 people throughout the period referred to. The low growth rates reflect the stagnation and decline in progress for this indicator.

Table (1): Number of Fixed Telephone Subscriptions and Penetration Rate in Iraq for the Period 2004-2022

Penetration Rate of Fixed Line Telephone Users	Population	Rate of Change	Number of Fixed Telephone Subscriptions	Years
3.81	27.139	-----	1034240	2004
3.99	27.963	7.81	1115000	2005
4.33	28.81	11.88	1247512	2006
4.60	29.682	9.38	1364512	2007
3.39	31.895	-20.68	1082300	2008
5.21	31.664	52.47	1650136	2009
5.30	32.49	4.27	1720591	2010
5.38	33.338	4.27	1794000	2011
5.47	34.208	4.29	1871000	2012
5.41	35.096	1.55	1900000	2013
5.41	36.005	2.51	1947700	2014
5.67	35.213	2.53	1997000	2015
5.62	36.169	1.70	2031000	2016
8.72	37.14	59.42	3237858	2017
7.04	38.42	-16.46	2705028	2018
7.42	39.31	7.76	2915031	2019
0.01	40150	-26.21	2151000	2020
0.01	41190	4.28	2243000	2021
0.01	42248	2.38	2296300	2022

Second: Mobile Phone Users

Iraq's efforts have emerged, as shown in Table 2, through its leading use of mobile phones, with an annual growth rate for the period from 2004-2006 exceeding expectations, ranging between 167.07% and 509.61%. In contrast, the annual growth rates for the same period in Arab countries ranged from the lowest rate of 6.30% in Kuwait for the period 2005-2006 to the highest rate of 109% in Syria for the period 2003-2004 (Muhammad, 2017: 80-82). From the data in Table 2, we find that the period 2007-2018 witnessed a decrease in the annual growth rate from 50.03% in 2007 to the lowest level of -0.09% in 2017. This indicates that the markets began to slowly move towards saturation of demand for telephone network services. During the period 2018-2022, the growth rate returned to an increase, reaching 9.13% in 2018 and 8.40% in 2022. This increase is due to the growing competitive market and the launch of new services at competitive prices.

Table (2): Number of Mobile Phone Subscriptions and Penetration Rate in Iraq for the Period 2004-2022

Prevalence Rate of Mobile Phone Users	Population	Rate of Change	Number of Mobile Phone Subscriptions	Years
2.12	27.139	---------	574000	2004
5.48	27.963	167.07	1,533,000	2005
32.44	28.81	509.61	9345371	2006
47.24	29.682	50.03	14021232	2007
54.96	31.895	25.02	17,529,000	2008
63.53	31.664	14.76	20116876	2009
71.60	32.49	15.65	23264408	2010
76.55	33.338	9.69	25519000	2011
78.22	34.208	4.85	26756000	2012
92.46	35.096	21.28	32450000	2013
91.65	36.005	1.69	33000000	2014
95.30	35.213	1.69	33559000	2015
92.47	36.169	-0.33	33447000	2016
89.97	37.14	-0.09	33415690	2017
94.92	38.42	9.13	36466941	2018
93.25	39.31	0.52	36656230	2019
0.10	40150	7.16	39281711	2020
0.10	41190	3.68	40727153	2021
0.10	42248	8.40	44146973	2022

Third: The Number of Internet Users

The development of Internet use in Iraq after 2003 is shown in Table 3, covering the period from 2004 to 2022. Iraq achieved the highest annual growth rate in 2010, amounting to 142.70%, reflecting the potential for integrating into the digital environment and reducing the technological knowledge gap by directing investment towards the information and communications technology sector. The data indicate that the penetration rate for Internet use per 100 people has begun to rise gradually. One of the most significant obstacles to the widespread use of the Internet is the high cost of technology services. The increase in these costs leads to a substantial discrepancy and a decline in diffusion rates within the Iraqi economic environment compared to the economies of the sample countries.

Table (3): Number of Internet Users and Penetration Rate (per 100 people)
in Iraq for the Period 2004-2022

The Prevalence of Internet Users	Population	Rate of Change	Number of Internet Users	Years
0.87	27.139		236849	2004
0.87	27.963	2.63	243076	2005
0.92	28.81	8.52	263779	2006
0.89	29.682	0.10	264031	2007
0.91	31.895	10.26	291114	2008
1.00	31.664	8.85	316883	2009
2.37	32.49	142.70	769068	2010
4.76	33.338	106.27	1586353	2011
6.80	34.208	46.70	2327137	2012
8.88	35.096	33.95	3117249	2013
12.84	36.005	48.35	4624303	2014
17.66	35.213	34.49	6219115	2015
21.84	36.169	27.00	7898106	2016
50.87	37.14	139.20	18892351	2017
49.95	38.42	1.59	19192156	2018
5.23	39.31	-89.29	2054871	2019
0.01	40150	-0.44	2045761	2020
0.00	41190	-0.65	2032427	2021
0.00	42248	1.10	2054883	2022

THE SECOND REQUIREMENT: FINANCIAL POLICY IN IRAQ

Given the distinctive role played by revenues in fiscal policy, which shapes the general budget and determines its economic features, and considering the direct linkage to international

oil prices, fluctuations in oil prices have a significant impact on all government sectors. This is especially true in light of the state's control over most operational and investment expenditures. A decline in oil prices and general price instability negatively affect individuals through increased prices of goods and services, higher unemployment rates, and the growing phenomenon of poverty—indicators of economic instability that lead to political and social imbalances.

The oil sector and its exports in Iraq are critical contributors to the gross domestic product, accounting for more than 50%. Additionally, oil revenues represent a high percentage of the state's hard currency earnings, ranging from 95% to 98%, and contribute between 60% to 70% of the state budget's resources (Ali, 2015:404). Therefore, a decline in oil prices weakens the balance sheets of oil companies and governments, increasing the liquidity risks for banks due to the adverse effects on the economy overall.

For example, in countries where the government or oil companies own the majority of shares in classified banks, such as the Gulf Cooperation Council countries, a decline in oil prices weakens the fundamental strength of banks and raises the financing costs for banks that turn to international markets to finance their activities. Government spending drives the growth of non-oil GDP and bank loans provided to the public sector, influencing the credit risks for banks due to the high concentration of loans offered to individuals or specific sectors of the economy, particularly sectors sensitive to economic cycles like real estate and construction.

The risks of financial instability are more pronounced in oil-exporting countries that are not members of the Gulf Cooperation Council. For example, Iraq and Algeria face increasing credit and liquidity risks based on banks' reliance on deposits derived from oil revenues and their meager foreign exchange reserves. The direct effects of declining oil prices are reflected in government budget deficits in oil-exporting countries. For instance, Saudi Arabia announced a budget with expenditures of approximately $229 billion and a financing deficit of $38.6 billion in 2015 (Abdel Reda, 2016:197).

There is a fact that fluctuations in oil prices not only embarrass importing countries when they suddenly rise but also place producing countries in a financial crisis when prices decline due to the inherent price volatility of oil. This volatility results from the mechanisms and nature of the oil economy in oil-exporting countries and all exporters of natural resources in general. Therefore, it is crucial for financial policymakers in producing countries to focus on precautionary savings. A policy of raising exports and expanding production capacity can lead to a significant shift in Iraq's financial capabilities, helping it withstand any shock from falling prices by using financial reserves accumulated during periods of high prices (Al-Ali, 2011:198).

Table (4): Net General Budget in Iraq for the Period (2004-2022)

Net budget	Overhead expenses	Public revenues	the years
593	21997	22590	2004
9585	17893	27478	2005
7369	27897	35266	2006
13080	32070	45150	2007
17790	50684	68474	2008
-326	47512	47186	2009
-524	59943	59419	2010
18153	67314	85467	2011
12286	90171	102457	2012
-4598	102168	97570	2013
-5838	96219	90381	2014
-3322	59557	56235	2015
-10709	56739	46030	2016
1557	63759	65316	2017
21739	68420	90159	2018
-4045	94520	90475	2019
-32027	80492	48465	2020
-12883	76082	63199	2021
6232	102849	109081	2022

The third requirement involves measuring the relationship between digital investment indicators and financial policy tools.

Table (5): Description of the Model Variables

The Nature of the Variable	Variable Name	Coding
independent	Number of Internet users	X1
independent	Mobile phone penetration rate	X2
independent	Fixed telephone penetration rate per 100 people	X3
continued	Public revenues	Y1
continued	Overhead expenses	Y2

The first equation: measuring the relationship between digital investment indicators on public revenues.

Model Estimation ARDL

The estimated elasticity's were all found to be statistically significant, indicating the model's strong explanatory power. The model explains 97% of the variability in public revenues, underscoring its high quality. Additionally, the coefficient reached 2.11%, and the F-statistic was

236.76, both of which are statistically significant with a probability less than 0.05 (p = 0.000). Table (6) presents the results of estimating the impact of digital investment indicators on public revenues in Iraq.

Table (6): Model Estimation ARDL

Selected Model: ARDL(3, 3, 0, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y1(-1)	1.461931	0.120753	12.10680	0.0000
Y1(-2)	-0.252690	0.218396	-1.157029	0.2516
Y1(-3)	-0.325991	0.125312	-2.601426	0.0116
X1	-0.000866	0.000466	-1.860884	0.0674
X1(-1)	0.001233	0.000783	1.575768	0.1201
X1(-2)	0.000116	0.000800	0.145144	0.8851
X1(-3)	-0.000696	0.000487	-1.429287	0.1579
X2	0.000203	9.62E-05	2.108905	0.0389
X3	0.000601	0.002333	0.257506	0.7976
C	2238.382	2906.922	0.770018	0.4442
R-squared	0.971284	Mean dependent var		67605.51
Adjusted R-squared	0.967181	SD dependent var		25237.30
SE of regression	4571.967	Akaike info criterion		19.81992
Sum squared residence	1.32E+09	Schwarz criterion		20.13368
Log probability	-713.4272	Hannan-Quinn crater.		19.94496
F-statistic	236.7640	Durbin-Watson stat		2.114498
Probe (F-statistic)	0.000000			

Boundary Testing

Rejecting the null hypothesis and accept the alternative hypothesis that the variables are integrated and exhibit a long-term equilibrium relationship at the significance levels of 5% and 10%. Table (7) indicates that the computed F-statistic (3.690491) exceeds the critical value (Bounds test) established by Pesaran for a fixed threshold.

Table (7): Boundary testing

F-Bounds Test		Null Hypothesis: No relationship levels		
Test Statistic	Value	Signi.	I(0)	I(1)
F-statistic	3.660491	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

APPRECIATE THE LONG-TERM RELATIONSHIP

The test results indicate that an increase in public revenues corresponds with increased mobile phone usage. This finding aligns with the economic context of Iraq. Table 8 illustrates the long-term relationship between the dependent variable (y1) and the independent variables (x1).

Table (8): Long-Term Relationship

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X1	-0.001822	0.001650	-1.104119	0.2737
X2	0.001738	0.000693	2.506425	0.0148
X3	0.005146	0.020195	0.254827	0.7997
C	19172.46	23232.57	0.825240	0.4123
EC = Y1 - (-0.0018*X1 + 0.0017*X2 + 0.0051*X3 + 19172.4570)				

The second equation focuses on measuring the relationship between digital investment indicators and public expenditures.

Model estimation ARDL

The estimated elasticity's were all found to be significant, indicating the strong explanatory power of the model. The model explains 98% of the variance in public revenues, highlighting its high explanatory quality. Additionally, the estimated coefficient reached 2.01%, reinforcing its significance. The F-statistic for the model was 478.2601, with a statistically significant probability of less than 0.05 ($p < 0.000$), underscoring the robustness of the parameter estimates. Table (9) presents the results of estimating digital investment indicators on public revenues in Iraq.

Table (9): Model Estimation ARDL

Selected Model: ARDL(3, 3, 0, 0)				
Note: final equation sample is larger than selection sample				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
Y2(-1)	1.469942	0.123717	11.88152	0.0000
Y2(-2)	-0.325407	0.219177	-1.484680	0.1426
Y2(-3)	-0.261952	0.124685	-2.100920	0.0397
X1	-0.001595	0.000334	-4.776836	0.0000
X1(-1)	0.002309	0.000590	3.910359	0.0002
X1(-2)	-0.000408	0.000656	-0.621899	0.5363
X1(-3)	-0.000532	0.000384	-1.384099	0.1712
X2	0.000238	8.80E-05	2.708057	0.0087
X3	0.000600	0.001704	0.352147	0.7259
C	1198.655	1972.269	0.607754	0.5455

R-squared	0.985575	Mean dependent var	65690.54
Adjusted R-squared	0.983514	SD dependent var	25660.99
SE of regression	3294.815	Akaike info criterion	19.16474
Sum squared residence	6.84E+08	Schwarz criterion	19.47850
Log probability	-689.5129	Hannan-Quinn crater.	19.28978
F-statistic	478.2601	Durbin-Watson stat	2.015905
Prob(F-statistic)	0.000000		

Boundary Testing

Rejecting the null hypothesis and accept the alternative hypothesis that the variables are integrated, indicating they achieve a long-term equilibrium relationship at the significance levels of 5% and 10%. Table (10) illustrates that the calculated F-statistic (3.980247) exceeded the upper limit of the bounds set by Pesaro's fixed limit test function.

Table (10): Boundary Testing

F-Bounds Test		Null Hypothesis: No relationship levels		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.980247	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Appreciate the long-term relationship

The test results indicate a direct relationship between mobile phone users (x2) and public expenditures (y2), suggesting that an increase in public expenditures leads to higher mobile phone usage. This finding aligns with the Iraqi economy's reality post-2003, where increased oil exports and subsequent spending, particularly consumer spending, fueled demand for mobile phones. Table (11) presents the long-term relationship between the dependent variable and the independent variables.

Table (11): Long-Term Relationship

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.001930	0.001156	-1.669818	0.0299
X2	0.002028	0.000501	4.049017	0.0001
X3	0.005109	0.014602	0.349914	0.7276
C	10208.47	16400.46	0.622451	0.5359
EC = Y2 - (-0.0019*X1 + 0.0020*X2 + 0.0051*X3 + 10208.4743)				

CONCLUSIONS

- There is a direct relationship between mobile phone users (x2) and public revenues (y2), indicating that increasing public revenues will lead to higher mobile phone use. This relationship aligns with the reality of the Iraqi economy.

- There is an inverse relationship between mobile phone users (x1) and overhead expenses (y2).

- There is a direct relationship between mobile phone users (x2) and public expenditures (y2), meaning that increasing public expenditures will increase mobile phone use. This relationship also reflects the reality of the Iraqi economy.

- The political instability and deteriorating security situation in Iraq have led the government to neglect support for the technology and information sector, hindering its development.

- Iraq's weak information and communications technology infrastructure has caused it to lag behind in the field of digitization.

RECOMMENDATIONS

- Emphasize the digital economy because it maximizes returns from the scientific and information revolution, enabling new tasks and broader participation compared to traditional methods.

- Focus on infrastructure development within Iraq to enhance capabilities in utilizing modern technology, information, and communications.

- Promote technological industries for their significant contribution to GDP growth.

- Train workers in productive sectors on modern technological skills to keep pace with scientific advancements.

- Prioritize digital economy indicators to boost the GDP growth rate.

FUTURE RESEARCH DIRECTIONS

The paper noted several areas for future research. Iraq as a one of the biggest oil export countries provide an ideal setting in which to examine the role of digital transformations in all business communications. Iraq experienced rapid development of all economic sectors, regulations, capital markets, and international trade over the past couple of years, which has affected the establishment and reliance on digital transformations in economic sector. Recent economic developments in financial policies and regulations of Iraqi economic sector have enabled significant progress toward the establishment of more financial policies of government

organizations and the formation of specialized economic plans to provide an independent oversight per sector. This therefore provides an interesting context for future studies to examine how these changes affect transforming investment from traditional to innovative investments.

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