An Examination of impact of infrastructure on Foreign Direct Investment: The Role of Institutional Quality in MENA Region from (2000-2020)

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Abstract

Foreign direct investment has become one of the tools for many developing countries in recent years to enhance overall economic growth. The aim of this study is to empirically examine the impact of infrastructure indictors on FDI using institutional quality as moderator in 15 counties from MENA Region from 2000 till 2020. Initially, Principal component analysis (PCA) was utilized to construct composite indicator for infrastructure, furthermore dynamic generalized least square (GLS) was applied to assess the impact of infrastructure on FDI. The results showed that there is a

negative and significant relationship between infrastructure and FDI in the MENA Region. The study recommends policymakers should focus on strengthening the quality of infrastructure as one aspect in attracting FDI, besides considering how investment gap associated with infrastructure growth could impact FDI inflow.

Keyword: FDI, Infrastructure, MENA Region, PCA, Generalized least Square.

1-Introduction

Foreign direct investment is a very important factor for enhancing economic growth as it adds value for host countries through providing home country with technology, new capital and creating employment opportunities which stimulate the economic growth as well as improve efficiency and amounts of investments in host country according to neoclassical growth theories. Furthermore, home country benefit from FDI through expanding into new markets seeking for higher profits, additional market share or benefit from skills and knowledge host country have or even seeking a strategic goal according (Dunning 1996 & 2000).

Secondly, infrastructure is one most important determinants that foreign investor consider when they are considering making investment outside their home country as infrastructure is very vital component for FDI especially for developing countries as African countries which the relationship between infrastructure and FDI is not quietly examined (Michiels

2018), as improving the infrastructure have a significant impact on attracting more FDI especially in developing countries as lower level of infrastructure contribute directly in increasing risk burden as well as increasing also cost associated for investment which discourage foreign investors to invest outside their home country Asiedu and Esfahani (2003), the main issue facing infrastructure in developing countries is the quality of infrastructure itself as it is a very crucial element for U.S investors to make FDI Wheeler and Mody (1992), furthermore infrastructure has positive and significant impact on FDI and enhancing its quality is essential, thus study is considering this effect on FDI and considering how the quality of infrastructure impact foreign decision in MENA region and African Countries as the quality of infrastructure still in progress and have not been quietly investigated in those regions

Thirdly, MENA Region had faced many challenges especially when it comes to enhancing economic growth and attracting more FDI due to instability in terms of political, economic and financial constraints, consequently foreign investment is very crucial for overcoming issues MENA region have been facing considering the last ten years "The Arab Spring" as many countries faced very sever political instability as Egypt, Tunisia, Libya and Yamen that witnessed revolution and changing in political regimes which affected their capabilities in attracting FDI and serving MNEs with right resources for

expansion as well as many MENs had forced to exist the market which had a huge impact on overall country's economy, monetary and fiscal policy and unemployment.

Fourthly, Institutional quality is also another determinant for attracting FDI especially MENA region since those countries faces very fragile institutional as North (1989) stated that economic behavior and incentives are influenced by a set of rules and limitations, which play a crucial role in determining economic growth. Dunning & Lundan (2008) argued that institutions and quality of host country have crucial role in shaping FDI as to understand the mechanism of MNEs, the institutional factor should be considered with alignment of eclectic paradigm.

Consequently, this study aims to address how infrastructure impact FDI inflows, besides focuses on providing insights toward how to improve the current and future infrastructure to attract more FDI. Consequently, the rest of the study is organized as follows; the next section provides a literature review about the relationship between infrastructure and FDI and theoretical background for FDI. The third section will focus on the study's methodology in data collection and main variables. The fourth section will be devoted to empirical results and discussion of the study. Finally, the fifth section devoted to conclusion and recommendation of the study.

2-Literature review

Infrastructure and Foreign Direct investment

Infrastructure is considered as one of the determinants for attracting FDI, as the quality of infrastructure has a major impact on attracting FDI (Chen et al., 2020). The definition of infrastructure has been reviewed by many researchers, but there is no common definition, but there is a classification of infrastructure because according to Tinbergen (1962), he introduced the distinction between infrastructure such as roads, education and superstructure such as manufacturing, agriculture and mining activities without a precise definition or theoretical framework. Furthermore, infrastructure was categorized based on social or economic needs, as physical structures related to social infrastructure that added value to society, such as schools and hospitals, while economic infrastructure was more related to the commercial side, such as communication channels, sources of electricity and water. Therefore, the aim of this subsection is to review previous works that have examined the relationship between different types of infrastructure and FDI. These works are based on developing countries.

The impact of infrastructure on FDI in developing countries has generated mixed results. More precisely, Khadarooa & Seetanah (2007) studied the impact of transport infrastructure on FDI in sub-Saharan Africa, including a sample of 30 countries during the period 1984-2002. The results of the

GMM method revealed that transport infrastructure has a positive and significant impact on FDI. This reflects the importance of transport in attracting more FDI, particularly in African countries. in addition, it is essential to note that many sub-Saharan countries favor reducing budgetary infrastructure spending, which could significantly influence FDI flows. in fact, the authors concluded that it is crucial to encourage sub-Saharan governments to scale their infrastructure investment activities and improve the quality of their institutions.

In the same vein, Seetanah & Khadaroo (2007) investigated the impact of transport infrastructure on FDI. To do this, they developed a sample composed of 25 African countries covering the period 1985-2004. Using the GMM method, the authors found that transport infrastructure has a positive and significant impact on FDI. Certainly, the financial burden caused by poor quality infrastructure can hinder foreign investors. This is why this study claims the extent of infrastructure in determining and attractiveness of FDI flows in Africa.

In addition, Abdul Rehman et al., (2010) assessed the impact of infrastructure on FDI in Pakistan over a period from 1975 to 2008, using the automatic regression distribution shift framework. The results highlighted a positive and significant relationship between infrastructure and FDI. This highlights the importance for policymakers to put in place policies to promote infrastructure development in addition to other determinants of FDI. This

highlights the fact that attracting more FDI depends on the presence and good quality of infrastructure. The authors concluded that FDI plays a crucial role for the host country by introducing new technologies and adding value to the national economy.

Soto & Martinez-Cobas (2024) analyzed the influence of logistics infrastructure on foreign investments in the Americas and the Caribbean from 2008 to 2021. Their results highlight that FDI is attracted to countries with well-developed transport and telecommunications infrastructures, granting particular importance to a reliable electricity network in Latin America. They observed that there is a threshold beyond which investments in transport infrastructure do not further contribute to attracting FDI. Furthermore, their analysis reveals that the region attracts FDI due to new market opportunities and more competitive production costs. They also noted that economic openness in Latin America may deter investment from neighboring countries, highlighting the need for policies to balance the attraction of foreign capital with international agreements.

Zhao et al., (2024) found pandemics in FDI target countries lead to a significant decline in FDI flows into China. In addition, the authors showed that different types of infrastructure in FDI target countries variably modify the effect of pandemics on these flows. While transportation infrastructure greatly mitigates the negative impact of pandemics, information and

energy infrastructure accentuate it. These empirical results are robust and take into account endogeneity problems.

In summary, it should be noted that the results of this research are also mixed. In addition, it is important to note that the literature on the link between infrastructure and FDI is largely focused on developing countries, particularly African countries. As a result, the hypothesis of this study is as follows:

Hypothesis 2. *Infrastructure affect FDI.*

    Hypothesis 2 (a). *Road Connectivity has negative and Significant impact on FDI.*

    Hypothesis 2 (b). *Quality of Roads has a negative and Significant impact on FDI.*

    Hypothesis 2 (c). *Railway Density Efficiency has negative and Significant impact on FDI.*

    Hypothesis 2 (d). *Efficiency of air transport has negative and Significant impact on FDI.*

    Hypothesis 2 (e). *Efficiency of Seaport Service has negative and Significant impact on FDI.*

3-Methodology

This section is classified into two main sub-sections, first sub-section will explain sample size of this study as well as main variables used in this study. Second sub-section will explain the methodology used in this study.

3.1-Population of the study

Noisy variable a strong endogenous link between dependent and independent variable are significantly correlated omitted variable recognized a major challenge that cross-country studies often face. To mitigated and regulate those factors, future studies suggest that the focus of studies should be directed toward one country or region (Habbash 2010, Basruddin 2011, Amer 2016 and Attia 2017). As well as applying this approach provides more reliable understanding for research and better designing for the study. Furthermore, (Serkaran 2003) stated that sample-based studies defining population being deployed is highly crucial in determining whether sample selected provides a valid presentation of population. Consequently, this study focuses on Middle East and North Africa Countries MENA Region consisting of only 15 countries after excluding three countries due to inability of researcher to obtain data for all of them, besides the final sample includes 314 observations from 2000 till 2020.

Table (1)

#	Countries		
1	Algeria	9	Morocco
2	Bahrain	10	Oman
3	Egypt	11	Qatar
4	Iran	12	Saudi Arabia
6	Iraq	13	Tunisia
6	Jordon	14	UAE
7	Kuwait	15	Yemen
8	Lebanon		

Source: Prepared by the author based on data from the World Bank

3.2- Dependent Variable

The main dependent variable of the study is Foreign Direct Investment (FDI), net inflows, measured as a percentage of the Gross Domestic Product (GDP). This variable is retrieved from the World Development Indicators (WDI) on the World Bank Database.

3.3 Independent Variables

The main independent variable of the study is Infrastructure this is the main primary indicators are dependent on some secondary indicators retrieved from Global Competitiveness Report 2019 (Chen et al., 2020) as shown in the table below.

Table (2) Variable Summary

Variable	Label	Measure	Source
Dependent Variable			
Foreign Direct Investment	FDI	Net inflows (% of GDP)	World Bank Database
Independent Variable			
2-Infrastructure			
Road Connectivity	RC	Score on the Road Connectivity Index, which measures average speed and straightness of a driving itinerary connecting the 10 or more largest cities that together account for at least 15% of the economy's total population. The scale ranges from 0 to 100	Global Competitiveness Report 2019 (Chen et al., 2020)
Quality of road Infrastructure	QRI	Response to the survey question "In your country, what is the quality (extensiveness and condition) of road infrastructure?" [1 = extremely poor—among the worst in the world; 7 = extremely good	Global Competitiveness Report 2019 (Chen et al., 2020)
Railway density efficiency	RD	Kilometres of railroad per 1,000 square kilometres of land	2017 or most recent year available	Global Competitiveness Report 2019 (Chen et al., 2020)

Efficiency of air transport	EAT	Response to the survey question "In your country, how efficient (i.e. frequency, punctuality, speed, price) are air transport services?" [1 = extremely inefficient, among the worst in the world; 7 = extremely efficient	Global Competitiveness Report 2019 (Chen et al., 2020)
Efficiency of seaport Service	ESS	Response to the survey question "In your country, how efficient (i.e. frequency, punctuality, speed, price) are seaport services (ferries, boats)?" [1 = extremely inefficient, among the worst in the world; 7 = extremely efficiency	Global Competitiveness Report 2019 (Chen et al., 2020)
Control Variable			
Real Interest Rate	RIR	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.	World Bank Database
Inflation Rate	INF	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	World Bank Database
Gross Domestic Product (Constant 2015 USD)	GDP	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products	World Bank Database
Financial Development	FD	Financial Development Index	International Monetary Fund (IMF) Svirydzenka 2016
Moderator Variables			
Voice and Accountability	VA	Capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Bank Database Kaufmann et.al (2010)
Government Effectiveness	GE	Capturing perceptions of the quality of public services, the quality of the civil service and the degree of its	World Bank Database Kaufmann et.al (2010)

		independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	
Political Stability	PS	Capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism	World Bank Database Kaufmann et.al (2010)
Regulation Quality	RQ	Capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank Database Kaufmann et.al (2010)
Rule of law	RL	Capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	World Bank Database Kaufmann et.al (2010)

Source: Prepared by the author based on data from the Global Competitiveness Report World Bank & IMF

3.4-Model Specification:

This study aims to investigate the impact of one of the variables of the investment facilitation which is infrastructure on foreign direct investment considering the moderating impact of IQ between the relationship between infrastructure indicators and FDI. For this purpose, model using panel dataset will be built to measure the impact of investment facilitation on FDI in the MENA region over the period 2000-2020. The analysis of this study will be based on the econometric work of (Chen et al.,

2020); however, the contribution of this thesis adds to that of their study. First, it will investigate the moderation effect of institutional quality on the relationship between investment facilitation and FDI. Second, the analysis will be based on a panel dataset for countries in the MENA region since it is very crucial to examine such relationship in these countries and accordingly, design specific policies for them. Third, the model analyzed different econometric techniques as discussed in the results such as static panel data models (random and fixed effects models) and system Stochastic Generalized Methods of Moments (SGMM). Fourth, the study will examine the effect of each primary indicator for infrastructure separately on FDI to see how the effect of each indicator will differ in the specified region. Finally, the model controls for financial development by using the financial development index retrieved from the International Monetary Fund (IMF) database as well as macroeconomic variables which driven from world bank database . In this instance, the empirical model that will be applied in the sudy can be written as follow.

$$\ln FDI_{it} = a_0 + a_1 \ln (INFR_{it}) + a_4 \ln (INF_{it}) + a_5 \ln (GDPPC_{it}) + a_6 \ln (FD_{it}) + a_7 \ln (RIR_{it}) + a_8 \ln (IQ_{it}) + a_9 \ln (INFR_{it} * IQ_{it}) + U_{1it}"$$

in Which

- FDI demotes as Foreign Direct Investment

- INFR demotes as Infrastructure.
- INF demotes as Inflation.
- GDPPC demote as Gross Domestic Product per Capita.
- RIR demotes as Real Interest Rate
- FD demotes as Financial Development
- IQ demotes as Institutional Quality

Where the subscripts i and t denote the country and time respectively. FDI denotes foreign direct investment net inflows, INF is inflation rate measured by the annual percentage change in the consumer price index, GDPPC is the GDP per capita measured in constant 2015 US dollars, FD is the financial development index, IR denotes the real interest rate, IQ refers to institutional quality which is measured by government effectiveness, political stability, regulatory quality, voice and accountability and rule of law. Finally, a_0 represent constant term, $(a_1 - a_9)$ represent the elasticities and U_1 is the error term.

3.5-Research Analytic Procedures

The current study uses the statistical package STATA 16. A descriptive statistics, the correlation matrix, panel data regression, dynamic panel threshold analysis are the main tests in the study.

3.5.1-Descriptive Statistics

A single variable in a structured format is used to represent the sample data based on the descriptive statistics for all variables in the research, including independent, dependent, and control variables. The mean, median, first quartile, third quartile, and standard deviation are used to determine the central tendency of each variable. Both the skewness and kurtosis of the data distribution provide information on the distribution's form, such as its symmetry, peakedness, and flatness, as compared to a normal distribution (Basiruddin, 2011; Hair, et al., 2012; Alessandro, 2013).

3.5.2-Correlation Matrix

The research uses two methodologies, namely the correlation matrix and variance inflation factor test (VIF), to investigate the issue of multicollinearity. The correlation between variables is shown by the pairwise correlation matrix, which measures the strength and direction of the linear link between two variables on a scale from +1 to -1. A correlation of ±1 signifies an ideal linear connection between the variables. Issues of multicollinearity are indicated when the correlation coefficient exceeds 0.60 and when there is a greater level of inter-correlation among the independent variables.

Multi-collinearity may undermine the predictive power of the regression model and the accuracy of coefficient estimate in

regression (Hababsh, 2010; Hair et al., 2012). In addition, the tolerance factor and variance inflation factor are used as robustness tests for multi-collinearity. The issue of collinearity across variables becomes apparent when the tolerance factor approaches zero and the variance inflation factor exceeds 10 (Habbash, 2010; Hair et al., 2012; Hassan and Ibrahim, 2014).

3.5.3-Regression Method

The most common technique used in this work is regression analysis, which is often regarded as the most prevalent tool available to econometricians (Brooks, 2019) and is also the most commonly used approach for multivariate analysis. Brooks (2019) states that the Ordinary Least Squares (OLS) regression is suitable for models that include both dummy and continuous variables, which is the situation in this study. Nevertheless, there are a number of underlying assumptions that must be satisfied prior to using parametric tests and verifying the soundness of ordinary least squares (OLS) regression (Habbash, 2010; Basiruddin, 2011; Hair et al., 2012).

The extant and recent studies such as (Hsiao, 2007, and Mejri, 2017) explained several advantages for panel regression analysis. Frist, it provides a way for minimizing the inherent statistical problems such as endogeneity. Secondly, it considers the time effect into account that is not noticeable in pure cross-section data. Thus, if an OLS regression for a single period provides a depiction, longitudinal data provide a series of

depictions (Habbash, 2010; Amer, 2016; Mejri, 2017; El-Kalla, 2017). Furthermore, using panel data approach researcher can obtain a larger number of observations, encounter high degrees of freedom and reduce the collinearity issues among the explanatory variables (Baltagi, 2008). Fourth, the panel data minimize eventually the influence of any omitted variables problems that may arise and control for unobservable individual heterogeneity and dynamics which is not possible in time series (N=1) and cross-sectional (T=1) regressions (Hsiao, 2007). Fifth, panel data may assist researchers in addressing a greater variety of issues, improving the efficiency of estimates, and expanding the breadth of interpretation. Finally, unlike pooled cross-section data, panel data cannot assume that observations are distributed randomly across time, therefore error terms for a given person may be associated over various periods. As a result, one of the major assumptions of OLS may be broken owing to the correlation between the error components, implying that OLS is no longer the best estimate. Econometrically, panel data sets are characterized as follows:

$Y_{it} = \alpha + \beta x_{it} + u_i$

Where Y_{it} is the dependent variable, α is the intercept, β is a k×1 vector of parameters; where k represents the number of explanatory variables, and x_{it} represents a 1× k vector of observations on the explanatory variable, where t=1,..., T and i= 1,......, N

As a result, the prior tests must be repeated to validate the data against the OLS assumptions. Nonparametric testing are preferred in this investigation. As a result, GLS regression may be more appropriate owing to its capacity to compensate for omitted variable bias and the existence of autocorrelation and heteroscedasticity. Using this method, this thesis may explore differences across cross-sectional units as well as fluctuations within individual units over time (Hassan et al. 2009; Basiruddin, 2011). Furthermore, the regression parameters do not change between cross-sectional units, increasing the dependability of the coefficient estimations. Before executing the regression analysis on panel data, the research should exert several specification tests to ensure that the regression model specification matches the data which will be discussed in next section. The research should address three major concerns: whether or not to pool the data, tests for individual and temporal effects, and heteroskedasticity of error terms.

Consequently, due to existence of these assumptions, the system generalised method of Moment (SYSTEM GMM) is preferred compared to OLS regression and (GLS) to control for endogeneity problems using instrumental variables (Al- Fayoumi et al., 2010; Ammann, Oesch, and Schmid, 2011; Wintoki, Linck, and Netter, 2012; Khemiri and Noubbigh, 2018 & Attia 2018).

4-Results and Disscussion

This section represents data analysis and discussion regarding the findings and statistical analysis regarding the

relationship between infrastructure on FDI as well as the moderating role of institutional quality in this relationship. The structure of this section is presented as follow

4.1-Principle Component Analysis (PCA)

To construct a composite indicator, this study applied principle component analysis (PCA) to extract the common principal component. To check the applicability of the data to factor analysis, two specific tests were carried out: Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) test. The results of these tests are presented in Appendix. The P-values for Bartlett's sphericity test are all less than 0.05 (0.00), and the KMO values are 0.50, indicating that the data are suitable for principal component analysis (PCA).

Table 3 Tests of applicability

	Bartlett test of sphericity			KMO
	Chi-square	Degrees of freedom	p-value	
Infrastructure	164.392	10	0.000	0.500

Source: Calculated by the author

Table 4. PCA (Total variance explained)

Component		Eigenvalue	Difference	% of Variance	Cumulative variance %
	1	1.578	0.142	0.316	0.316
Infrastructure	2	1.436	0.528	0.287	0.603
	3	0.908	0.310	0.182	0.785
	4	0.597	0.118	0.119	0.904
	5	0.479		0.056	1.000

Source: Calculated by the author

Table 5. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI	314	2.739	3.565	-4.542	23.537
INFR	315	0.552	0.267	0	1
IQ	300	0.585	0.29	0	1
VA	300	-0.975	0.433	-2.05	0.304
VE	300	-0.131	0.686	-2.349	1.505
PS	300	-0.559	1.041	-3.18	1.224
RQ	300	-0.199	0.719	-2.17	1.107
RL	300	-0.188	0.725	-1.838	0.996
GDP	315	25.299	0.959	23.461	27.244
INF	291	0.056	0.087	-0.101	0.849
RIR	200	0.041	0.117	-0.201	0.609
FD	294	0.336	0.128	0.089	0.578

Source: Calculated by the author

4.2- Variance Inflation Factor

The Variance Inflation Factor (VIF) serves as a measure of the reciprocal of the inter-correlation among predictor variables. In this context, VIF is calculated using the formula $\text{VIF} = \frac{1}{(1-r^2)}$, where r^2 represents the multiple correlations between the predictor variable and the other predictors. When VIF values exceed 10, it indicates a significant issue with multi-collinearity, as explained in Chatterjee and Hadi (2012). In this case, all VIF scores are below 10, which implies the absence of collinearity among the explanatory variables (as shown in Table 9).

Table 6. VIF correlation

Variable	Model 2
INFR	2.10
GDP	1.37
INF	1.54
RIR	1.13
FD	1.75
Mean VIF	1.58

Source: Calculated by the author

4.3- GLS Results

Table 7. FDI and composites of INFR

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
INFR	-2.450*					
	(1.282)					
QRI		-3.266***				
		(1.218)				
RD			-2.577***			
			(0.631)			
RC				-1.911**		
				(0.782)		
EAT					0.504**	
					(0.205)	
ESS						-3.310***
						(1.062)
GDP	-2.149***	-2.344**	-2.179***	0.486	-1.385	-2.094***
	(0.362)	(1.151)	(0.232)	(1.415)	(1.181)	(0.251)
INF	9.312**	5.344	12.210***	5.706*	7.741**	5.747
	(3.806)	(3.278)	(3.172)	(3.241)	(3.131)	(3.830)
RIR	-1.758	2.811	-0.172	2.805	1.009	-2.392
	(1.940)	(1.804)	(2.033)	(1.880)	(1.808)	(2.051)
FD	10.221***	17.372***	6.180***	17.237***	15.847***	7.865***
	(2.475)	(2.786)	(1.459)	(2.862)	(2.872)	(1.678)
Constant	54.328***	60.144**	55.899***	-11.273	34.093	54.632***
	(9.185)	(29.274)	(5.859)	(35.354)	(29.864)	(6.506)
Observations	175	175	175	175	175	175
Number of countries	15	15	15	15	15	15
Year effects	No	Yes	No	Yes	Yes	No
Country effect	No	Yes	No	Yes	Yes	No

Source: Calculated by the author

The above table (Table 7) show the main findings of GLS Regression as well as value of Hausman test and P-Value Test as the estimated results are reliable and unbiased. With regards to infrastructure except to have a negative and significant on FDI and the findings of this study reveals that the relationship between infrastructure and FDI is negative and significant, furthermore the relationship between secondary indicators of infrastructure revealed that the negative and significant impact on FDI except for efficiency of air transport. As 1% increase of infrastructure causes that FDI to decrease by 2.45 %, same applied for secondary indicators which are road Connectivity (RC), quality of road Infrastructure (QRI), railway density efficiency (RD) and efficiency of seaport service (ESS) 1 percent increase will cause FDI to decrease by -3.26, 2.577, -1.911 and 3.31 respectively accepting hypothesis 2 (a), 2 (b), 2 (c) and 2 (e), while on the other hand efficiency of air transport (EAT) has a positive and significant impact on FDI rejecting hypothesis 2 (d) . The result is consistent with Nguea (2020) who stated that energy infrastructure has a negative and significant impact on FDI as the negative effect is due to independent and quality of power supplied in Cameroon, furthermore Ogbanga et.al (2022) concluded that transport infrastructure has negative but insignificant impact on FDI as they justified the negative relationship is due to poor quality of road and transport infrastructure Nigeria, while the Rahman et.al (2010), Ahmad

et.al (2022) stated that infrastructure has positive and significant impact on FDI which aligned with positive and significant relationship between access to air transport and FDI

The findings is consistent with Ogbanga et.al (2022) as they stated a negative relationship between infrastructure and FDI in Nigeria as the authors highlighted that despite its position as one of Africa's largest economies, Nigeria suffers from a relatively low level of infrastructure, and that inadequate infrastructure has a discrete impact on the potential benefits of FDI, which justify the findings of this thesis as these results considered to be justifiable due to bottlenecks and obstacles MENA region have especially in the last ten years in terms instability of political systems due to revolution that occurred in Egypt, Tunisia, Libya and Yeman as well. OECD report (2021) explained why infrastructure could not attract FDI, despite that there is a huge in investment on infrastructure by MENA countries but still on the other hand the performance of infrastructure especially in ports and roads is low resulting an increase in costs, postponing in trade process. MENA Countries faces a huge problem when it comes to transport and port infrastructure as OECD Report and World bank 2020 to build new infrastructure and sustain the existing one requires a huge amount of investments minimum of 100 billion dollars as this issue will be explained later in the investment gap section. The drawbacks of infrastructure has a significant impact on

investment sectors especially after COVID-19 therefore there are two aspects that contribute in lowering level of infrastructure in MENA countries

A- Quality of infrastructure

In the last ten years MENA countries witnessed a huge amount of investment in the infrastructure sector, especially Egypt. The poor logistics considered to be one of the factors that contribute in lowering level of infrastructure especially transport infrastructure as this challenge is vital dilemma in the MENA countries as according logistic performance index in world bank almost all countries score below three as scale is from one to five except for UAE and Qatar that score above three which show how fragile the infrastructure in terms of quality and performance as for example port infrastructure is not fully utilized in MENA countries except for Morocco and Egypt after expansion Suez canal in 2015 but still there are other factors that contribute in lowering FDI in Egypt, therefore lowering quality of infrastructure plays a major role increasing cost and decreasing efficiency which untimely causing FDI to decrease explaining the negative relationship between infrastructure and FDI OECD report (2021).

B- Investment Gap

The amount of investment needed to sustain level of infrastructure and create a new growth is considered one of the main aspects lowering FDI as investment gap approximately seven percent of MENA countries GDP as for example Egypt needs over

675 billion USD or five percent of their GDP to sustain level of infrastructure for the next 20 years which requires a lot of fund investments and cutting costs that could not applicable. Furthermore, the lack of strong transport and port system as well as unified railways contribute to increasing transport cost and logistic cost as the logistic cost in Egypt is 20 percent of GDP while Jordon is approximately between 10 to 12 percent of their overall GDP considering the quality of infrastructure also considered another challenge OECD report (2021).

4.4-Moderating effect between Infrastructure and Institutional Quality

With regard to governance indicators, the result showed the interaction between Infrastructure and indictors of governance which are (INFR *VA), (INFR*VE), (INFR*RQ) and (INFR*RL) have a negative and significant impact on FDI, suggesting that all of them unfavorably moderate the relationship between INFR and FDI in Model (2), Model (3), Model (5), Model (6) respectively. On the other hand the interaction between political Stability (INFR*PS) has a negative but insignificant impact on FDI in Model (4).

The result of moderating effect of Infrastructure and Institutional quality is consistent with Desalegn and Solomon (2021), who stated negative and significant relationship between governance and infrastructure investment in Ethiopia suggesting lack of sufficient framework that guarantee effective

implementation as lack of institution quality impact both infrastructure and governance. The unfavorable effect between (INFR*IQ) on FDI is very reasonable as according to OECD survey showed that weak governance is a primary factor contributing to the frequent failure of infrastructure projects to achieve their intended goals in terms of timing, resources, and service delivery. According to IMF (2015) and Schwartz (2020, chapter 1 & chapter 3) stated that losses and inefficiency in public investment can exhibit a structural pattern. On average, almost 33% of the resources allocated to the development and ongoing maintenance of public infrastructure are wasted due to inefficiencies. These inefficiencies are tightly connected to inadequate infrastructure governance, which refers to the enterprises and processes responsible for the planning, allocation, and execution of infrastructure investment expenditure. Studies indicate that, on average, improving infrastructure governance might account for over 50% of the efficiency losses seen (Schwartz et.al (2020), Chapter 3).

Table 8. FDI and Infrastructure: Moderating effect of institutional quality

VARIABLES	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI	(6) FDI
INFR	4.203**	-8.318***	-1.681	0.146	-1.192	-0.686
	(2.061)	(2.997)	(1.041)	(1.250)	(1.400)	(1.431)
IQ	1.627					
	(1.979)					
INFR*IQ	-8.743***					
	(2.979)					
VA		1.765				
		(1.129)				
INFR*VA		-5.469**				
		(2.356)				
VE			1.193			
			(1.529)			
INFR*VE			-4.704**			
			(1.834)			
PS				-0.793		
				(0.718)		
INFR*PS				-1.142		
				(1.018)		
RQ					-0.055	
					(0.656)	
INFR*RQ					-3.635***	
					(1.119)	
RL						0.460
						(1.041)
INFR*RL						-4.591***
						(1.408)
GDP	-1.778***	-2.027***	-1.557***	-1.642***	-2.043***	-1.582***
	(0.342)	(0.363)	(0.314)	(0.340)	(0.360)	(0.337)
INF	1.329	4.614	-1.084	-0.451	-0.072	-0.727
	(3.721)	(3.248)	(4.117)	(3.309)	(3.111)	(3.442)
RIR	-1.596	-0.795	-0.238	-1.514	-0.732	-1.223
	(1.784)	(1.403)	(2.597)	(1.783)	(1.598)	(1.757)
FD	9.734***	9.638***	10.575***	10.033***	10.565***	10.946***
	(2.350)	(2.357)	(2.826)	(2.302)	(2.212)	(2.455)
Constant	44.539***	53.617***	38.883***	40.575***	51.841***	40.079***
	(8.856)	(9.191)	(7.732)	(8.712)	(8.919)	(8.569)
Observations	168	168	168	168	168	168
Number of countries	15	15	15	15	15	15

Source: Calculated by the author

5-Conclusion

The main purpose of this study is examining the impact of infrastructure on FDI considering the moderating effect of IQ on this relationship in MENA Region from 2000 till 2020. The findings showed that infrastructure has a negative and significant impact on FDI as well as IQ has negative and significant impact on the relationship between infrastructure and FDI. This result shows how fragile the infrastructure in MENA Region is in terms of inadequate quality besides inefficiency to improve infrastructure in long-term due to investment gap as mentioned before. Consequently, based on the main findings of these results and limitations mentioned above this study recommended the following. Firstly, The MENA Region government should enhance overall quality of infrastructure as one of this main challenge that MENA faces is the quality as a huge amount of investment was directed toward improving infrastructure but still quality is dilemma toward causing a negative impact on FDI. Secondly The MENA Region should also consider the huge amount of fund needed to improve infrastructure through preparing a realistic budget as for example Egypt needs approximately 675 billion USD or five percent of GDP to sustain level of infrastructure for the next 20 years (OECD 2021).

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