FINANCIAL TECHNOLOGY, SUSTAINABLE DIMENSIONS, AND ECONOMIC GROWTH OF THE DEVELOPING COUNTRIES: EVIDENCE FROM THE MIDDLE EAST COUNTRIES

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Abstract

It is crucial to understand the financial technology (FinTech) dimensions' impact on financial system stability (AlBaker, 2024). Though FinTech can bring about positive changes, it also introduces new risks (Imeraj et al., 2025). Thus, investigating its influence allows for the development of measures to ensure the constancy and resilience of the financial systems (Jones & Maynard, 2023). As Middle Eastern countries continue to invest in digital infrastructure, education, and innovation, technology's role in driving economic growth may become increasingly significant in the future. Therefore, this study examines the effect of FinTech dimensions on the economic growth (through gross domestic product [GDP]) in the Middle East context. Utilizing yearly panel data from 2000 to 2021 for 12 Middle Eastern countries, the results revealed that the FinTech dimensions (such as information and communication technology [ICT] goods exports, fixed broadband subscriptions, and labor force participation rate) have a significant positive impact on economic growth in the Middle East. While there is a significant negative relationship between ICT goods imports and inflation with economic growth, individuals using the Internet, mobile cellular subscriptions, and population are found to have an insignificant effect on economic growth. This study provides valuable insights for policymakers, businesses, and researchers. FinTech has some challenges, but there are always potential Solutions. Various solutions and recommendations for the future have been included.

Keywords: FinTech, Economic Growth, GDP, ICT Goods Exports, ICT Goods Imports, Jordan, Middle East

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1. INTRODUCTION

Following the 2008 financial crisis, a group of start-ups and venture capital-backed firms began investigating improvements in information technology and digital infrastructures to reimagine financial services. Some of these financial technology (FinTech) companies planned to change wealth management and investment advising services, whereas others wanted to revolutionize lending and mobile and digital payments. The so-called "FinTech revolution" promised to increase access to finance while providing fairer lending standards, better investing advice, and more secure transactions. Some are enthusiastic about FinTech's capacity to close the wealth gap since fulfilling these promises will address some fundamental reasons for wealth disparity (Jones & Maynard, 2023). For countries to adopt and support FinTech, the regulatory bodies need to ensure that further information technology infrastructure has been built, thereby providing additional infrastructure in addition to current needs, and motivating people to interact with FinTech by emphasizing the benefits of using the technology. Moreover, the government can provide subsidies to network providers to develop more mobile cellular networks and expand line coverage, particularly in rural regions, as well as encourage the usage of FinTech (Azizan, 2019).

Globally, the use of FinTech has expanded dramatically (AlBaker, 2024; Al Rifai & AlBaker, 2025; Imeraj et al., 2025; Langi et al., 2024). Evidence suggests that development practitioners are consistently convinced that FinTech outreach will result in financial development and economic growth. In contrast, because access to the various financial services is limited, the benefits of financial growth are likely to be unavailable to individuals and businesses (Njogu, 2020). FinTech is changing the financial services landscape. Simultaneously, rapid technological development and customer preferences for digital services are the main reasons for adopting the modern models of business and the entry of more flexible non-financial firms (in telecommunications and technology) into the market. This offers various customers "banking-related activities" in the essential fields of the banking operations, for instance, retail or bulk payments, customer activities, lending and equity raising, and financial market infrastructure (Doszhan et al., 2020).

Scientific activity in FinTech and digitization has expanded, primarily in the last decade, with 45% of publications. Therefore, future investigation lines need to focus on banking, financial activities, trade, territorial development, legal, management, study methodologies, economic growth, sustainable development, as well as FinTech (European Commission, 2020). Several previous studies have emphasized the importance of international investigations on FinTech. Outcomes of the prior literature contribute to the explanation of FinTech through establishing the association of science with technology and reporting decision-making. FinTech faces difficulties reaching developing and poor economies and increasing financial inclusion in such countries (Manawar et al., 2023). Therefore, the main purpose of the current study is to examine the effect of FinTech dimensions on the economic growth measured by gross domestic product (GDP) in 12 Arab countries in the Middle East.

Many Middle Eastern countries face several vulnerabilities, such as ailing economies, accumulated debt, economic challenges, and shareholders' poor legal protection (Qawqzeh et al., 2021; Qawqzeh & Al Zobi, 2025). Therefore, the Middle East region is considered a unique and important setting to examine the effect of FinTech dimensions on GDP and economic growth because of the various difficulties and challenges that led to the current economic situation (Bshayreh et al., 2024; Qawqzeh, 2023).

A fast-changing technological landscape is creating new opportunities to target and focus on credit, share risk, and use information technology to boost productivity across all industries (McIntosh & Mansini, 2018; Al Zobi et al., 2025). Moreover, money and finance play important roles in developed and developing economies; as a result, the financial industry acts as a link to the economy (Telukdarie & Mungar, 2023). However, traditional banking approaches to tackling the issue of financial inclusion in developing nations are inefficient. Further, opening operational and functional banking business institutions in several developing economies characterized by low income is clearly not a financially viable option, given that they require a massive amount of resources, assets, equipment, and staff to act efficiently. In this regard, FinTech provides the instruments, mechanisms, and tools needed to drive financial inclusion in methods that traditional banking systems cannot. Moreover, FinTech provides a valuable, cost-effective, and less expensive means of fostering financial development progress (Isukul & Tantua, 2021).

In this regard, policymakers must create a favourable environment for the development of new FinTech innovations and ensure the safety of the current innovations because this will contribute to increased economic growth, as well as devise effective measures to manage and monitor inflation levels, as the high level of inflation has an inverse influence on economic growth. In addition, researchers are encouraged to conduct further investigations using a longitudinal period to address the potential influences of the economic cycles (Chepngeno, 2022).

Financial inclusion and FinTech promotion in the developing countries have risen to the top of the policy agenda, as seen by the development of financial inclusion departments in Central Banks and Ministries of Finance, as well as particular targets of the FinTech and financial inclusion (Hussein, 2020). At the same time, there are several challenges toward the digitalization of financial services in developing countries, such as effective regulations, unified guidelines for the financial sector's electronic engagement and governmental information systems and databases, universal approaches for identifying remote clients, insufficient financial literacy among the population, as well as fraud (Doszhan et al., 2020).

The adoption of information and communication technology (ICT) may not be uniform across the population. If there is a considerable digital divide, with some groups or areas lacking access to and abilities in using ICT, the total economic advantages may be concentrated in a few industries or individuals (Vimalkumar et al., 2021). In addition, inadequate regulatory frameworks or outmoded policies may impede the successful integration of imported ICT items into economic growth. Data privacy, cybersecurity, and intellectual property

protection are issues that must be addressed to create an environment suitable for the expansion of the digital economy (Mat et al., 2019).

However, FinTech is still an emerging field and in its nascent phase (Sangwan et al., 2020; Bshayreh et al., 2025). Despite regulators' willingness and encouragement for FinTech innovation, marginalised people continue to have uneven access to financial activities and wealth. Indeed, the COVID-19 epidemic and its economic consequences have highlighted and deepened long-standing disparities. Therefore, minorities have not only suffered disproportionately from the coronavirus's health impacts, but also have been affected badly economically. As a result, the racial wealth disparity has widened during the crisis (Jones & Maynard, 2023).

Consequently, this study has the following objectives:

- analyze the impact of ICT goods on economic growth;
- investigate the effect of ICT goods exports on economic growth;
- examine the implications of individual Internet usage on economic growth;
- study the influence of fixed broadband subscription on economic growth;
- analyze the impact of labor force participation rate on economic growth.;
- investigate the effect of cellular subscription rate on economic growth.

It is crucial to understand the FinTech dimensions' impact on financial system stability (AlBaker, 2024).

Thus, this study raises the following questions:

RQ1: What is the impact of information and communication technology goods on economic growth?

RQ2: What is the effect of information and communication technology goods exports on economic growth?

RQ3: What is the individual Internet usage implication on economic growth?

RQ4: What is the influence of fixed broadband subscription on economic growth?

RQ5: What is the impact of labor force participation rate on economic growth?

RQ6: What is the impact of cellular subscription rate on economic growth?

Therefore, this study looks at how different aspects of FinTech affect economic growth, measured by GDP, in the Middle East. It uses yearly data from 12 Middle Eastern countries between the years 2000 and 2021, exploiting correlation analysis, regression analysis, and validity tests (multicollinearity and heteroscedasticity).

The findings revealed that the economic growth is impacted positively and significantly by the FinTech dimensions (such as ICT goods exports, fixed broadband subscriptions, and labor force participation rate). In contrast, it is affected significantly and negatively by ICT goods imports and Inflation. While insignificant effects by individuals using the Internet, mobile cellular subscriptions, and population are found on economic growth.

The structure of this paper is as follows. Section 2 shows the literature review and the hypotheses development regarding the FinTech dimensions and economic growth relationships. Section 3 presents the methodology that has been used to conduct empirical research, including research design, measurement, description, and sources of the study's variables, data collection, and econometric specification. Section 4 reflects the main findings and results discussion. Section 5 provides the conclusions and recommendations for prospects.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

FinTech is an industry term that refers to any corporation that offers software and any technology-based financial services, ranging from mobile payments to cryptocurrency. FinTech, in general, attempts to attract clients by offering more user-friendly, efficient, transparent, and automated goods and services that are now available. The traditional banks have yet to investigate all potential advancements in this area (Mackenzie, 2015). In this regard, FinTech has led to a huge revolution in the financial industry, including incremental technical advancements in financial services. FinTech has also caused substantial changes in how the financial industry is planned and functioning in the digital age. Further, FinTech has heavily affected customers to go toward digitalization by boosting speed and lowering prices. As a result, more specialized financial services geared toward people have emerged (Pasa et al., 2021).

According to Philippon (2016), FinTech provides development in the industry by enhancing the business cycle to create more extensive ways of channeling goods and services, create new paths to business enterprise, improve access to financial services, and make critical protection, administrative, and legal implementation. Though FinTech possesses the ability to make financial activities more accessible and inexpensive, it is unrealistic to expect technology to tackle the complicated issue of wealth disparity on its own. After all, FinTech firms face the same market incentives as traditional financial firms, with limited motivations to address underlying factors such as uneven access to credit and financial activities, as well as lower rates of return and discrimination. Nonetheless, prominent industry actors tout FinTech as a fundamental tool of advancing financial inclusion for historically excluded and marginalised areas (Jones & Maynard, 2023). AlBaker (2024) shows that how well FinTech companies perform financially is an important factor that helps the economy grow in Organisation for Economic Co-operation and Development (OECD) countries. This is useful information for Middle East and North Africa (MENA) countries trying to build better digital finance systems. Al Rifai and AlBaker (2025) support this idea by proving that when governments work to include more people in FinTech, it leads to real improvements in access to financial services, which in turn helps entrepreneurship and increases GDP in areas that are not well-served by traditional banking. Kantheti and Bvuma (2024) also show through their research that faster payment systems and better liquidity from FinTech lead to more new businesses and more spending by households, both of which help the economy grow faster.

Gurram (2025) pointed out that using artificial intelligence (AI) and alternative data in FinTech can help small businesses in areas where credit is hard to get, but it also brings problems like a lack of transparency and biased algorithms. Chinoda and Kapingura (2024) looked at North African countries and found that digital lending and blockchain for

sending money have made it easier for people, especially young people and those in rural areas, to get money and be more financially stable. Kantheti and Bvuma (2024) noted that fast digital payment systems, especially when supported by new ideas from central banks, help people spend more, make businesses more official, and bring different regions of an economy closer together. Hapsari et al. (2019) showed that regulatory sandboxes in the MENA are good ways to support new FinTechs while keeping risks under control. They suggest that having good rules is just as important as using new technology to help economies grow in a lasting way. These findings show how powerful FinTech can be, but also highlight the need for fair strategies, based on data, and tailored to local needs in developing countries.

FinTech has a significant influence on the operations of various firms and has laid the groundwork for financial institutions to differentiate their products from competitors. Therefore, FinTech is crucial for allocating funds to efficient uses and assigning risk to those who can manage it, thereby boosting economic growth (Chepngeno, 2022). In their study, Liu and Walheer (2022) found that FinTech plays an important role in enhancing financial inclusion. In the Asian region, Azizan (2019) revealed a substantial and long-lasting relationship between FinTech and economic growth. More specifically, FinTech, such as fixed broadband, ICT exports, and inflation, has a positive impact and is cointegrated with economic growth, whereas ICT imports and mobile users hinder economic growth. Imeraj et al. (2025) examined more closely how the adoption of FinTech worldwide affects various aspects, highlighting both benefits and new risks — such as the potential increase in income inequality — which could be more severe in poorer areas lacking adequate infrastructure.

Besides, Chepngeno (2022) found that there is a significantly positive influence between the FinTech dimensions, such as mobile banking, M-Pesa, and Internet banking, and economic growth. However, inflation has a negative influence on economic growth, and there is an insignificant influence of the unemployment rate and the agency banking on the economic growth.

Based on the data from the Green Economy Index, Metawa et al. (2022) revealed that government support for clean technology creation, as well as rising investor interest in FinTech businesses, would spur green economic growth. In this regard, Bahrini and Qaffas (2019) showed that other FinTech tools, such as ICT, mobile phone, fixed broadband subscriptions, and Internet usage, are considered essential drivers of economic growth in the MENA context. In addition, Chatterjee (2020) found that in the developing nations, the significance of ICT indicators in promoting financial inclusion and hence growth is not encouraging. In another study, Hussein (2020) revealed a significant association between the FinTech tools, such as mobile subscribers, mobile money accounts, and the use of the Internet, with financial inclusion in Egypt. AlBaker (2024) looked at factors that affect how well FinTech companies perform financially. They found that the economic situation and policies supporting innovation in developed countries can provide important lessons for helping FinTech grow in MENA countries.

Selecting 19 countries randomly, Daud (2018) showed that FinTech leads to a boost and enhances economic growth. More specifically, energy consumption and mobile cellular subscriptions also have a longitudinal positive and significant relationship with economic growth, whereas the population has a negative influence on economic growth. In another study, Lum (2011) found that mobile cellular subscriptions positively and significantly affect GDP growth. Lee et al. (2012) also revealed that mobile cellular has a significant role in the economic growth in Africa. Njogu (2020) revealed that M-Pesa transactions, rate of economic growth, and the interest rate have a positive and significant influence on the financial development as a percentage of the GDP in Kenya. In contrast, the agency banking, mobile banking, and Internet banking have a positive but insignificant influence on the financial development. Langi et al. (2024) looked at how peer-to-peer lending through FinTech acted as an important financial bridge during the COVID-19 pandemic, offering valuable insights into the strength and new ideas for financial systems in the Middle East.

As a more sustainable and cost-effective solution to the challenges of financial inclusion and economic growth, Manawar et al. (2023) illustrated that FinTech has the potential to enhance the economic security of the people in developing countries. In addition, Isukul and Tantua (2021) showed that FinTech should be employed to drive financial growth in developing nations. To overcome their financial development difficulties, developing countries should embrace, adopt, and adapt FinTech.

In this regard, FinTech can have a transformative impact on the economic growth in developing countries by addressing key challenges and unlocking new opportunities (Doszhan et al., 2020). Therefore, this study developed several potential ways in which FinTech can influence the economic growth in these contexts, as shown in Table 1.

Table 1. Ways in which FinTech can influence economic growth in developing countries (Part 1)

Topic	*Problem*	*FinTech Solution*	*Impact*
Financial inclusion	Several individuals in developing economies lack access to traditional banking services due to limited infrastructure and high costs.	Mobile banking, digital wallets, and other FinTech solutions provide affordable and accessible financial services, thus bringing more people into the formal financial system.	Increased financial inclusion can stimulate economic activity by empowering individuals to save, invest, and access credit.
Access to capital	SMEs often struggle to access traditional financing, hindering their growth potential.	Peer-to-peer lending platforms and crowdfunding enable SMEs to access capital from a broader pool of investors, fostering entrepreneurship.	Increased funding opportunities for businesses can lead to job creation and overall economic expansion.
Efficiency and cost reduction	Manual and inefficient processes in traditional banking systems can lead to high transaction costs.	Automation, blockchain, and digital payment systems streamline financial processes, reducing costs and enhancing efficiency.	Lower transaction costs benefit both businesses and consumers, promoting economic growth through increased productivity.

Table 1. Ways in which FinTech can influence economic growth in developing countries (Part 2)

Topic	*Problem*	*FinTech Solution*	*Impact*
Risk mitigation	Limited access to credit is often exacerbated by a lack of credit history and risk assessment tools in developing countries.	Alternative credit scoring models based on non-traditional data, such as mobile usage and online behavior, can enable more accurate risk assessments.	Improved risk assessment can lead to increased lending, supporting economic activities that might have been deemed too risky by traditional methods.
Digital payments and remittances	Inefficient and costly cross-border transactions can hinder international trade and remittance flows.	Digital payment platforms and blockchain technology facilitate faster, safer, and cost-effective cross-border transactions and remittances.	Enhanced international financial connectivity promotes trade and increases the inflow of remittances, thus positively affecting the local economy.
Entrepreneurship and innovation	Limited access to financing and resources can stifle entrepreneurial activities.	FinTech ecosystems nurture innovation by providing funding, mentorship, and support to startups and entrepreneurs.	A thriving entrepreneurial ecosystem contributes to economic diversification, job creation, and technological advancement.
Government efficiency	Inefficiencies in government disbursement of funds and public services can hinder economic development.	Digital government services, e-governance, and blockchain can enhance transparency and efficiency in public administration.	Improved government efficiency can lead to better allocation of resources, reduced corruption, and a more conducive environment for economic growth.

Source: Authors' elaboration.

In conclusion, FinTech has the potential to play a pivotal role in driving economic growth in developing countries by addressing financial access barriers, improving efficiency, and fostering innovation and entrepreneurship. However, it is crucial to manage potential risks such as regulatory challenges and cybersecurity concerns to ensure sustainable and inclusive growth.

Some prior studies have focused solely on the depiction of differences, whereas others have aimed to understand the emergence of state factional management and its applicability. The basic driving force of the industrial evolution is technological innovation. In this context, Schumpeter (1959) developed the theory of innovation by combining technology and economics. He used the term "innovation" to suggest that technological progress causes an imbalanced country's economic growth and unstable social development. He argued that innovation is considered the driving force behind economic development and the encouragement of industrial or structural changes in any economy. He also highlighted the significant role of technological development in enhancing economic growth.

In addition, Romer (1990) introduced the endogenous growth theory (EGT). This theory applied to FinTech shows that the integration of FinTech is critical to promoting long-term sustainable economic growth. Continuous improvement and acceptance of FinTech contribute to enhanced efficiency, financial inclusion, creativity, and resilience, which all can have a favourable impact on a country or region's economic performance. Regarding FinTech, EGT suggests that the adoption and advancement of the FinTech dimensions can stimulate innovation, productivity, and efficiency, and then the economic growth, which can be achieved by various channels, such as innovation and productivity, access to finance, entrepreneurship and start-ups, data-driven decision-making, and economic resilience. Therefore, according to the above discussions, the following hypotheses were formulated:

H1: Information and communication technology goods imports are positively associated with economic growth.

H2: Information and communication technology goods exports are positively associated with economic growth.

H3: Individuals using the Internet are positively associated with economic growth.

H4: Fixed broadband subscriptions are positively associated with economic growth.

H5: Labor force participation rate is positively associated with economic growth.

H6: Mobile cellular subscriptions are positively associated with economic growth.

In this study, the FinTech dimensions represent the independent variables, namely ICT goods imports (*ICT_IMP*), ICT goods exports (*ICT_EXP*), individuals using the Internet (*IUI*), fixed broadband subscriptions (*FBS*), labor force participation rate (*LFPR*), and mobile cellular subscriptions (*MCS*). The main dependent variable is economic growth, which is measured through *GDP*, whereas *INFLATION* and population (*POP*) represent the control variables.

3. RESEARCH METHODOLOGY

3.1. Collection and resources of the data

The sample in this study included 12 countries in the Middle East, namely Jordan, the United Arab Emirates, Algeria, Bahrain, Egypt, Kuwait, Lebanon, Morocco, Oman, Qatar, the Kingdom of Saudi Arabia, and Tunisia. However, other countries are excluded due to the unstable situations, revolutions, and the war, such as Yemen, Iraq, and Palestine. The analysis covers twenty-two years from 2000 to 2021. The needed data of the variables under investigation were collected from the World Bank website[1]. As mentioned earlier, the dependent variable is economic growth (*GDP*), whereas the independent variables are the FinTech dimensions, represented by *ICT_IMP, ICT_EXP, IUI, FBS, LFPR*, and *MCS*. In addition, this study utilized control variables that possess a potential impact on economic growth, namely Inflation and Population. Measurement, description, and sources of the study's variables are shown in Table 2 below.

[1] https://data.worldbank.org/

Table 2. Measurement, description, and sources of the variables

Variable	*Symbol*	*Description*	*Measurement*	*Source*
Economic growth	*GDP*	Dependent variable	Annual percentage growth rate of GDP at the market prices according to constant local currency.	World Bank Open Data
ICT goods imports	*ICT_IMP*	Independent variable	Total percentage of the goods imports.	
ICT goods exports	*ICT_EXP*		Total percentage of the goods exports.	
Individuals using the Internet	*IUI*		Percentage of population.	
Fixed broadband subscriptions	*FBS*		Total of fixed subscriptions to high-speed access to the general Internet.	
Labor force participation rate	*LFPR*		Percentage of the total population aged 15–64 years old.	
Mobile cellular subscriptions	*MCS*		Number of mobile cellular subscriptions.	
Inflation	*INFLATION*	Control variable	Consumer prices (annual %).	
Population	*POP*		Total population.	

Note: IUI — individuals who have used the Internet via a computer, digital TV, mobile, or any device; FBS — residential and companies' subscriptions; LFPR — people aged 15 years old to 64 years old who are economically active; MCS — all subscriptions of the mobile cellular; Inflation — the change percentage per year in the cost to the average consumer of gaining a basket of goods or services; POP — all of the residents.
Source: Authors' elaboration.

3.2. Econometric specification

The current study examines the impact of FinTech dimensions (*ICT IMP, ICT EXP, IUI, FBS, LFPR,* and *MCS*) on *GDP* in the context of the Middle East countries, as follows. However, other methods could also work well for studying the same thing. For example, panel vector autoregression (PVAR) can illustrate how variables relate to each other over time, and it can account for the possibility that changes in FinTech may influence GDP growth, and vice versa (Abrigo & Love, 2016).

$$GDP = \beta_0 + \beta_1 ICT\_IMP + \beta_2 ICT\_EXP + \beta_3 IUI + \beta_4 FBS + \beta_5 LFPR + \beta_6 MCS + \beta_3 INFLATION + \beta_8 POP + \varepsilon \quad (1)$$

where, β_0 = constant, $\beta_1 - \beta_8$ = coefficients, and ε = error term.

3.3. Descriptive statistics

Table 3 below shows the descriptive statistics of the variables under investigation in this study. Mean of the dependent variable measured using *GDP* is 3.540, broadly dispersed from a minimum of -21.4 to a maximum of 26.170, and with a standard deviation of 4.379. Mean of the FinTech dimensions is as follows: *ICT_IMP* (5.036%), *ICT_EXP* (1.642%), *IUI* (48.749%), *FBS* (1009800), *LFPR* (58.725%), and *MCS* (18622488). As for the Inflation and POP, they have a mean of 4.725% and 20859496, respectively. Maximum, minimum, and standard deviation of the independent variables and the control variables are presented in Table 3 below.

Table 3. Descriptive statistics of the variables

Variables	*GDP*	*ICT_IMP*	*ICT_EXP*	*IUI*	*FBS*	*LFPR*	*MCS*	*INFLATION*	*POP*
Mean (3.540)	3.540	5.036	1.642	48.749	1009800	58.725	18622488	4.725	20859496
Max (26.17)	26.17	17.185	9.054	99.374	10835866	88.860	103000000	154.756	109000000
Min (-21.4)	-21.4	0.001	0.000	2.195	26	38.058	266703	-2.540	713186
Std. dev (4.379)	4.379	2.136	2.178	31.843	1883960	14.070	24143179	12.571	26472479

Source: Authors' elaboration.

3.4. Correlation matrix

The correlation and significance of the variables under investigation in this study, namely *GDP, ICT_IMP, ICT_EXP, IUI, FBS, LFPR, MCS, inflation,* and *POP,* are presented in Table 4. As shown, the correlation values between variables are less than the value of harmful multicollinearity (< 0.8).

Table 4. Correlation and significance of the variables

Variable	*GDP*	*ICT_IMP*	*ICT_EXP*	*IUI*	*FBS*	*LFPR*	*MCS*	*INFLATION*	*POP*
GDP	1								
ICT_IMP	-0.133	1							
	0.056								
ICT_EXP	-0.025	0.437	1						
	0.722	0.000							
IUI	-0.371	0.238	0.066	1					
	0.000	0.001	0.346						
FBS	-0.098	0.265	0.097	0.302	1				
	0.161	0.000	0.167	0.000					
LFPR	0.055	0.160	-0.153	0.515	-0.125	1			
	0.434	0.022	0.028	0.000	0.074				
MCS	-0.038	0.059	0.056	0.031	0.727	-0.336	1		
	0.589	0.404	0.423	0.661	0.000	0.000			
INFLATION	-0.240	-0.155	-0.054	0.027	0.027	-0.120	0.081	1	
	0.001	0.027	0.445	0.699	0.696	0.087	0.250		
POP	0.017	-0.031	0.006	-0.219	0.561	-0.445	0.753	0.104	1
	0.807	0.663	0.936	0.002	0.000	0.000	0.000	0.137	

Source: Authors' elaboration.

3.5. Relaxing the various assumptions

Multicollinearity is an examination to check whether the explanatory variables under investigation have a high correlation with each other in a specific regression model. This issue can lead to undermine the statistical significance of such variables (Hair et al., 2014). Thus, this study utilized the variance inflation factors (VIFs) examination to examine the Multicollinearity problem. If the VIF values are less than 10, then it is an indication that there is no issue regarding the Multicollinearity (Gujarati & Porter, 2009). As shown in Table 5, all values of the explanatory variables are less than 10.

Table 5. Variance inflation factor test

Variable	*Centered VIF*
ICT_IMP	1.487
ICT_EXP	1.357
IUI	1.999
FBS	2.766
LFPR	1.839
MCS	5.777
INFLATION	1.061
POP	4.829
C	NA

Source: Authors' elaboration.

The general assumption in the regression analysis of the panel data is that there must be no issue regarding the heteroskedasticity and serial correlation issues. Table 6 shows the results of the heteroskedasticity and serial correlation problems. The results revealed that the probability (Sig.) values of the heteroskedasticity and serial correlation tests are insignificant (0.217) and (0.106), respectively. Then, this study has no problems regarding Heteroskedasticity and serial correlation.

Table 6. Probability of the heteroskedasticity and serial correlation tests

Test	*Result*
Heteroskedasticity	Prob (0.217)
Serial correlation	Prob (0.106)

Source: Authors' elaboration.

4. RESULTS AND DISCUSSION

The regression analysis of the influence of FinTech on *GDP* is represented in Table 7. As mentioned above, the dimensions of the FinTech, namely *ICT_IMP, ICT_EXP, IUI, FBS, LFPR*, and MCS, serve as the independent variables, whereas *INFLATION* and *POP* serve as control variables. Using the fixed effect method through the EViews software, the regression analysis in Table 7 shows that the R-squared is 0.528, which indicates that the FinTech dimensions explain 52% of the variance in GDP, and the Prob (F-stat) is found to be significant at 0.000. Thus, the model is considered statistically significant.

Table 7. Regression analysis: The influence of FinTech dimensions on *GDP*

Variable	*Coefficient*	*Standard error*	*t-statistic*	*p-value*
ICT_IMP	-0.368	0.136	-2.699	0.008
ICT_EXP	0.221	0.123	1.788	0.076
IUI	-0.018	0.028	-0.651	0.516
FBS	0.000	0.000	1.739	0.084
LFPR	0.078	0.028	2.814	0.005
MCS	0.000	0.000	1.210	0.228
INFLATION	-0.074	0.020	-3.807	0.000
POP	0.000	0.000	-1.021	0.309
C	1.106	1.376	0.804	0.422
Mean dependent variable		3.540	R^2	0.528
S.D. dependent variable		4.379	Adj R^2	0.453
Durbin-Watson		1.517	F-stat	7.024
Dependent variable		GDP	Prob (F-stat)	0.000

Source: Authors' elaboration.

The results revealed that among the FinTech dimensions, *ICT_IMP* is found to have a significantly negative influence on *GDP*. This result reflects that the *ICT_IMP* affects the *GDP* inversely in the Middle East context. *ICT_IMP* can have varying effects on the economic growth and GDP of Middle Eastern countries due to various reasons. While ICT can help boost economic growth, it can also have a negative and detrimental impact in some situations, for instance, first, dependency on imports. If a country substantially relies on importing ICT goods without creating its own technology industry, it may face economic fragility. Dependence on foreign technology might expose the economy to external shocks like shifts in global trade dynamics, supply chain interruptions, or geopolitical concerns. Second, concerning trade imbalances, importing ICT items without equivalent increases in exports might create trade imbalances. In this regard, persistent trade deficits can put additional pressure on the country's balance of payments, causing a drop in foreign exchange reserves and potentially jeopardizing general economic stability. Third, regarding employment displacement, rapid adoption of modern technology through imports may result in employment displacement in conventional industries that are unable to keep up with technological advancements. This can lead to societal issues and challenges like unemployment and economic inequality. Finally, inadequate infrastructure, such as a lack of consistent Internet access and electrical availability, might stymie the efficient use of imported ICT items. This may impede the potential positive influence on productivity and economic growth. The result is consistent with the argument reported by Goliuk (2017), Dao (2017), Azizan (2019), and Vimalkumar et al. (2021). Chatterjee (2020) also supports that the association between ICT indicators and growth is not very promising in developing nations.

On the other hand, results revealed that *ICT_EXP, FBS*, and *LFPR* have a significantly positive influence on *GDP*. Such results indicate that dimensions of FinTech, such as *ICT_EXP, FBS*, and *LFPR*, have a significant contribution to achieving promising economic growth in the Middle East context. It can be generally concluded that achieving the promising economic growth in the Middle East

countries can be facilitated through leveraging *ICT_EXP*, increasing *FBS*, and enhancing *LFPR*. Below is an explanation of how each of these dimensions can contribute.

ICT_EXP exports can contribute to promising economic growth through diversification of the economy, revenue generation, technology transfer and innovation, and job creation. *FBS* can contribute to enhancing the economic growth in Middle Eastern countries through e-commerce growth, innovation, and entrepreneurship, quality of life improvements, as well as enhanced productivity. Finally, *LFPR* can improve economic growth through increased human capital, reduced skills mismatch, demographic dividend, particularly among the youth, and sustainable economic growth through increasing the potential of the available labor force, which is considered very important for meeting the demands of a growing economy and ensuring long-term prosperity. The reported result is on the same line with several previous studies, such as Chepngeno (2022), Hussein (2020), Bahrini and Qaffas (2019), and Azizan (2019).

In addition, the results show that *IUI* and *MCS* have an insignificant influence on *GDP*. The same results have been reported by Alheet and Hamdan (2020). Various reasons may contribute to the perception that *IUI* and *MCS* have an insignificant influence on the *GDP* or economic growth in some Middle Eastern countries, for instance, oil dependency. Many Middle Eastern countries rely largely on oil exports as their main source of wealth. The oil industry dominates the economy, making other industries, like technology and telecommunications which look minor in contrast. In addition, such results can be attributed to the infrastructure and access issues, focusing on specific economic sectors, cultural and regulatory factors, and high levels of unemployment among the youth in the Middle East context.

Regarding the control variables, the results showed that *INFLATION* has a negative and significant impact on *GDP* (economic growth). The same result was reported by Bahrini and Qaffas (2019), whereas population (*POP*) has an insignificant influence on *GDP*.

5. CONCLUSION

Research on FinTech's effects contributes to the development of regulatory frameworks. Establishing appropriate regulations helps mitigate the various risks, ensuring the integrity and stability of financial systems, and fostering innovation that enhances sustainable economic growth. In addition, understanding the implications of FinTech dimensions on the stability of the financial systems is crucial. While FinTech can bring about positive changes, it also introduces new risks; therefore, investigating its influence allows for the development of measures to ensure the stability and resilience of the financial systems. FinTech fosters entrepreneurship by providing a platform for innovative financial solutions. Understanding the influence of FinTech on economic growth helps policymakers create an environment that supports startups and innovative ventures, thus enhancing economic dynamism and job creation. Further, investigating the FinTech-economic growth relationship provides insights into how governments and industry players can collaborate to harness the benefits of FinTech. Such collaboration can lead to strategic investments, policy adjustments, and public-private partnerships that support economic growth.

In this regard, the Middle East, like many economies, faces several challenges related to financial inclusion. Studying FinTech's issues can shed light on how digital financial services and technologies can extend access to financial services, particularly in areas with limited traditional banking infrastructure, thus promoting financial inclusion and economic growth. Moreover, several Middle Eastern countries have a youthful population. Examining the implications of FinTech is vital, as younger generations are often early adopters of the technology. FinTech can align with the preferences and behaviour of the youth, potentially driving economic growth through technology-driven financial services. Therefore, this study aimed to examine the effect of FinTech dimensions on the economic growth (through GDP) in the Middle East context. Utilizing yearly panel data of the period (2000–2021) for 12 Middle Eastern countries, the results revealed that the FinTech dimensions, such as ICT goods exports, fixed broadband subscriptions, and labor force participation rate, have a significant positive impact on economic growth (GDP) in the Middle East context. In contrast, there is a significantly negative relationship between ICT goods import and Inflation with the economic growth (GDP). Besides, individuals using the Internet, mobile cellular subscriptions, and the population are found to have insignificant effects on economic growth.

It is critical to recognize that the impact of the FinTech dimensions, such as Internet and mobile technologies, on GDP and economic growth is dynamic and can be changed over time. As the Middle Eastern countries continue to invest in digital infrastructure, education, and innovation, technology's role in driving economic growth may become more significant in the near future. In addition, FinTech has an important impact on economic growth indicators, such as increased access to capital through empowering entrepreneurs and start-ups, and facilitating business expansion. Job creation and income growth are also achieved by fostering entrepreneurship and enhancing employment opportunities in the financial sector. Further, improving productivity and efficiency can be fulfilled by streamlining financial processes and automation manual tasks.

To mitigate the potential negative effects and maximise the positive contributions of the ICT goods imports to the economic growth, Middle Eastern policymakers should focus on developing a comprehensive approach that includes fostering domestic innovation, investing in education and skill development, and implementing supportive regulatory frameworks. In general, there are several mechanisms through which FinTech affects economic growth, for instance, improving financial inclusion through accessibility to financial services and reaching the unbanked and underbanked. Enhanced efficiency in transactions is represented by speed and cost reduction, increased transaction security, and innovation in lending and investment by using peer-to-peer lending platforms and crowdfunding and venture capital. Consequently, policymakers and regulatory bodies are required to pay more attention to educating people about the benefits of FinTech.

Furthermore, this study provides valuable insights for policymakers, businesses, and researchers in the Middle East context. There are some challenges regarding FinTech, but there are always potential solutions to any challenges, as follows. The infrastructure challenges can be solved through addressing connectivity issues and building digital infrastructure. Challenges regarding the regulatory considerations can be addressed through developing appropriate regulatory frameworks, balancing innovation with consumer protection, and collaboration between FinTech and banks. Cybersecurity concerns can be controlled by building resilience against cyber threats and educating users on Cybersecurity best practices.

This study has some limitations, namely, some indicators of FinTech may not be consistently available or reported in all sampled countries, particularly in the years 2000 to 2010. In addition, in the absence of direct information regarding the use of FinTech, existing indicators might not fully reflect the real influence on economic growth.

The current study provided some recommendations for the prospects. For instance, future studies can conduct an investigation into the potential future developments in FinTech. Future studies could also provide policy recommendations for governments and regulatory bodies, as well as suggestions for companies and financial institutions regarding FinTech. It is recommended for future researchers to conduct such an investigation in any country in the Middle East separately. Examining the impact of FinTech on the firm's performance in a specific sector can also provide significant insights.

Yet, as FinTech continues to advance and the financial landscape evolves, there will likely be several challenges and various opportunities to explore. It can be concluded that FinTech is still an emerging field and is in its nascent phase. The followings are some potential research directions in the FinTech areas: 1) the influence of FinTech on the environmental, social, and governance factors; 2) the role of FinTech in promoting sustainable development and socially responsible practices; 3) examine emerging cybersecurity threats in the FinTech areas and propose countermeasures; 4) influence of FinTech in promoting financial literacy, education, and financial inclusion; 5) the influence of FinTech on the green finance; 6) the effect of the cryptocurrencies on the traditional financial systems; and 7) the role of AI and machine learning in FinTech towards risk assessment and fraud detection.

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