Investments, Governance Quality, and Industrial Development in Africa

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Abstract

This study examines the role of governance quality in the relationship between investment and industrial development for a panel of 25 African countries between 1996 and 2019. The study explores the endogenous growth model used by Grigorian and Martinez (2000). To provide a detailed policy mix, four investment indicators such as structure. machinery, transport, and others are explored using a random-effects estimation approach. The findings from our estimated models reveal that some measures of investment exerted a positive impact on industrial development. Similarly, all governance indicators exert a positive impact on industrial development. However, these governance indicators do not play an intermediating role in amplifying the industrial development in the region. Specifically, the interaction between investment and governance indicators has negative effects on industrial development. The result points to the fact that the region needs to initiate a developmental policy that will facilitate the importation and installation of machinery and transport equipment as

well as the expansion of structures that are needed for industrial activities.

Keywords: Industrial development; Governance quality; Investments; Fixedeffects model; Africa.

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1. Introduction

here is a growing debate on the role of industrial development in many economies. Most developed countries have recorded remarkable progress in this regard with massive investment in their industrial sectors. However, the experience is worrisome in developing regions such as Africa. A developmental process requires an efficient and effective industrial sector that can engage a larger share of the labour force in the production process (Chete et al. 2016). However, this process remains unachievable in many African countries as the industrial sector contributes less than 15% to their GDP. This also manifests in the enormous socio-economic challenges in the region. Some of the key factors for the drawback in the industrial sector can be attributed to poor investment, policy inconsistency, low human capital development, poor resource mobilisation, and lack of good governance, among others. A strong industrial sector is fundamental to the growth of emerging

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and advanced economies. This is evident in the advancement of industrial activities in China and "Asian Tigers" countries (Jayanthakumaran, 2016). Despite recognizing industrial development as the primary engine of economic prosperity, Africa is yet to record substantial diversification of its productive base away from primary commodities (Lall, 2005 and Dixit, 2012).

In essence, efforts to unlock the potential of the industrial sector remain challenging in most African countries. These bad experiences are themselves outcomes of policy mistakes, lack of commitment, low investment, socioeconomic problems and poor governance framework. Importantly, the pivotal role of investment in the growth process has been established both theoretically and empirically (Solow, 1956; Barro, 1990; Anderson, 1990; De Long and Summers 1991; Choe, 2003). High investment suggests high capital accumulation which expands productivity. Thus, Africa needs a sustained level of investment and effective tools through which to place such investment are also necessary (UNDP report, 2015). Moreover, the industrial sector needs some critical drivers such as modern machines, technologies, innovation, structures, and effective and efficient transport systems, among others. Advanced and emerging economies invest heavily in these key drivers to develop a strong production base for their industrial sector. However, the developing region such as Africa does not have the required investment in these areas due to lack of human infrastructure to support advanced technologies and therefore, does not benefit from the high capital accumulation rate.

As argued by De Long and Summers (1993), rapid growth is expected where equipment investment is high while slow growth will characterize an economy with poor equipment investment. This observation is evident in many African countries where there are low investments in structure, machine technology. communication equipment, transport equipment, and intellectual property products, among others. The level of investment in the continent since 1990 has not been transformative on the industrial processes. Thus, African developmental challenges are situated within the agenda for unlocking pathways to industrial development (UNCTAD, 2013). The "jobless" arowth observed in the region can be attributed to poor contribution from the industrial sector. Expectedly, as the region continues to record a high growth rate, the level of unemployment continues to rise. The fundamental problem lies in the drivers of such growth. Over-reliance on the commodity sector continues to make the region less competitive. Many countries that have recorded breakthroughs in their industrial sector leverage huge investments in relevant areas. Investment is expected to create a strong capital base for the expansion of the industrial sector.

Also, the role of governance is essential to investment and industrial development relationships. Many studies have established the importance of governance (see Acemoglu and Robinson, 2008; Flachaire et al., 2014; Huang and Ho, 2016; Wilson, 2016, Mamun et al., 2017). Thus, good governance quality is fundamental to the development of the industrial sector. The driver of industrial development such as investment needs an accommodating environment which can be majorly guaranteed by a strong governance structure. Many policies emanate from the government to influence economic activities and this may positively or negatively influence investment needed for industrial development. Many emerging and advanced economies

that have recorded progress in their industrial advancement have good governance structures. Undoubtedly, African countries have made some progress in their governance structure which manifests in their growing democratic system (Oyinlola et al., 2020). However, this manifestation has not translated to improvement in the level of investment and industrial development in Africa. The foregoing narrative is apparent in the region with high unemployment and poverty rates. Lack of good governance and infrastructure development dampened the industrialization trajectory in most African countries (AfDB report (2017).

Existing studies on Africa are preoccupied with growth issues such as institution and growth (For example, see Acemoglu et al., 2014; Ajide et al., 2014, Huang and Ho, 2016; Wilson, 2016; Cieslik and Goczek, 2018), foreign direct investment and growth (Akinlo, 2004; Gui-Diby, 2014; Adeleke, 2014); institution and foreign direct investment (Globerman and Shpiro, 2002; Asiedu, 2006; Bellos and Subasat, 2012; Dixit, 2012; Farla et al., 2013; Ajide and Raheem, 2016), industrial policy and development (Rodrik 2007 and Cimoli, et al., 2009); and, industrial growth and quality of institution (Grigorian and Martinez, 2000 and Inada, 2013). However, little attention has been given to understanding the drivers of industrial development (a key component of growth) in Africa. Yet a more recent study by Oyinlola et al. (2019) tries to provide some empirical explanations for industrial challenges in sub-Saharan Africa (SSA). But many critical issues such as investment, governance quality, remain unexplored. Therefore, this study contributes to the literature by specifically probing the role of governance quality in the investmentindustrial development nexus of the African

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region. In the context of African development, existing studies examined the linkages among governance quality, investments and industrial development are none to the best of our knowledge. This creates a vacuity in the literature that the present study attempts to fill. This proposition is plausible given the fundamental development challenges facing the continent. For instance, investment thrives in an economically, politically and institutionally stable region, which is evident in emerging and advanced economies. Historically, the African continent has been facing different enormous challenges (conflicts, corruption, human rights abuse, among others) which undermine the role of governance. Investors are motivated by returns and safety which can only be guaranteed in a society with a strong governance structure.

More so, there are concerns about human rights abuse, poor rule of law, poor accountability and transparency which are reflected in poor governance in the region (Mbaku, 2020). This in a way undermines huge investments that can boost industrial expansion. It is therefore pertinent to untangle the nature of the relationship among the three variables which will assist in designing relevant policy to address the industrial challenges in the region. Notably, there is limited information on the nature of investment among countries in this region, thus necessitating the exploration of the most recent indicators constructed by Robert et al. (2015). These indicators are investments in structure (residential and nonresidential), transport equipment, machinery (computers, communication, equipment, and other machinery), and other assets (software, intellectual property products and cultivated assets). This robust information gives more insights into empirical exploration.

Subsequent sections are presented as follows: Section two focuses on the background of the study by examining the trend analysis of the key variables of interest. Section three takes a brief tour of the literature on industrial development. Section four examines data issues and methodology. Empirical results and discussion of findings are presented in section five and finally, section six concludes with the policy implications of the study.

2. Trend Analysis of Governance, Investments, and Industrial Development in Africa

The section examines the trends in governance, investment and industrial development. The analysis is structured into two phases: regional and country level.

The importance of governance has been discussed extensively in the literature. Though there is no consensus on the general definition of the concept (i.e. governance), the nature of the organization and its perceptions about governance determine its definition and

measurement. Thus, different governance measurements were developed. These include Corruption Perceptions Index (CPI); Country Policy and Institutional Assessment (CPIA); International Country Risk Guide (ICRG), Also, Freedom House created its measures using the country's political rights and civil liberties on a scale of 1 to 7. Most of these indicators do not capture all the dimensions of governance. For instance, CPI developed by Transparency International (TI) focuses strictly on corruption while political features and the structure of governance are excluded. For the study, World Governance Indicators (WGI) is the most relevant due to its robust information on the dimensions of governance. The governance indicator is made up of six indices which include: Control of Corruption, Political Stability and Absence of Violence/Terrorism, Voice and Accountability, Government Effectiveness, Regulatory Quality and Rule of Law. These indices have a range from -2.5 (Worst) to 2.5 (Best).

Region	Institutional Index	Political Index	Economic Index	Aggregate Index
North America	1.49	1.02	1.49	1.33
Europe & Central Asia	0.49	0.46	0.60	0.50
East Asia & Pacific	0.18	0.29	0.03	0.17
Latin America & Caribbean	-0.01	0.24	0.07	0.10
Middle East	-0.04	-0.66	-0.04	-0.25
South Asia	-0.50	-0.75	-0.51	-0.59
Africa	-0.68	-0.62	-0.74	-0.68

Table 1. Governance Indicators across the Regions (1996-2019)

Source: Authors' Computation from World Governance Indicators (2021)

Note: Economic Index consists of Government Effectiveness and Regulatory Quality, Political Index consists of Political Stability and Absence of Violence/Terrorism, and Voice and Accountability, and Institutional consist of Rule of Law and Control of Corruption

In Table 1, the performance of governance at different dimensions and aggregate level is presented across the region. Expectedly, North America is the best performer with an aggregate index of 1.33. This is followed by Europe and Central Asia with a positive

scale of 0.50, East Asia and Pacific with a positive scale of 0.17, and Latin America and the Caribbean with a positive scale of 0.10. The worst performers among regions are the Middle East (-0.25), South Asia (-0.59) and Africa (-0.68). This trend analysis reveals that some regions enjoy good governance relative to others. This analysis also shows the

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worrisome state of governance in Africa. The efforts by the region have not materialised significantly as indicated by a negative scale in all the indices. A region with good governance attracts more investments relative to a region with poor governance. This is due to certainty and a conducive investment climate.

Country	Economic Index	Institutional Index	Political Index	Aggregate Index		
Mauritius	0.7	0.6	0.9	0.8		
Botswana	0.5	0.8	0.8	0.7		
Namibia	0.1	0.3	0.6	0.3		
South Africa	0.5	0.2	0.3	0.3		
Senegal	-0.2	-0.2	-0.1	-0.2		
Benin	-0.4	-0.5	0.3	-0.2		
Morocco	-0.1	-0.2	-0.5	-0.3		
Burkina Faso	-0.5	-0.4	-0.3	-0.4		
Mozambique	-0.5	-0.7	-0.1	-0.4		
Rwanda	-0.3	-0.2	-1.0	-0.5		
Mali	-0.7	-0.6	-0.3	-0.5		
Madagascar	-0.7	-0.6	-0.3	-0.5		
Gabon	-0.6	-0.7	-0.3	-0.5		
Eswatini	-0.6	-0.4	-0.8	-0.6		
Uganda	-0.3	-0.7	-0.8	-0.6		
Mauritania	-0.6	-0.7	-0.6	-0.6		
Egypt, Arab Rep.	-0.5	-0.4	-1.0	-0.6		
Kenya	-0.4	-0.9	-0.8	-0.7		
Sierra Leone	-1.1	-0.9	-0.4	-0.8		
Тодо	-1.0	-0.9	-0.7	-0.9		
Cameroon	-0.8	-1.1	-0.9	-0.9		
Guinea	-1.0	-1.2	-1.2	-1.1		
Congo, Rep.	-1.2	-1.2	-0.9	-1.1		
Nigeria	-1.0	-1.1	-1.2	-1.1		
Sudan	-1.4	-1.3	-2.0	-1.6		

Table 2. Governance Indicators across the Regions (1996-2019)

Source: Authors' Computation from World Governance Indicators (2021)

Note: Economic Index consists of Government Effectiveness and Regulatory Quality, Political Index consists of Political Stability and Absence of Violence/Terrorism, and Voice and Accountability, and Institutional consist of Rule of Law and Control of Corruption.

Table 2 presents the governance indices across African countries. Notably, the top performers are Mauritius (0.8), Botswana (0.7), Namibia (0.299) and South Africa (0.3) based on the aggregate index. The least performers are Congo Rep. (-1.1), Nigeria (-1.1) and Sudan (-1.6). Further, the disaggregate dimensions reveal an intriguing story. The best-performing countries with respect to the economic, institutional and political indices are Mauritius (0.7, 0.6 and 0.9, respectively); Botswana (0.5, 0.8 and 0.8, respectively), Namibia (0.1, 0.3 and 0.6, respectively) and South Africa (0.5, 0.2, and 0.3, respectively). Most of the countries in the African region are still facing many challenges such as political instability/ terrorism (Nigeria, Mali, Egypt, Cameroon etc.), human rights abuse, corruption etc. This further reveals the fundamental challenges facing many countries in the region. Thus, poor governance cannot be exonerated from the developmental challenges facing the region. In sum, the performance of the African region is very disappointing. These have overall implications for investment and the economy at large. The ability to promote investment and industrial development hinged on the level of governance quality.



Figure 1. Average Total Investment (Trillion Dollars, US\$) across the regions (1996-2014) Source: Plotted by Authors from Feenstra et al. (2015)¹

Furthermore, investment plays an important role in the growth process and it is as well important as a key input in the industrial sector. The objective of investment primarily focuses on increasing capital accumulation in the economy. These investments include residential and non-residential, machinery, transport equipment, technological development and property right. Thus, all these categories of investment are important for economic progress. Figure 1 shows the average total investment across the eight regions. Expectedly, East Asia and the Pacific recorded the highest average investment value of US\$70.9 billion while Africa recorded the lowest with an average value of US\$0.8 billion. The implication of this is that the African region has a huge investment gap which

¹ The data was updated in 2021. https://www.rug.nl/ggdc/productivity/pwt/pwt-releases/pwt100

affects capital accumulation in the region. This can be observed in poor infrastructural development in many African countries. In Table 3, the structure of investment across African countries is presented. A cursory check from the table reveals that investment in structure (residential and non-residential) takes the largest share in total investment in most of the African countries. There is also evidence of low investment in technology and intellectual property products. Notably, African countries remain the least performers Investments, Governance Quality, and Industrial Development in Africa

in terms of technological advancement and innovation. This continues to hinder the economic progress of the region. The advanced economies (such as the USA, France, United Kingdom, and Japan) and emerging economies (China) have huge investments in this area, which promotes the expansion of their industrial sector. It is very disappointing that many African countries are not making the required efforts in exploring these investment opportunities to drive their industrial development.

Country	buntry Structure Machinery (% Total Investment) (% Total Investment)		Investment on transport (% Total Investment)	Other Investment (% Total Investment)
Benin	62.6	21.3	14.6	1.4
Botswana	61.6	30.5	6.4	1.5
Burkina Faso	52.3	25.3	14.2	8.2
Cameroon	53.6	31.7	14.2	0.5
Congo, Rep.	78.8	14.8	6.0	0.5
Egypt, Arab Rep.	50.8	39.1	9.0	1.1
Eswatini	47.9	26.1	13.8	12.2
Gabon	55.1	15.9	7.2	21.8
Guinea	53.9	19.9	22.4	3.8
Kenya	53.0	24.2	18.8	3.9
Madagascar	60.4	27.6	6.4	5.6
Mali	48.2	33.0	15.5	3.3
Mauritania	51.2	30.3	12.0	6.4
Mauritius	62.4	26.4	11.3	0.0
Morocco	47.9	28.1	9.3	14.7
Mozambique	65.2	19.6	12.9	2.4
Namibia	46.6	24.2	25.0	4.1
Nigeria	70.2	14.2	8.0	7.7
Rwanda	69.8	21.5	6.0	2.7
Senegal	62.2	25.0	10.7	2.0
Sierra Leone	36.7	33.5	26.6	3.1
South Africa	45.7	35.6	11.9	6.9

 Table 3. Structure of Investment across African countries

Country	Investment on structure (% Total Investment)	Investment on machinery (% Total Investment)	Investment on transport (% Total Investment)	Other Investment (% Total Investment)	
Sudan	48.2	25.0	25.4	1.3	
Тодо	55.8	26.0	14.2	3.9	
Uganda	73.8	17.5	7.5	1.2	

Source: Computed by Authors from Feenstra et al. (2015)

Note: Investment in structures (including residential and non-residential); Investment in machinery (including computers, communication equipment, and other machinery); Investment in transport equipment; Investment in other assets (including software, other intellectual property products, and cultivated assets).

Figure 2 provides a graphical illustration of the average industrial value-added growth across the regions of the world. Expectedly, South Asia has the highest average growth of industrial value-added while North America has the lowest growth. The African region follows South Asia with a growth of 4.7%. Despite the high growth rate of industrial value-added, the fundamental challenges are still inherent in the development of the region. This raises the question of which part of the industrial sector is growing. Realistically, the expansion of industrial productivity implies the engagement of labour services in production. Moreover, emerging and advanced economies explored their industrial development to address challenges of unemployment, poverty and inequality, among others. It is not surprising that such growth does not address those challenges in the African region. This is simply due to the development of the extractive industry, which is capital intensive, therefore, it is difficult to engage a large labour force in the process. Regions such as Europe and North America are already at a steady-state which suggests that they required small investments to maintain and sustain their growth relative to Africa.



Figure 2. Average Growth rate of Industrial Value Added across the regions (1996-2019) Source: Plotted by Authors from World Development Indicators (2021)

Table 4 presents the growth rate of industrial value-added at the country level. A cursory look at the table shows that more than 50% of the countries recorded an average industrial growth of less than 5%. These countries include Senegal, Gabon, Nigeria, South Africa, and Egypt, among others. Uganda, Mali, Burkina Faso, Madagascar, and Mauritania recorded industrial growth of less than 10% while Sierra Leone. Mozambigue. and Rwanda recorded above 10%. The implication of this is that industrial growth is disappointingly inadequate in most countries. Since most of these countries experience low industrial growth, it will be difficult for the region to achieve industrial development. One

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would expect high industrial growth in the region for them to move closer to emerging and advanced economies, but the available information says otherwise. This suggests that many African countries are still lagging in industrial development.

The above description of the key variables shows that there is still a lot for African countries to do to achieve inclusive economic progress. Expectedly, it would be very difficult to find the required investments in the region with poor governance and high infrastructural gap and this, in turn, reflects in the poor performance of the industrial sector in most of the countries.

able 4. Average Growth rate of In	dustrial Value Added in	African Countries	(1996-2019)
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Country	Average
Mozambique	11.2
Rwanda	10.6
Sierra Leone	10.1
Uganda	8.3
Burkina Faso	7.8
Sudan	7.1
Тодо	5.9
Mali	5.8
Guinea	4.8
Senegal	4.2
Egypt, Arab Rep.	4.2
Benin	3.8
Кепуа	3.7
Morocco	3.4
Namibia	3.4
Madagascar	3.3
Eswatini	2.9
Mauritius	2.6
Cameroon	2.6
Botswana	2.2
Nigeria	2.1

Country	Average
Congo, Rep.	2.0
South Africa	1.4
Mauritania	0.8
Gabon	-0.4

Source: Computed by Authors from World Development Indicators (2021)

3. Literature Review

Industrial development captures the shift from a subsistence economy that is predominantly agrarian economy to a more mechanized form of production that involves efficient and highly technical exploitation of resources in a highly formal and commercialized economic setting (Rapley, 1997). In other words, industrial development is a process of development that is stable and sustained with respect to the economic and socio-political realms of the society (Oyenga, 1968). In economics, industrialization entails the investment and utilization of industrial plants in the manufacturing of capital goods as well as processing raw materials into finished products. Both manufactured capital goods and finished products are developed either for additional industrial use, general commercial use or domestic use (Todaro, 1989). Several scholars (such as Adam Smith, Robert Malthus, Ricardo, Keynes, Bradford De Long and Summers) argue that several important factors drive industrialisation such as capital, investments, surplus (from savings) and technological progress. These factors are key constituents that add value to land and labour. This later allows countries to build and sustain wealth (Bruce, 1994).

Capital accumulation serves as a bedrock for industrial expansion, which is highly complemented by subsequent investments. The remarkable progress made by western powers in this regard motivates them to explore different parts of the world to sustain the industrialization process (UNIDO 1969). For instance, in 1820, the massive turnaround in industrial activities in Europe was largely attributed to the huge investment in machinery and coal used in running the steam engine and other machines. In furtherance, the contemporary political neoclassical and economists posit that the experience of industrialization of Western Europe and North America can be best explained in a unilinear process reflecting the stages of evolvement to reach the ultimate state of industrialisation (Rostov, 1971). Industrial development results from technical, institutional, organisational and institutional changes that create and absorb new areas of productive activity and consumption into the economic structure.

Many studies have explored extensively the role of governance quality on foreign direct investment and growth (such as Cieslik and Goczek, 2018; Wilson, 2016; Huang and Ho, 2016, among others). However, considering the three stages of development, industrial development has been identified as a key stage for economic growth before transiting to the service stage. Countries that skipped the industrial development stage are perceived to be experiencing premature growth. Thus, emerging economies have been designing different policies to promote industrial development. In examining the important role

of investment, De Long and Summers (1991) examined the relationship between equipment and economic growth. Their finding shows that machinery and equipment investment has a positive effect on growth. The study suggests that higher equipment investment promotes faster growth as well as a high social return on equipment investment.

De Long and Summers (1993) improve their existing work by focusing on developing economies. Their finding further reinforces the previous finding that high equipment investment promotes high growth. A similar study by Anderson (1990) found that the rate of investment, the social rate of return to investment and the investment-induced returns to labour positively influence productivity. Exploring the effects of foreign direct investment on industrial growth using a regulation change in China, Inada (2013) explains that increased foreign direct investment enhances labour productivity and total factor productivity of benefited local industries industries and (Inada, 2013). Similarly, Zhang (2013) reveals that foreign direct investment has significant and positive impacts on industrial performance in China. Low-tech industries benefit more than medium- and high-tech industries from foreign direct investment inflows. In a robust analysis of China, Leung (1996) investigates the significant role of foreign manufacturing investment in regional industrial growth in China. Investment concentrates mostly on electronics. construction materials. transport equipment and chemical industries in some regions in China. Also, foreign manufacturing investment is directed towards different activities, especially technological advancement. Aitken and Harrison (1999) posit that foreign direct investment hurts local industry performance. Similarly, Javorcik

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(2004) shows that foreign plants promote growth in the productivity of local plants in the industries providing foreign plants.

Furthermore, some studies have also examined the important role of governance in the industrialisation process. Investigating the role of government in promoting industrialization in the East Asian region, Ohno (2003) argues that good governance is a precondition to industrialisation. Many developing countries do not effectively manage available resources to foster their development due to weak policies and institutions. A critical analysis of Africa's industrialization further shows that bad political culture, weak political and social institutions, poor leadership and bad governance have contributed to the failure of industrial development. This suggests that there is a critical role for the government to create a stable and peaceful environment for the improvement of the industrial sector. Also, the government is at the helm of affairs to design a policy that can unlock the potential in the sector through huge investment in viable areas as observed in industrialized countries.

The ability to promote investment for industrial development hinges heavily on the governance of a country. Good governance promotes the establishment of adequate legal infrastructure and efficient functioning institutions. Adequate infrastructure and efficient institutions create an enabling environment for investment to thrive which may benefit industrial growth. In the absence of good governance, transaction costs associated with investment may likely rise due to the presence of corruption and bureaucratic bottlenecks, and in turn, the investment may collapse when there are no clear and transparent legal and regulatory frameworks guiding investment procedure, and realisation of adequate gains from investment require

conducive and friendly environment (Clague and Rausser, 1991). In addition, the investment would be largely affected when economic, political and institutional structures are less effective thereby negatively dampening industrial growth. Further, the quality of governance plays a significant role in industrial growth through its ability to promote capital accumulation for the productive sector of the economy. The confidence of investors may be eroded in the absence of an adequate regulatory framework and monitoring which can strongly undermine the investment opportunities that industries can benefit from. Poor regulatory framework tends to discourage investors from exploring viable investment opportunities (Grigorian and Martinez, 2000).

Also, the available evidence in the literature shows that there are at least three strands of channels through which governance shapes investment and industrial development: infrastructure, investment climate, and human skills. Infrastructure is considered by Ogbuagu, et al. (2014) as the core ingredient of accelerated industrial development, but its dynamic development is poorly shaped when corruption is endemic. Meaningful infrastructural projects are not commonplace when the mobilisation of public funds is misguided. Therefore, infrastructural developments suffer and industries slow in growth when the government scores low on indices used to measure its quality (Ajakaiye and Ncube, 2010). Earlier, Eifert et al. (2005) reported that African industries are less competitive on the global scene due to higher indirect business costs, many of which are due to inadequate infrastructure. Page (2010) argues that at every point of the investment process in Africa, there is support for an attractive investment climate, received from governance parameters. Asem et al. (2013) link governance to private sector development, with attention to Ghana. They contend that the structure of government-most notably democracy-matters to industrial size. Good institutions are also found to be a pathway to a favourable business climate. These findings agree with those of Acemoglu et al. (2014). More so, a study by Brunetti et al. (1997) posits that the disparities between institutional frameworks in the Transition countries may contribute to the observed differences in the countries' relative economic performance.

There is no doubt that industries benefit from investment given good governance. Also, there is a linkage among investments. governance quality. and industrial development. The industrial sector thrives in a stable environment. Therefore, accommodating investment environment depends on the governance framework as well as determining the extent of investment in an economy. It is pertinent to probe the role of governance in the relationship between investment and industrial development in developing regions such as Africa. In the absence of good governance, it would be very difficult to facilitate the investment needed for industrial development.

4. Theoretical and Methodological Frameworks

4.1. Theoretical framework

This section focuses on the theoretical and methodological issues. The study adopts endogenous growth theory but explored the model proposed by Keefer and Knack (1995). The model assumed that output is determined by the initial level of output, investment, labour, human capital (education) and institution. The initial output level measures

the decreasing marginal product as in the case of the neoclassical production function. This is important to determine the conditional convergence to a steady-state output across the countries. Thus, this model is abstracted to industrial development. Theoretically, the output is the aggregation of the output by different sectors of the economy. Among the sectors in the economy, the industrial sector plays a significant role in amplifying the overall output. For the expansion of industrial output, investment is critical as this sector relies heavily on capital stock. As more resources are devoted to investment, the level of capital stock increases which enhances the productivity in the industrial sector. When actual investment exceeds break-even investment, the huge resources are channelled to investment rather than are required to capital stock unchanged. For most developed countries, there is a huge investment and this has moved them to the steady-state. In the case of developing regions such as Africa, the level of investment is still very low. Thus, the region is far from reaching a steady-state in the capital stock required for both industrial and overall growth. This suggests that industrial growth/ expansion requires allocation of more resources to investment. Beyond investment, Keefer and Knack (1995) introduced the role of an institution into the growth model. The institution was seen as an important variable to promote investment and economic growth. When there is a strong institution, property rights can promote investment resulting in increase in productivity. Also, the quality of the institution serves as a signal to potential investors. The high quality institution promotes fairness in the evaluations of enforceable contracts and reduction of expropriation risks. More so, North (1990) argues that the underdevelopment and retrogression Investments, Governance Quality, and Industrial Development in Africa

in the Third World can be attributed to the ineffectiveness of societal development and poor enforcement of contracts. In the absence of guaranteed property and contractual rights, investment and specialisation are dampened. Since institutional quality influences output growth through investment, the same assumption holds in the case of industrial growth. Thus, high quality institutions can enhance investment, which in turn can amplify the level of industrial growth.

4.2. Methodological Framework

This section focuses on the methodological issues and data used in the empirical investigation of the role of governance in enhancing investment to foster industrial development in the African region. In terms of the period of coverage, all variables start from 1996 to 2019. Also, the scope of this study is limited to 25 African countries. This study argues that investment in structures, machinery, transport equipment and other important assets such as software, intellectual property products, and cultivated assets will enhance the development of industries in a country or region. Investment in these areas will also facilitate the expansion of industrial activities. Most success stories recorded in the developed countries such as the United States, France, Japan and emerging economies such as China, India, Singapore, etc. relied heavily on investment in key areas given enabling the institutional environment for their industrial development. Thus, the study adopts the model of Grigorian and Martinez (2000) with some modifications. First, the utilization of different measures of governance that capture economic, political, and institutional dimensions (as explored by Kaufmann et al., 2010; Andres et al., 2014; Asongu and Nwachukwu, 2016). The second

major value addition is the introduction of different measures of investment. The study further explored the interaction between investment and governance indicators. This is to probe further the extent to which governance enhances the relationship between investment and industrial development. Thus, we present our baseline model as follows:

$$INDUV_{it} = \alpha_0 + \alpha_1 LAB_{it} + \alpha_2 CAP_{it} + \alpha_3 INV_{it} + \alpha_4 GOV_{it} + Y'\theta + \varepsilon_{it}$$
(1)

From the specification above (Eq. 1), INDUV_{it} represents the log of industry value added in mining, manufacturing, construction, electricity, water, and gas and this serves as the proxy for industrial development. This proxy was chosen to capture industrial development as this accounts for the value addition of industries to the final output of the sector. This further shed light on the extent to which the capacity utilization in the sector translated to higher productivity. Given the challenges facing the industrial sector in developing regions such as Africa, it is more reasonable to capture the level of industrial development by the level of value addition of the sector which may imply that the poor industrial sector tends to contribute less to the production process to the final output.

Based on the argument of Solow (1956), capital labour and are fundamentally important in the production process as the level of productivity depends on labour availability and capital stock in the economy. This is significantly important for industrial development as productivity in this sector is highly dependent on the amount of labour and capital stock in the sector. LAB_{it} represents the labour force participation rate (as a percentage share of total population ages 15+) and CAP_{it} represents the log of capital stock in the economy. INV_{it} is the log of

real investment captured from four different namely: categories, structure (STRUC), machinery (MACH), transport equipment (TRAEO), and other assets (OTHER). These measures captured the investment in key areas that create an enabling environment for industrial activities to thrive. GOV_{it} captures the governance quality. Many studies have established evidence for the critical role of governance in promoting a conducive environment for businesses to thrive through the provision of infrastructural facilities, enforcement of property rights, protection of lives and properties among others (See Asiedu, 2006; Adeleke, 2014 and Bellos and Subasat, 2012). The study relies on World Bank governance indicators. The study further classifies them into four categories. Following the recent trend in the literature on the classification of governance indices, Principal Component Analysis (PCA) was adopted to circumvent the problem of high correlation among the indices, which may make the variation in each of the indices inconsequential. The level of substitution, given the correlation, indicates that some information may not be relevant. Hence, PCA provides an opportunity for addressing problems of extraneous information (for more information see Kaufmann, Kraay, and Zoida-Lobaton, 2010; Andrés, Asongu, & Amavilah, 2014; Asongu and Nwachukwu, 2016; and Ajide and Raheem, 2016, Ogbuabor et al., 2020). In essence, the method is based on two approaches namely; general aggregation (which implies an average of all six indices to derive a single index) and second, we categorized the indices into three by averaging them: economic index (average of regulatory quality government effectiveness); and institutional index (average of rule of law and control of corruption) and political index

(average of political stability and voice and accountability). REQGE captures economic index; *ROLCC* represents institutional index; PSAVA is the political index and GENID captures general aggregation index. Y is a $K \times 1$ vector of control variables in the model such as education expenditure (% of GNI) and log of health expenditure per capita (proxies for human capital development); EXP represents government spending as a percentage of GDP, representing the critical role of government in productivity (See Arpaia and Turrini, 2008); FDI GDP captures the role of foreign investment in the economy. This can either promote or retard growth of the economy depending on the inflow into real sectors (Alfaro et al., 2001, Fowowe and Shuaibu, 2014, Iwasaki and Saganuma, 2015, Orji et al., 2021) and TROP represents trade as a percentage of GDP (a proxy of trade openness) and it captures the level of domestic economic openness and extent of country receptiveness to foreign businesses (See Law and Habibullah, 2009). The measurement, definition, and data sources are presented in Table 5 below. The number of countries in the study is captured by i=1...N and the period is captured by t= 1...T.

$$\varepsilon_{it} = \mu_i + \pi_{it} \tag{2}$$

The parameters in the regression model are α_0 , α_1 , α_2 , α_3 , α_4 while θ captures a $1 \times k$ vector of parameters on the control variables. Hence, the component μ_i is the random heterogeneity specific to a particular observation and π_{it} is the regression random error. The most suitable approach for the random effects model is the Generalised Least Squares (GLS). Thus, the parameters of equation 1 are estimated with the random effects model. The estimator of the GLS for the slope parameters is presented as follows: Investments, Governance Quality, and Industrial Development in Africa

$$\alpha_{RE} = \left(X \cdot \Omega^{-1} X\right)^{-1} \left(X \cdot \Omega^{-1} y\right)$$
(3)

This estimator requires

$$\Omega^{\frac{1}{2}} = \sigma_{\eta}^{-1} \left(I - T^{-1} \theta t_{T} t_{T}^{'} \right)$$
(4)
Such that $\theta = 1 - \frac{\sigma_{\eta}^{2}}{\sqrt{\sigma_{\eta}^{2} + \sigma_{u}^{2}}}$

This allows us to obtain the GLS estimator in the random effects model by employing Ordinary Least Squares in a transformed model. The crucial parameter in the transformed model is θ . Hence, the transformed model of equation 1 is presented in matrix form as follows:

$$INDUV_{it}^{*} = \alpha_{RE}^{'} X_{it} + \varepsilon_{it}$$
(5)

The quasidemeaning transformation for the dependent variable (industrial development) in equation 5 is $INDUV_{it}^* = \sigma_{\eta}^{-1} (INDUV - \theta \overline{INDUV_i}).$

 α'_{RE} captures the slope coefficients of the independent variables and X_{it} is the vector of the independent variables (labour force, capital stock, investment measures, governance quality measures and control variables). The slope of the independent variables is assumed to be uncorrelated with independent variables, which makes the random effects model consistent and efficient (Olubusoye et al., 2016). However, the fixed effects model is only consistent but not efficient. This justifies the choice of the random effects model.

To account for the interaction terms, the extended form of equation (5) is presented as follows:

$$INDUV_{it}^{*} = \alpha_{RE}^{'} X_{it} + \phi_{i}^{'} (INV * GOV) + \varepsilon_{it}$$
 (6)

In equation 6, attention is focused on how governance quality can serve as a key catalyst for investment in spurring industrial development in the African region. Given the

objective of this study, the interactive term is very vital in the model specification. This is in line with Brambor et al.'s (2006) argument that the use of interactive models accounts for the inclusion of all constitutive terms of the interaction and the conditional interpretation of the marginal effects of the estimated coefficients. Also, interactive models allow the effect of an explanatory variable on a dependent variable to change, conditioned on the level of some other variables. Hence, the marginal effect is the sum of the regressor coefficient and the interactive term. The definition and source of data are presented in Table 5.

Variable	Definition	Source
STRUC	Investment in structures (including residential and non- residential) at Constant National Prices for Millions of 2011 US\$	Feenstra et al. (2015)
MACH	Investment in machinery (including computers, communication equipment, and other machinery) at Constant National Prices for Millions of 2011 US\$	Feenstra et al. (2015)
TRAEQ	Investment in transport equipment at Constant National Prices for Millions of 2011 US\$	Feenstra et al. (2015)
OTHER	Investment in other assets (including software, other intellectual property products, and cultivated assets) at Constant National Prices for Millions of 2011 US\$	Feenstra et al. (2015)
CAP	Capital Stock at Constant National Prices Millions of 2011 US\$	Feenstra et al. (2015)
PSAVA	Average of political stability and voice and accountability	World Governance Indicators, 2021
REQGE	Average of regulatory quality and government effectiveness	World Governance Indicators, 2021
ROLCC	Average of rule of law and control of corruption	World Governance Indicators, 2021
GENID	Average of the aggregation of all the six individual indices	World Governance Indicators, 2021
EDUCEX	Adjusted savings: education expenditure (% of GNI)	World Development Indicators, 2021
HEAL	Health expenditure per capita (current US\$)	World Development Indicators, 2021
EXP	Government consumption expenditure, etc. (% of GDP)	World Development Indicators, 2021
INDUV	Industry, value added (constant 2010 US\$)	World Development Indicators, 2021
LAB	Labour force participation rate, total (% of total population ages 15+) (modelled ILO estimate)	World Development Indicators, 2021
TROP	Trade (% of GDP)	World Development Indicators, 2021

Table 5. Definition of Variables

5. Empirical Results and Discussion

This section starts with a presentation of descriptive statistics of the series in the estimated models. Table 6 shows that most of the series exhibit positive average values except for all the four governance measures. This suggests that all the series have upward trends except measures of governance quality that show downward trends. Considering the standard deviation, the political indicator is the most volatile among the governance measures. Also, the measures of governance quality are relatively more stable compared to investment and industrial development series.

Industrial development is adjudged as the most volatile series while the economic index is the most stable among the series.

Table 7 presents the relationship between the variables used in the empirical models. It could be summarily stated that governance indicators are highly correlated justifying their separate inclusion in the models. Similarly, there is a high correlation among the investment measures, therefore, justifying separate introduction into the models as well. Other variables appear to have low correlation coefficients. Thus, the challenge of running into the problem of multicollinearity has been adequately taken care of through the separate introduction of highly correlated Investments, Governance Quality, and Industrial Development in Africa

variables into the models. The random effects model is chosen over pooled OLS and fixed effects due to the decision criteria (Wald Chisquared statistics and Hausman test). The p-value of the Wald Chi-squared statistics of the random effects model is statistically significant suggesting that country differences are treated as random which rendered OLS and fixed effects model invalid (Tables 9-12). Thus, the random effects must be accounted for. Also, the p-value of the Hausman test is statistically insignificant implying that the random effects estimator of the null hypothesis is accepted. Thus, this justifies the use of a random-effects model for our estimation.

Variables	Ν	Mean	Std. Dev.	Min	Max
CAP (US\$ Billion)	600	1028	2226	0.550	22,060
LAB	600	62.96	12.25	42.21	87.01
TROP	600	66.41	30.06	1.219	175.8
INDUV (US\$ Million)	600	13,580	27,040	71.68	139,600
EXP	600	14.63	4.987	0.911	31.56
EDUCEX	600	3.891	1.857	0.850	9.480
HEAL	600	109.3	139.8	7.087	700.0
PSAVA	525	-0.459	0.701	-2.195	0.987
REQGE	525	-0.484	0.549	-1.648	1.085
ROLCC	525	-0.516	0.565	-1.502	0.974
GENID	525	-0.486	0.567	-1.660	0.880
STRUC (US\$ Billion)	600	1,236	3,031	0.679	28,570
MACH (US\$ Billion)	600	408.2	773.9	0.281	7,724
TRAEQ (US\$ Billion)	600	237.1	670.3	0.010	9,961
OTHER (US\$ Billion)	600	85.4	210.6	0.000	1,479
FDI_GDP	600	3.428	5.243	-11.20	39.83

Table 6.	Descriptive	Statistics
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Source: Authors' Computation

Table 8 presents the results of the baseline regression where the impacts of investment and governance were first examined independently. We explored a step-

wise method by first examining the effect of investment on industrial development in models 1-4. More so, a similar approach was applied in models 5-8, which focus on the impact of

governance quality on industrial development. From the results, the coefficients of labour are negative and statistically significant across the models with investment and governance measures. This suggests that labour does not play an important role in facilitating industrial development contrary to theoretical expectations. More so, the small magnitudes further lend support to the low contribution of the labour force to the industrial process in the African region. The reason for this may be attributed to the inefficiency of the region's large labour force. This inefficiency may be attributed to the high unemployment rate and underemployment as well as low skilled labour which dominates the region. This finding is corroborated by the International Labour Organisation report (2016) that reveals the worrisome unemployment situation in Africa where more than 70 percent of the workforce remain in vulnerable employment relative to the global average of 46.3 percent.

	CAP	LAB	TROP	EXP	HEAL	FDI_GDP	PSAVA	REQGE	ROLCC	GENID	STRUC	MACH	TRAEQ	OTHER
CAP	1													
LAB	0.08	1												
TROP	-0.17	-0.21	1											
EXP	-0.35	-0.05	0.41	1										
HEAL	-0.17	-0.38	0.32	0.47	1									
FDI_GDP	-0.004	0.06	0.34	0.14	-0.07	1								
PSAVA	-0.23	0.014	0.36	0.40	0.50	-0.03	1							
REQGE	-0.24	-0.107	0.20	0.40	0.62	-0.1	0.76	1						
ROLCC	-0.30	-0.16	0.28	0.50	0.61	-0.14	0.80	0.92	1					
GENID	-0.28	-0.08	0.30	0.46	0.61	-0.11	0.92	0.94	0.96	1				
STRUC	0.92	0.12	-0.16	-0.30	-0.18	0.04	-0.20	-0.18	-0.25	-0.23	1			
MACH	0.85	0.20	-0.15	-0.30	-0.22	0.07	-0.19	-0.22	-0.28	-0.24	0.91	1		
TRAEQ	0.67	0.07	-0.03	-0.17	-0.16	0.09	-0.16	-0.21	-0.26	-0.22	0.70	0.84	1	
OTHER	0.85	-0.03	-0.12	-0.29	-0.08	0.01	-0.21	-0.24	-0.27	-0.25	0.71	0.67	0.60	1

Source: Authors' Computation

Also, the estimates of capital stock (CAP) are positive and statistically significant across the models. For instance, a percent increase in the level of capital stock leads to 0.18 percent on average, increase in industrial development. Interestingly, its contribution to industrial development is slightly higher under governance measures as indicated by the higher estimates. This shows that the improvement in capital stocks in most African economies can facilitate industrial development in the region. In addition, the coefficients of human capital as measured by education and health spending have different signs and magnitudes. On education (EDUCEX), its coefficients are largely positive across models but statistically insignificant. More so, its coefficients are very small. However, the coefficients of health expenditure per capita (HEAL) are all positive and statistically significant across the models. In all, this may imply that the education aspect of the human capital is still very low. This may hinder industrial development in the region.

Also, the estimates of government spending (EXP) and foreign direct investment (FDI_GDP) have negative signs across the models. Also, the magnitudes of EXP and

FDI GDP are very trivial suggesting little influence on industrial development. In most African countries, a larger proportion of government spending is recurrent due to the large size of the government. This, however, has implications for capital spending which affects the provision of infrastructures that are necessary for industrial development. Also, the foreign direct investment remains unproductive rather than serves as а drag on industrial development. This may suggest that FDI inflows have not translated significant improvement in industrial to activities of the African region. On the trade openness (TROP), which captures the domestic economic openness and the extent of a country's receptiveness to foreign businesses, its coefficients are all positive and statistically significant across the models. The region benefits significantly from trade openness to strengthen its industrial sector. There is a lot of effort in the region to foster trade among countries. This can unlock the potential in the industrial sector which has the capacity of generating huge employment in the region. By this, the industries may benefit from exploring the international market due to technological transfers thereby fostering industrial development.

Shifting attention to investment measures, its coefficients are all positive and statistically significant across the models except in model 3. The results reveal that a percent increase in the level of investment leads to 0.05 percent on average, increase in industrial development. This implies that investment is crucial to boosting industrial production in the region. In many African countries, the level of investment has continued to improve. This has created a conducive environment for industries to benefit in terms of structure, technology, and intellectual property, among others. Industrial

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development requires a huge investment in structures, ICT, machinery, and innovation. However, the investment in transport equipment has a drag effect on industrial development. This is indicative of the poor transport system in most African countries. For productive investments, African countries need to leverage more on their investment in these key areas. The plausible reason is that this nature of investment is very important for the industrial sector. The industrial sector needs investment in structure, machinery, transport equipment, software communication and intellectual property. For example, the critical role played by investors cannot be overemphasised as their investment continues to expand and benefit industrial growth in the African region. This reveals the growing investment opportunities that drive industrial development in the region.

Similarly, governance measures contribute positively to industrial development. This is shown in the positive and statistical significance of all coefficients. This suggests that there is a significant improvement in governance in the region. More so, this is very important for the expansion of industrial activities that can generate more job opportunities for the large unemployed population. An overview of the governance structure in Africa shows that the era of military coups has become unpopular thereby creating an enabling environment for the democratically elected government to play its critical role in the development of policies, upholding the rule of law, accountability, enforcement of property rights and maintenance of law and order. This will significantly promote industrial development. In addition, going by the signs, each of the governance indicators complies with a theoretical proposition. A strong institutional foundation tends to create many opportunities for the expansion of industrial productivity.

Thus, this result is an indication of improvement in the governance architecture in most African countries. Many African countries are making efforts to improve their political structure through a smooth transition of government

as well as freedom of speech. Given the developmental challenges facing the region, the political class have realized that a strong and technologically driven industrial sector is a viable way to address those challenges.

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LCAP	0.146***	0.113***	0.198***	0.148***	0.203***	0.219***	0.200***	0.210***
	(0.0293)	(0.0234)	(0.0216)	(0.0216)	(0.0171)	(0.0173)	(0.0169)	(0.0169)
LAB	-0.0103**	-0.0114***	-0.0102**	-0.00980**	-0.0131***	-0.0114**	-0.0101**	-0.0120***
	(0.0045)	(0.0044)	(0.0045)	(0.0044)	(0.0047)	(0.0046)	(0.0046)	(0.0046)
EDUCEX	0.0005	0.0026	-0.0020	-0.0075	0.0020	0.0015	0.0026	0.0064
	(0.0117)	(0.0114)	(0.0118)	(0.0116)	(0.0129)	(0.0126)	(0.0127)	(0.0127)
LHEAL	0.275***	0.253***	0.282***	0.272***	0.260***	0.247***	0.263***	0.250***
	(0.0269)	(0.0268)	(0.0267)	(0.0265)	(0.0282)	(0.0281)	(0.0279)	(0.0279)
FDI_GDP	-0.0034^	-0.0033^	-0.0025	-0.0031^	-0.0019	-0.0021	-0.0018	-0.0019
EVD	0.0085***	0.0010)	0.0010)	(0.0010)	0.0010)	0.0010)	0.0010)	0.0010)
EAF	-0.0085	-0.0089	-0.0090	-0.0074	(0.0030)	-0.0107	(0.0030)	(0.0030)
TROP	0.0036***	0.0028***	0.0038***	0.0033***	0.0033***	0.0034***	0.0037***	0.0035***
inor	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0004)	(0.0006)	(0.0006)
STRUC	0.0456**		· · · ·	· · · ·	. ,	· · · ·	· · · ·	· · ·
	(0.0227)							
MACH		0.101***						
		(0.0211)						
TRAEQ			-0.0034					
			(0.0144)					
OTHER				0.0443***				
				(0.0134)				
PSAVA					0.130***			
DEGOE					(0.0297)	0.040+++		
REQGE						0.248***		
ROLCC						(0.0430)	0 2//***	
NULUU							(0.0459)	
GENID							(0.0.100)	0 0453***
GENID								(0.00751)
CONSTANT	19.12***	19.12***	19.04***	19.27***	19.31***	19.12***	19.17***	19.24***
	(0.431)	(0.439)	(0.436)	(0.447)	(0.451)	(0.455)	(0.454)	(0.451)
OBSERVATIONS	600	600	600	600	525	525	525	525
COUNTRY NO.	25	25	25	25	25	25	25	25
WALD-CHI2	1559	1642	1550	1598	1294	1344	1330	1358
PROB > CHI2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HAUSMAN TEST	13.96	8.76	11.85	8.83	12.96	8.88	10.43	10.69
	(0.083)	(0.363)	(0.158)	(0.357)	(0.113)	(0.352)	(0.236)	(0.220)

Table 8. Random Effects Mode	s for Investmen	t and Governance
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Source: Authors' compilation

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

9 and 10 where investment measures and governance indicators are jointly introduced development when the role of governance

The next discussion focuses on Tables | into the models. This allows us to evaluate the direct impact of investment on industrial

is taken into consideration. From the results in Table 9, there are slight changes in the magnitude and level of significance in the control variables. There is a twist to the effect of investment measures. The effect of investment on structures was positive but only statistically significant in model 3. However, the investment in machinery is positive and statistically significant. In Table 10, the effect of investment on transport equipment is majorly negative and statistically insignificant. On the other hand, other investment significantly enhances industrial development. From these results, it is clear that investment in structures and transport equipment is suboptimal. Specifically, the level of investment in residential, non-residential and transport

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infrastructure is significant. Nonetheless, the level of investment in machinery and other assets plays an important role in fostering industrial development. Expectedly, the industrial sector relies heavily on investments to foster productivity and expansion. Also, all the governance measures promote industrial development. There is increasing awareness of the important role of government in many African countries. This has been improving the democratic situation in the region. By this, investors gain more confidence through enforcement of contractual agreements due to functional government. Therefore, the countries in the region must continue to improve on this to foster the desired level of development in the industrial sector.

Table	9. Random	Effects	Models	without	interaction	between	Investment
	(St	tructure	and Mad	chinery)	and Gover	nance	

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LCAP	0.163***	0.180***	0.158***	0.172***	0.125***	0.148***	0.132***	0.144***
	(0.0306)	(0.0304)	(0.0302)	(0.0302)	(0.0254)	(0.0261)	(0.0255)	(0.0257)
LAB	-0.0133***	-0.0117**	-0.0104**	-0.0123***	-0.0142***	-0.0127***	-0.0116**	-0.0131***
	(0.0047)	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0045)	(0.0046)	(0.0045)
EDUCEX	0.0041	0.0037	0.0049	0.0083	0.0045	0.0038	0.0044	0.0077
	(0.0130)	(0.0127)	(0.0128)	(0.0128)	(0.0127)	(0.0125)	(0.0126)	(0.0125)
LHEAL	0.253***	0.240***	0.256***	0.244***	0.236***	0.228***	0.241***	0.232***
	(0.0286)	(0.0284)	(0.0283)	(0.0282)	(0.0284)	(0.0282)	(0.0282)	(0.0281)
FDI_GDP	-0.0025	-0.0027	-0.0024	-0.0024	-0.0027	-0.0029	-0.0025	-0.0025
	(0.0019)	(0.0019)	(0.0019)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)
EXP	-0.0100***	-0.0103***	-0.0099***	-0.0103***	-0.0100***	-0.0103***	-0.0100***	-0.0103***
	(0.00301)	(0.00297)	(0.0030)	(0.0030)	(0.0030)	(0.0029)	(0.0029)	(0.0029)
TROP	0.0031***	0.0032***	0.0035***	0.0033***	0.0025***	0.0027***	0.0029***	0.0028***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
PSAVA	0.127***				0.107***			
	(0.0298)				(0.0297)			
STRUC	0.0377	0.0373	0.0397*	0.0360				
	(0.0242)	(0.0238)	(0.0239)	(0.0237)				
REQGE		0.245***				0.207***		
		(0.0439)				(0.0447)		
ROLCC			0.242***				0.198***	
			(0.0460)				(0.0472)	
GENID				0.0446***				0.0380***
				(0.00754)				(0.00773)
MACH					0.0952***	0.0842***	0.0839***	0.0793***
					(0.0232)	(0.0233)	(0.0236)	(0.0234)
CONSTANT	19.37***	19.19***	19.25***	19.31***	19.37***	19.20***	19.25***	19.30***
	(0.444)	(0.447)	(0.441)	(0.440)	(0.451)	(0.457)	(0.456)	(0.454)
1								

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
OBSERVATIONS	525	525	525	525	525	525	525	525
COUNTRY NO.	25	25	25	25	25	25	25	25
WALD-CHI2	1291	1343	1323	1351	1356	1394	1378	1402
PROB > CHI2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HAUSMAN TEST	17.66 (0.039)	13.01 (0.162)	17.40 (0.043)	16.77 (0.052)	11.96 (0.215)	8.35 (0.499)	9.55 (0.388)	9.82 (0.365)

Source: Authors' compilation

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 10. Random Effects Models without interaction Investment (Transport and Other) and Governance

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LCAP	0.209***	0.217***	0.200***	0.213***	0.147***	0.157***	0.143***	0.144***
	(0.0223)	(0.0221)	(0.0220)	(0.0219)	(0.0221)	(0.0216)	(0.0219)	(0.0215)
LAB	-0.0133***	-0.0115**	-0.0102**	-0.0121***	-0.0131***	-0.0111**	-0.00957**	-0.0117***
	(0.0047)	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0045)	(0.0045)	(0.0045)
EDUCEX	0.0030	0.0013	0.0025	0.0068	-0.0023	-0.0036	-0.0021	0.0020
	(0.0131)	(0.0128)	(0.0129)	(0.0129)	(0.0128)	(0.0124)	(0.0126)	(0.0124)
LHEAL	0.260***	0.247***	0.263***	0.250***	0.242***	0.223***	0.246***	0.227***
	(0.0283)	(0.0282)	(0.0280)	(0.0279)	(0.0282)	(0.0279)	(0.0277)	(0.0277)
FDI_GDP	-0.0019	-0.0021	-0.0018	-0.0018	-0.0026	-0.0029	-0.0025	-0.0027
	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)
EXP	-0.0102***	-0.0107***	-0.0103***	-0.0106***	-0.0082***	-0.0081***	-0.0080***	-0.0081***
	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0029)	(0.0030)	(0.0029)
TROP	0.0033***	0.0034***	0.0037***	0.0035***	0.0028***	0.0028***	0.0032***	0.0029***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
PSAVA	0.131***				0.155***			
	(0.0298)				(0.0299)			
TRAEQ	-0.0067	0.0017	-0.00007	-0.0033				
	(0.0149)	(0.0146)	(0.0147)	(0.0146)				
REQGE		0.248***				0.303***		
		(0.0440)				(0.0445)		
ROLCC			0.244***				0.278***	
			(0.0460)				(0.0459)	
GENID				0.0453*** (0.0075)				0.0547*** (0.0076)
OTHER					0.0556***	0.0657***	0.0559***	0.0663***
					(0.0141)	(0.0140)	(0.0139)	(0.0139)
CONSTANT	19.30***	19.13***	19.18***	19.24***	19.60***	19.42***	19.44***	19.57***
	(0.447)	(0.449)	(0.448)	(0.446)	(0.455)	(0.459)	(0.458)	(0.454)
OBSERVATIONS	525	525	525	525	525	525	525	525
COUNTRY NO.	25	25	25	25	25	25	25	25
WALD-CHI2	1287	1336	1321	1350	1349	1427	1391	1443
PROB > CHI2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman Test	15.97	12.20	14.12	13.98	13.21	8.15	10.10	10.52
	(0.068)	(0.202)	(0.118)	(0.123)	(0.153)	(0.520)	(0.342)	(0.310)

Source: Authors' compilation

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The second part of the discussion focuses on the models with interaction terms. Table 11 investment (structure and machinery) and

governance indicators. As earlier discussed, we followed a stepwise procedure in this analysis. From the results, the coefficients of the structure and governance indicators remain positive and statistically significant. The direct impact of structure is positive but not statistically significant. However, all governance indicators remain positive and statistically significant. This suggests that good governance is essential to the development of the industrial sector in the region. Considering the interaction terms, the coefficients are negative but statistically significant in models 3 and 4. Intuitively, it implies that governance Investments, Governance Quality, and Industrial Development in Africa

does not enhance industrial development through this investment measure. In addition, it also serves as a drag on industrial development. For the direct impact, the coefficients of investment in machinery and governance indicators remain positive and statistically significant. From models 5-8, we can observe that the signs of the interaction term are negative and statistically significant. By and large, we can interpret this to suggest that governance quality is not large enough to facilitate this investment measure that can promote industrial development in the African region.

Table	11. Random	Effects	Models	with	between	Investment
	(Structure	and Ma	chinery)	and	Governar	nce

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LCAP	0.162***	0.184***	0.160***	0.174***	0.120***	0.146***	0.131***	0.140***
	(0.0305)	(0.0306)	(0.0301)	(0.0301)	(0.0254)	(0.0262)	(0.0253)	(0.0257)
LAB	-0.0123***	-0.0101**	-0.0082*	-0.0104**	-0.0142***	-0.0117**	-0.0103**	-0.0120***
	(0.0047)	(0.0047)	(0.0047)	(0.0047)	(0.0046)	(0.0046)	(0.0046)	(0.0045)
EDUCEX	0.0088	0.0084	0.0125	0.0146	0.0084	0.0061	0.0089	0.0120
	(0.0133)	(0.0132)	(0.0132)	(0.0133)	(0.0127)	(0.0126)	(0.0126)	(0.0126)
LHEAL	0.255***	0.245***	0.262***	0.249***	0.233***	0.229***	0.245***	0.233***
	(0.0286)	(0.0286)	(0.0283)	(0.0283)	(0.0282)	(0.0282)	(0.0280)	(0.0279)
FDI_GDP	-0.0025	-0.00293	-0.0029	-0.0027	-0.0024	-0.0029	-0.0028	-0.0026
51/5	(0.0019)	(0.0019)	(0.0019)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)
EXP	-0.0107***	-0.0109***	-0.0111***	-0.0112***	-0.0104***	-0.0106***	-0.0109***	-0.0110***
TDOD	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0029)	(0.0029)	(0.0029)	(0.0029)
TRUP	(0,0006)	(0.0034****	(0,0006)	(0,0006)	(0.0027	(0.0028	(0,0006)	(0,0006)
PSAVA	0.332**	(0.0000)	(0.0000)	(0.0000)	0.455***	(0.0000)	(0.0000)	(0.0000)
1 OAWA	(0.132)				(0.135)			
STRUC	0.0284	0 0220	0 0191	0 0193	()			
	(0.0248)	(0.0266)	(0.0256)	(0.0256)				
STRUC PSAVA	-0.0169	. ,	x ,	. ,				
_	(0.0107)							
REQGE		0.463***				0.402**		
		(0.176)				(0.187)		
STRUC_REQGE		-0.0183						
		(0.0143)						
ROLCC			0.610***				0.626***	
			(0.175)				(0.186)	
STRUC_ROLCC			-0.0300**					
			(0.0137)					
GENID				0.0932***				0.106***
				(0.0293)				(0.0309)
STRUC_GENID				-0.0041* (0.0024)				

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
MACH					0.0824***	0.0764***	0.0625**	0.0624**
					(0.0236)	(0.0243)	(0.0251)	(0.0244)
MACH_PSAVA					-0.0298***			
					(0.0113)			
MACH_REQGE						-0.0176		
						(0.0164)		
MACH_ROLCC							-0.0371**	
							(0.0156)	
MACH_GENID								-0.0060**
								(0.0026)
CONSTANT	19.40***	19.17***	19.27***	19.32***	19.56***	19.23***	19.39***	19.43***
	(0.447)	(0.450)	(0.443)	(0.442)	(0.456)	(0.463)	(0.464)	(0.461)
OBSERVATIONS	525	525	525	525	525	525	525	525
COUNTRY NO	25	25	25	25	25	25	25	25
WALD-CHI2	1301	1349	1342	1362	1380	1399	1401	1423
PROB > CHI2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HAUSMAN TEST	17.39	13.12	17.18	16.86	12.97	3.30	9.18	9.66
	(0.066)	(0.217)	(0.705)	(0.078)	(0.225)	(0.974)	(0.515)	(0.470)

Source: Authors' compilation

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12. Random Effects Models with the interaction between Investment (Transport and Other) and Governance

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LCAP	0.206***	0.218***	0.199***	0.211***	0.147***	0.153***	0.145***	0.144***
	(0.0225)	(0.0221)	(0.0220)	(0.0220)	(0.0221)	(0.0214)	(0.0219)	(0.0216)
LAB	-0.0133***	-0.0109**	-0.00974**	-0.0117**	-0.0131***	-0.0126***	-0.0091**	-0.0118***
	(0.0047)	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0045)	(0.0046)	(0.0045)
EDUCEX	0.0050	0.0043	0.0068	0.0103	-0.0012	-0.0060	-0.0004	0.0012
	(0.0133)	(0.0132)	(0.0132)	(0.0132)	(0.0129)	(0.0123)	(0.0128)	(0.0126)
LHEAL	0.262***	0.251***	0.268***	0.255***	0.241***	0.227***	0.247***	0.228***
	(0.0284)	(0.0286)	(0.0282)	(0.0281)	(0.0283)	(0.0277)	(0.0278)	(0.0277)
FDI_GDP	-0.0017	-0.0021	-0.0018	-0.0018	-0.0025	-0.0025	-0.0025	-0.0027
	(0.0019)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)
EXP	-0.0109***	-0.0113***	-0.0114***	-0.0115***	-0.0082***	-0.0088***	-0.0082***	-0.0080***
	(0.0031)	(0.0030)	(0.0031)	(0.0031)	(0.0030)	(0.0029)	(0.0030)	(0.0029)
TROP	0.0035***	0.0035***	0.0038***	0.0036***	0.0028***	0.0026***	0.0032***	0.0029***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
PSAVA	0.239**				0.206**			
	(0.115)				(0.0990)			
TRAEQ	-0.0108	-0.0092	-0.0157	-0.0143				
	(0.0155)	(0.0188)	(0.0180)	(0.0170)				
TRAEQ_PSAVA	-0.00992							
	(0.0101)							
REQGE		0.394**				0.0335		
		(0.164)				(0.0949)		
TRAEQ_REQGE		-0.0144						
		(0.0156)						
ROLCC			0.472***				0.364***	
			(0.160)				(0.132)	

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VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
TRAEQ_ROLCC			-0.0218 (0.0147)					
GENID				0.0761*** (0.0259)				0.0458** (0.0215)
TRAEQ_GENID				-0.00293 (0.00236)				
OTHER				X Z	0.0523*** (0.0154)	0.0862*** (0.0153)	0.0490*** (0.0170)	0.0700*** (0.0163)
OTHER_PSAVA					-0.0055	, , , , , , , , , , , , , , , , , , ,	()	, , , , , , , , , , , , , , , , , , ,
OTHER_REQGE					()	0.0331*** (0.0103)		
OTHER_ROLCC						()	-0.0094 (0.0135)	
OTHER_GENID							()	0.0010 (0.0022)
CONSTANT	19.37*** (0.446)	19.16*** (0.456)	19.29*** (0.456)	19.32*** (0.451)	19.62*** (0.457)	19.41*** (0.460)	19.45*** (0.463)	19.56*** (0.458)
OBSERVATIONS	525	525	525	525	525	525	525	525
COUNTRY NO.	25	25	25	25	25	25	25	25
WALD-CHI2	1281	1341	1329	1354	1348	1467	1393	1444
PROB > CHI2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HAUSMAN TEST	19.90 (0.030)	11.54 (0.317)	14.08 (0.169)	14.72 (0.142)	14.25 (0.162)	7.51 (0.677)	9.76 (0.462)	10.31 (0.414)

Source: Authors' compilation

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The subsequent discussion focuses on the results presented in Table 12 where we report the models with interaction terms by considering other measures of investment (transport and other assets) and governance quality. This is aimed at probing further if the quality of governance can improve other forms of investment. This operation is to provide more insight into the relationship between investment and industrial development through the role of governance quality. In terms of direct impact, the coefficients of investment in transport are negative and not statistically significant. However, the coefficients of other assets are positive and statistically significant. The narrative from these results suggests that transport infrastructure is largely weak in African countries. Whereas investment in other assets

such as software and intellectual property is growing thus enhancing industrial activities. This further reinforces the argument above that some investment measures are key to the development of the industrial sector. Also, the direct impact of all measures of governance positive and statistically significant. is Undeniably, governance quality has improved in the region, but this improvement needs to translate to promote the economic wellbeing of the teeming unemployed population. On the interaction results, the narrative remains the same as coefficients are negative and statistically insignificant across the models except in model 6. Thus, there is a need for a greater role for African countries to stimulate investment in these key areas by reflecting the progress recorded in governance quality

in the implementation of reliable policies for industrial development.

6. Conclusion and Policy Implications

There has been some consensus on the industrial sector as a tool for addressing fundamental challenges in the African region. The industrial sector has been identified as a key driver of development in developed and emerging countries. African developmental challenges have also been linked to poor industrial development. In addition, not much investigation has been conducted empirically, on the drivers of industrial development in Africa. Thus, the study examines the role of governance in investment and industrial development relationship in 25 African countries between 1996 and 2019. The study relied on the endogenous growth model. It also employs the random effects model approach. Using the step-wise approach, the findings indicate a positive direct impact of all measures of governance and some investment measures on industrial development. This suggests that investment is paramount for boosting industrial activities in Africa. More so, investments in structure and transport are low in most African countries, which undermines industrial development. Also, governance quality plays an important role in promoting industrial development in Africa. This can be linked to the significant improvement in the area of governance in the region. Generally, the governance structure in Africa shows that the period of the unstable political system (e.g. coup d'état) has become unpopular thereby creating enabling environment for democracy to play its critical role in implementing investment-friendly policies, upholding the rule of law, accountability, and maintenance of law and order. However, the results of the interaction suggest that governance quality is still weak hence, resulting in the ineffectiveness of investment measures in fostering industrial development. This implies that African countries need to do more by leveraging governance quality to attract viable and beneficial investments that will improve industrial sector activities. This may reduce the independence of African countries from primary commodities to more competitive products.

Several relatable policies can be drawn from our findings to help policymakers design reliable policies for industrial development. First, there is a need for the African region to create a stable environment for investors. This can be done through the following: improvement of the rule of law, terrorism/ political violence reduction, improvement in freedom of speech and accountability and corruption reduction. Moreover, investing in modern technology, transport equipment, communication, intellectual property products and software is critical for the development of the industrial sector. Thus, leveraging the improvement in governance quality to attract investment to the key infrastructures that are necessary to propel industrial development is very germane. Second, many industrial policies have been designed in the past without significant impact on the industrial sector, however, the development and institutionalization of the master plan that can stimulate investment may be necessary. Also, investment with respect to a country's ability and legislation may provide solutions to the challenges in the industrial sector.

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Appendix 1: List of African Countries

Benin, Burkina Faso, Botswana, Cameroon, Congo Republic, Egypt, Gabon, Guinea, Kenya, Liberia, Morocco, Madagascar, Mali, Mozambique, Mauritania, Mauritius, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Eswatini, Togo, Uganda.