

# **Manufacturing Export, Infrastructure and Institutions in Africa: Reflections from ECOWAS<sup>1</sup>**

**By**

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## **Abstract**

*This study examines the extent of manufacturing export in ECOWAS countries, how it has been affected by the extent of infrastructural development and the distilling role of institutions. In retrospect, we present stylized facts that proves that ECOWAS poor infrastructural development has largely being driven by the poor institutions, which promotes private benefits rather than public good (such as infrastructure). In essence, this has hampered manufacturing export and reduced the extent of competitiveness of these countries.*

**Keywords:** ECOWAS; Infrastructural provision; Institutions; Manufacturing export; Manufacturing value added.

**JEI Codes:** F13; F31.

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## **Manufacturing Export, Infrastructure and Institutions in Africa: Reflections from ECOWAS**

### **1 Introduction**

The main focus of this paper is to examine the role of institutions in underscoring the linkage between infrastructures and manufacturing export in countries in the Economic Community of West African States (ECOWAS).

The manufacturing sector plays a vital role in enhancing countries' global competitiveness and the extent of their internationalisation drive. This includes their ability to adequately provide goods and services that are able to compete effectively in the international market, where demand is mostly based on the quality and efficiency of the products being sold. This has brought about the reiteration that countries in Africa should pay more attention to improving the manufacturing sector, unlike the traditional export baskets that include the composition of primary products like those from the agriculture or natural resource. The address by the World Bank' president in 2014 clearly states that the hope of African countries should focus on developing the light manufacturing sector, which could help in the development of industrialization, export diversification, and job creation (Kim, 2014). Kim also stated that recent analysis suggest that the development of this sector could create about seven million new jobs in the continent and the drastic effect on a continent that currently faces unemployment situation, is immeasurable.

The issues relating to the development of the manufacturing sector cannot be discussed in isolation. There are catalysts to this development, called infrastructure. Infrastructure encompasses those physical components or structures that are needed to enhance the operation of a particular process in a society. With regard to the manufacturing sector, infrastructure plays two important roles: the enhancement of the input and the output process in a production system. With regards to the input process, infrastructure enhances the procurement of material input and also in the preservation of these inputs. The output processes involve the use of infrastructure in preserving, securing and transporting the finished products to the potential market.

The cost of poor infrastructural development is seen in the increased cost of trading, in the form of production and transportation cost (Limao and Venables, 2001; Abe and Wilson, 2009). For instance, the recent industrial migration from Nigeria to neighbouring countries – like Ghana – was attributed to increased cost of production due to poor power supply and port congestions that consequently resulted to increased overhead cost of production of manufacturing companies (Sunday Trust, 2013). Likewise, industries in most of these countries (African countries) experience increased trade cost on transportation of raw materials and finished goods, as a result of poor infrastructural facilities (World Bank, 2013). Actually, poor infrastructural development in African countries (including ECOWAS countries) is one of the main impediments to trade development. This cannot be denied seeing the Statistics that shows that limited road access in Africa reaches only about 34 percent of the rural community, compared to the 90 percent for the rest of the world (African Development Bank-ADB, 2010a). Likewise, less than 40% of the region's population have access to electricity and about one-third, living in rural areas, are within two kilometres of an all-season road, compared to two-thirds of the population in other regions (ADB, 2010b; Obilomo and Ojo, 2013).

The World Bank (2013) predicted that for African countries to be effectively competitive in the global sphere, there is the need for an annual investment of about 93 billion US\$ until 2020 for infrastructural development. Noting this prediction, most African countries have resorted to the consideration of increased inflow of Foreign Direct Investment (FDI) and Official Development Assistance (ODA) to offset the huge infrastructural deficit. It is no wonder that across Africa, over 70% of the public funding comes from foreign aid (Moyo, 2009); Asiedu (2006) earlier confirmed that the need for African countries to attract FDI in order to fill their resource gap is needed for development projects. The inflow of these forms of capital is not without a cost. Apart from the fact that the continent has experienced increased poverty and institutional breakdown as a result of these funds (Moyo, 2009), the uncertainty of these funds is another encumbrance to their reliance for developmental projects (African Economic Outlook, 2014).

In the light of these, the quality of institutions and governance structure is considered as a sustainable alternative. In essence, we argue that African countries can begin to play less on depending on foreign resource for financing their infrastructural deficit, by improving their institutional and governance structure to effectively manage funds and reserves to aid this. This argument stems from the fact that African countries experience huge resource leakages from fund outflow that is predicated on poor institutions. For instance, in 2002, the African Union estimated the annual cost of corruption on the continent to be US\$150 billion<sup>2</sup>. Putting this in perspective, African countries will experience a windfall from public resources (in the form of channelling these funds to development projects like infrastructural development) if institutions are developed and the governance structure is enhanced.

The theoretical justification for this argumentation is intense, as proponents of institutional economics (e.g. Acemoglu, Johnson and Robinson, 2001; Blair-Henry and Miller, 2008; Acemoglu and Robinson, 2012; Osabuohien and Efobi, 2013, Efobi, 2014), have argued that the distinguishing factors between countries – in the global sphere – is the strength of their institutions and policies. Acemoglu and Robinson (2012) portrays a compelling discuss by noting that institutions are political forces that creates incentives for government and politicians and determines the quality of policies that are put forward by them. Sometimes, these forces are either overt or explicit, but the common peculiarity is that these rules – no matter the form – structure social interactions (Hodgson, 2006). Some other contributors to the literature on institutional economics include North (1990; 1991), Williamson (1998; 2000) and a host of others like Osabuohien and Efobi (2013; 2014), Asongu (2014). Putting this in perspective, we suspect that the reason why African countries – ECOWAS inclusive – have not recorded much progress in infrastructural development that would have hitherto enhanced growth is because of the poor institutional forces that exist in these countries. Analogically, political actors in these countries would have had incentive to pursue the development of infrastructure for trade facilitation if only the extent of institutional development was emphasised in these countries.

Noting this, policy analysts have consistently presented a wake-up call for the strengthening of the institutional framework of African countries to pursue improved infrastructural development. For instance, in the ECOWAS region, the regional community is beginning to emphasise the

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<sup>2</sup> Considering that African countries' average inflation rate of 7.08 for 2003-2010 (according to the United Nations Statistics, available at [http://www.un.org/en/development/desa/policy/wesp/wesp\\_archive/2012annex\\_tables.pdf](http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2012annex_tables.pdf)), then the value for 150 billion US\$ in 2010 would be about 1 trillion US\$, which is over 11 times more than the annual contribution required for infrastructural development.

need for regional actions that will propel member states to put in place policies to enhance infrastructural development. Some of these actions include the Supplementary Act of 2007 that focused on the harmonisation of policies and regulatory framework for the development of soft (ICT) infrastructure in the sub-region. Article 33 of the Act provides that member states should participate in the modernisation and development of infrastructure in order to provide reliable interconnectedness, both for regional and international communication (ECOWAS, 2007). Among the notable achievements of this effort is the declaration for the support of the deployment of submarine cable project that links member countries to Southern Europe (Osabuohien and Efobi, 2014).

It is on this note that this study intends to empirically examine the linkage between institutional development and its effect on infrastructure and manufacturing export in African countries – especially ECOWAS countries – to be precise. The main reason for focusing on ECOWAS countries is highlighted in the subsequent section (stylized trend) of this paper. The remainder of the paper is organised as follows: the second section presents discuss from the empirical literature, while the third section provides some stylized facts. In the fourth section, we present some bi (and multivariate) relationships between the three elements of study. The fifth section concludes with policy implications.

## **2. Insights from Literature**

It is advantageous for countries to begin to focus on the improvement of the productivity of their manufacturing sector. This is especially when countries are beginning to think towards enhancing their global competitiveness. In Africa, this cannot be overemphasised due to the fact that there has been an over reliance on primary product by most of the countries in this region. In a policy document by the United Nations Economic Commission of Africa-UNECA (2013), the need for the development of the manufacturing sector of African countries was tied to the fact that the productivity gains that emanates from the linkages (backward and forward) between the manufacturing sectors and other sectors gives rise to increased scope for technology transfer and diffusion and improved managerial and technological spill-overs. Generally, the manufacturing sector has also been known to be an economic growth enhancer through its functional role in capital accumulation, knowledge and managerial skills transfer, increasing economies of scale and learning by doing effects<sup>3</sup>.

The literature on the relevance of infrastructural development on trade is rather much with reiterating stances cutting across regions. For instance, the Asian's region trade expansion was in turn facilitated and encouraged by the development of supporting infrastructure including physical and institutional infrastructure (Douglas and Jayant, 2005). This massive investment in infrastructure for trade facilitation was facilitated by the structural reforms in this region that was targeted at improving the environment for investment, production and trade. In essence, countries within the region understood that the duo (infrastructure and trade) are complimentary in themselves, although there is still the need to boost infrastructural provision in this region.

In an earlier study on European countries' trade performance, the conclusion was reached that infrastructural availability drastically affected transport cost of trade (Bougheas, Demetriades

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<sup>3</sup> For more discussion on the importance of the manufacturing sector, see Mbate (2014), who examined industrial policy and structural changes in ECOWAS countries.

and Morgenroth, 1999). Their theoretical model predicts that for pairs of countries for which investment in infrastructure is optimal, a positive relationship between the level of infrastructure and the volume of trade is predictive. Focusing on Africa, Tomasz and Colin (2009) estimated a standard gravity model for developed and developing countries, with particular reference to Africa. They concluded that trade facilitation – in the form of improved quality of the basic transport and communications infrastructure – improves export performance in Africa. Somewhat similar conclusion was reached on a global perspective by Portugal-Perez and Wilson (2012) that the marginal effect of the transport efficiency on exports appears to be decreasing with per capita income. In contrast, they emphasise that the impact of physical infrastructure on exports appears increasingly important for richer countries.

It is not surprising that infrastructure services plays a significant role in trade costs by reducing distribution margins, lowering prices and raising consumer welfare; more so, infrastructural provisions increases the profitability for exporters – by lowering transaction costs and value addition to the production process – while expanding linkages to the global distribution networks (Douglas, 2005, 2008).

Of course, the influence between trade and infrastructure is expected as Nordas and Piermartini (2004) clearly highlights four possible interactions that stems from the relationship. The first is the *direct monetary outlays*, which covers the charges for infrastructural services. As expected, in countries with poor infrastructural service, this outlay becomes higher and even increases the overhead cost for the benefit from such services. *Timeliness* of delivery of goods and services is another interaction that is influenced by infrastructural services. The third is *risk* of damages, losses and higher insurance cost on goods produced, while poor *market access* is the fourth issue caused by poor infrastructure.

Noting the relevance of infrastructure on trade, it is therefore puzzling on why countries do not pay much attention to the development of this social good. In understanding these reasons, it is important to address this issue from the institutional perspective. The reason for this approach is because institutions are supposed to be a form of framework that creates incentives for public officers to consider efficient actions for the overall good of the society (Acemoglu and Robinson, 2012). These actions are in the form of policies that pertains to the overall progress of the society (Blair-Henry and Miller, 2008). Therefore, it is prudent to assume that states that do not experience considerable progress in infrastructural development are lacking in the development of efficient institutions to drive these progress. Francois and Manchin (2007) seem to support this suspicion.

Likewise, recent study by Cissokho et al (2013) further buttress this stance, noting that for West African countries to maximize their agricultural export, they need to engage in investments in better infrastructure and institutional framework in the form of faster customs clearance and fewer police payoffs at the borders. Cissokho et al's study is the closest to this current study but differs in the respect that the quality of institutions is brought to perspective here. They emphasized the role of institutions and supplemented their recommendation based on an interview carried out at two borders (Dakar-Kayes and Dakar-Bissau). Their submissions calls for the need for further investigation on the linkage between institutions, infrastructure and trade.

Also, a more compelling literature on the role of institutions on trade is emerging. Proponents of this debate have examined this linkage in diverse perspectives. Some have concluded that there is a strong relationship between investment in productivity (which affects country's trade performance) and the quality of institutions (Knack and Keefer, 1995; Mauro, 1995; Rodrick, 1995; Brunetti and Weder, 1998). On another perspective, some authors noted that weak institutional framework actually affects productivity by either reducing aggregate productivity or slowing productivity growth (Hall and Jones, 1999; Olson et al, 2000). Yet from another perspective, poor institution is accused for a country's poor integration in the international market because poor institutions can hurt a country's capacity to export manufactured goods (Meon and Sekkat, 2008; Osabuohien and Efobi, 2011).

Despite these compelling arguments, these studies inadvertently did not consider the role of institutions in determining the extent of provision of public infrastructure for enhanced trade. This perspective is germane considering that poor institutional framework creates a disincentive for public officers to act accordingly for state interest. In essence, this is not about creating rules to guide behaviors of economic agents but that the emphasis should be on the rules. Thus, the behaviors of individual are only guided by the rules and not any form of informalities like norms and accepted ways of behaviors prevalent in a particular system (World Bank, 1997). Putting this in context, the rising trend of poor institutions in a country will give rise to the erosion of governmental legitimacy and consequently hampers the effective delivery of public goods and services (Lawal, 2007). This has been empathetically reemphasized in the case of African countries (e.g. Asiedu, 2006; Asiedu and Lien, 2011; Fosu, 2011; Osabuohien and Efobi, 2013; Efobi, 2014).

### **3. Stylized Trends: Manufacturing Sector<sup>4</sup>, Infrastructure and Institutions**

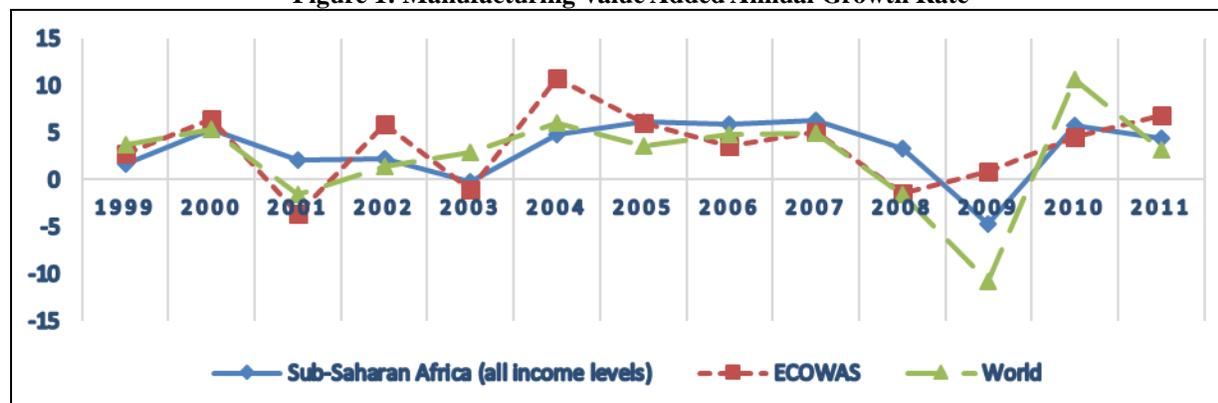
To understand the performance of the manufacturing exports of African countries (especially ECOWAS countries), there is the need to first of all observe the performance of the manufacturing sector. The main indicator in achieving this is the manufacturing value added, which explains the net output of industries in a particular country after adding up all outputs and subtracting intermediate inputs (World Bank, 2014).

Obviously, the manufacturing sector in many of African countries has experienced an undulating growth rate of the manufacturing sector, as displayed in Figure 1. However, this direction of flow is not peculiar to African countries, as the trend for world average was not stable as well. However, there is a need to appreciate the manufacturing sector growth rate of African countries, noting that apart from the earlier period prior to the financial crisis and during the crisis, these countries have exhibited a stable rising of the productivity of this sector. For instance, in the ECOWAS region, the manufacturing sector witnessed a consistent rising trend from 2008 onward from -1.38 percent to about 6.30 percent in 2012. Similar rising was displayed for SSA countries, except that after 2008, the rising trend was not as smooth as that of ECOWAS region.

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<sup>4</sup> Emphasis was on the extent of productivity and export of the manufacturing sector.

**Figure 1: Manufacturing Value Added Annual Growth Rate**



Source: Authors' Computation from World Bank (2013)

Noting this seemingly 'success story' for ECOWAS countries, the extent to which the manufacturing sector contribute to the GDP of these countries is still minimal. For the period 1995-2012, the manufacturing sector contributed below 10 percent to the GDP and this trend is decreasing by the year, except for 2012 as depicted Table 1. Other African countries in the SSA region also witnessed similar modicum contribution of the manufacturing sector to GDP, at-least when comparing both regions with the average of countries from other regions of the world as displayed in Table 1. For instance, countries in East Asia and Pacific (EAP) – such as China and Malaysia – experienced a whopping contribution of the manufacturing sector to their economy with rates above 20 percent for most of the period. Likewise, countries in Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), and South Asia (SA) all had manufacturing sector contributions rate of about 15 percent or more in most of the period presented in the Table.

	1995-99	2000-04	2005-09	2010	2011	2012
East Asia and Pacific-EAP	24.271	23.203	22.991	22.969	22.370	19.224
Europe and Central Asia – ECA	19.347	17.572	15.959	15.117	15.168	14.824
Latin America and Caribbean – LAC	18.646	18.436	17.349	16.753	16.300	15.228
South Asia - SA	15.862	15.136	15.647	14.852	14.870	14.344
<b>Sub-Saharan Africa-SSA</b>	<b>13.558</b>	<b>13.076</b>	<b>11.695</b>	<b>10.941</b>	<b>10.340</b>	<b>9.835</b>
<b>ECOWAS</b>	<b>9.031</b>	<b>8.040</b>	<b>7.366</b>	<b>7.135</b>	<b>7.090</b>	<b>8.451</b>
World	19.107	17.792	16.697	16.188	16.100	NA

**Note:** The region – Middle East and North Africa – was not included due to data unavailability for the period considered.

**Source;** Computations from World Bank (2013)

The trifling contribution of the manufacturing sector of ECOWAS countries and countries in SSA to the overall economy reflects the performance of these countries in manufacturing export. As displayed in Figure 2, the manufacturing sector in ECOWAS and SSA countries, are able to account for between 20-30 percent of the total merchandise export. This rate is far below the global average that was consistently within the range of about 70 percent. The manufacturing

sector in countries in East Asia and Pacific, Europe and Central Asia and South Asia exported way above 70 percent of the total merchandise export.

**Figure 2: Manufacturing Export as % of Total Merchandise Export**



**Note:** EAP: East Asia & Pacific; ECA: Europe & Central Asia; SA: South Asia; SSA: Sub-Saharan Africa. Latin America & the Caribbean and Middle East & North Africa were not included due to data constraint.

**Source:** Computations from World Bank (2013)

To be exact, not only have the manufacturing sectors of countries in these regions performed below the world average, they have experienced decreasing trend in terms of percentage of manufacturing export to total merchandise export. For instance, the percentage dropped from 26.39 percent in 2005 to 20.64 percent in 2012, after it increased from 19.44 in 1999. Of course, the manufacturing export in SSA countries also dropped from 29.84 percent in 2005 to 25.75 percent in 2012, after it increased from 25.61 percent in 1999. No wonder the sea port of countries in this region have experienced low traffic compared to those in other regions (see Table 3), reflecting the low participation in international trade relative to the shipping activities in the ports. As a matter of fact, much more less than 1 percent of the total global flow of containers from land to sea is to or from the sea ports of ECOWAS countries.

	1995-99	2000-04	2005-09	2010	2011	2012
EAP	---	50.83	52.00	52.98	53.70	54.12
ECA	---	21.06	19.24	17.44	17.50	17.32
LAC	---	6.55	6.77	7.40	7.15	7.17
MENA	---	0.00	5.32	8.58	8.61	8.55
SA	---	2.35	2.87	3.20	3.09	3.01
<b>ECOWAS</b>	---	<b>0.20</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.08</b>

**Note:** The region – SSA was not included due to data unavailability for the period considered.

**Source;** Computations from World Bank (2013)

The poor infrastructural provision<sup>5</sup> in this region (ECOWAS) cannot be denied as a likely suspect. Apart from policy submissions to this effect (e.g. African Development Bank-ADB, 2010a, 2010b; World Bank, 2013), the statistics of some infrastructural indicators validates these submissions. For instance, considering the electric power consumption per capita – presented in the first segment of Table 3 – which measures the Kilo Watt per capita of electricity available for public consumption, ECOWAS countries (and SSA at large) had a dismal statistics. For the entire period, countries in there region had a highest KWh per capita consumption of about 223 (for ECOWAS) and 534 (for SSA). This is many folds less than the global average KWh consumption and those countries in other regions such as EAP, ECA, LAC and MENA.

In the same vein, in Table 3, the average total rail lines in ECOWAS region dropped from 1572.71km in the period (1995-1999) to 630.50km in 2013. Comparably, the statistics for countries in the EAP region presents a dissimilar trend. In the EAP region, the average rail lines increased from 276655.75km to 374221.00 in similar period. The decreasing trend in the rail lines per km is likely traceable to poor maintenance of the rails and in some cases, fund mismanagement that would have been used to maintain the rails. For instance, Nigeria recounts incidences of misappropriation of public fund that would have hitherto improved public infrastructure. Recently, railway staffs of the Nigerian Railway Corporation were indicted for fraud that is worth over 6 million US\$ (PM News, 2014).

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<sup>5</sup> Other measure of infrastructure (Logistic Performance Index) was presented in Table A1 in the appendix.

**Table 3: Infrastructural Development**

	<b>Electric power consumption (kWh per capita)</b>					
	1995-99	2000-04	2005-09	2010	2011	2012
EAP	1465.55	1837.81	2558.37	3063.47	3263.54	---
ECA	4722.48	5107.15	5457.38	5515.09	5465.18	---
LAC	1434.98	1589.24	1804.44	1954.67	2045.50	---
MENA	1547.43	1910.07	2327.01	2667.04	2704.73	---
SSA	534.46	524.71	536.85	529.92	534.93	---
World	2255.15	2457.13	2781.32	2981.61	3045.01	---
<b>ECOWAS</b>	<b>150.06</b>	<b>158.06</b>	<b>171.85</b>	<b>211.72</b>	<b>223.01</b>	<b>---</b>
	<b>Roads, paved (% of total roads)</b>					
EAP	---	41.08	41.57	---	64.97	---
ECA	---	86.00	87.01	---	86.22	---
LAC	---	31.48	32.96	---	25.97	---
MENA	---	78.00	73.51	---	80.39	---
SSA	---	17.96	18.00	---	15.61	---
World	---	46.01	40.76	---	57.01	---
<b>ECOWAS</b>	<b>21.67</b>	<b>19.12</b>	<b>20.88</b>	<b>35.50</b>	<b>20.57</b>	<b>---</b>
	<b>Internet users (per 100 people)</b>					
EAP	1.41	9.00	21.36	34.23	37.24	41.15
ECA	4.18	22.67	43.01	56.30	59.29	63.97
LAC	0.86	8.83	23.72	34.71	39.35	43.43
MENA	0.35	4.20	15.44	26.63	30.99	35.92
SSA	0.20	0.96	4.43	10.16	12.74	14.68
World	2.40	10.38	20.62	29.35	32.02	35.58
<b>ECOWAS</b>	<b>0.08</b>	<b>0.86</b>	<b>3.47</b>	<b>7.11</b>	<b>8.46</b>	<b>9.28</b>

**Note:** \* The regions presented were based on data availability.

Likewise, the road and ICT (internet) infrastructure in ECOWAS and other SSA countries is still below the world average. In fact, compared to other regions of the world such as the EAP, ECA, LAC and MENA, countries in ECOWAS and SSA region are many folds below the average infrastructural development obtainable. However, there is need to emphasise that ECOWAS region records an impressive road network compared to other regions in Africa. From Table 3, we observe that the ECOWAS region had an average paved road network ranging from 19.12 to 35.50 percent of the total roads, while those in other SSA countries ranged from 15.61 to 17.96 percent.

Not beguiled by the seemingly impressive performance of ECOWAS countries compared to other sub-regions in Africa – in relation to some infrastructural provisions – the poor performance of African countries in general (including ECOWAS countries) raises serious concerns. In this study, the poor institutional development in this region is ascribed as a likely culprit. The statistics for the indicators of institutions – as reported by the World Governance Indicators – and as displayed in Table 4 does not deny this fact. As it is, countries in ECOWAS region and SSA (at large), recorded lower scores for the control of corruption and government effectiveness. Although in regulatory quality measures, the performance of these countries in relation to those in other regions of the world is kind of murky.

**Table 4: Institutional Quality\*\***

	<i>Control of corruption</i>				<i>Government Effectiveness</i>				<i>Regulatory Quality</i>			
	1996	2000	2005	2008	1996	2000	2005	2008	1996	2000	2005	2008
EAP	-0.43	-0.6	-0.53	-0.57	-0.3	-0.48	-0.46	-0.53	-0.35	-0.61	-0.56	-0.69
ECA	-0.70	-0.62	-0.52	-0.48	-0.58	-0.51	-0.37	-0.31	-0.59	-0.49	-0.32	-0.1
ECOWA												
S	-0.59	-0.61	-0.70	-0.62	-0.83	-0.76	-0.86	-0.79	-0.73	-0.57	-0.70	-0.64
LAC	-0.35	-0.18	-0.16	-0.12	-0.34	-0.15	-0.14	-0.10	0.22	0.07	-0.07	-0.12
MENA	-0.46	-0.57	-0.55	-0.62	-0.45	-0.63	-0.63	-0.61	-0.64	-0.78	-0.73	-0.63
SSA	-0.63	-0.58	-0.68	-0.62	-0.66	-0.72	-0.78	-0.78	-0.65	-0.64	-0.75	-0.7
World	-0.03	-0.02	-0.02	-0.02	-0.04	-0.01	-0.01	-0.01	-0.05	-0.03	-0.02	-0.01

Notes: The values ranges from -2.5 (worst) to +2.5 (best) i.e. the higher the better. EAP-East Asia and the Pacific; ECA-Europe and Central Asia; MEA-Middle East and North Africa; LAC-Latin America and Caribbean; SSA-Sub Saharan Africa. The years reported are those that have values for the regions afterwards the data has been mainly reported for countries not regions.

Source: World Governance Indicators as computed by Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010) for the World Bank (2012).

Emphasis is placed on the control of corruption and government effectiveness because of the significant role they play in the improvement of infrastructural facility. Considering the control of corruption, it measures the extent to which public offices are exercised for private gains – including both petty and grand forms of corruption – and other forms of “capture” of the state by elites and private interests (World Bank, 2013). It also measures the strength and effectiveness of a country’s policy and institutional framework that are put in place to prevent and combat corruption. On the other hand, government effectiveness captures the quality of the public services, the civil service and its independence from political pressures. Likewise, the quality of policy formulation and implementation, and the credibility of the government’s commitment to its stated policies, is also indicative of the extent of government effectiveness. These two measures, in some form, are expected to affect the extent of infrastructural development. Pathetically, the performance of countries in ECOWAS and SSA were not impressive (see further description in Table A2 in the appendix).

#### 4. Empirical Strategy

To begin the empirical synthesis, it is important to state the basic empirical model that underpins this relationship.

##### 4.1 Model

We take clue from the empirical model of Sekkat and Varoudakis (2000) that was applied in Meon and Sekkat (2008), which assumes that the exports of manufacturers are explained by the following relationship:

$$\log(X_{it}) = \alpha_{0i} + \alpha_1 \cdot \log(E_{it}) + \alpha_2 \cdot RYP_{it} + \alpha_3 \cdot \log(I_{it-1}) + \mu_{it} \quad (1)$$

Where the main explained variable is the relevant ratio of exports to GDP for the relevant year ( $X_{it}$ ), while the explanatory variables include the real effective exchange rate ( $E_{it}$ ) that captures the countries’ currency appreciation/depreciation. The other variables include the GDP growth rate of country ‘i’s’ partners (RYP) and the lag of investment in the relevant sector over GDP ( $I_{it-1}$ ).

Noting that the empirical model of Sekkat and Varoudakis (2000) closely relates to the thesis of this study, we apply this model in this study by including some of their covariates and our main variables of interest. In this study, we are interested in the infrastructural provision and the interactive variable with institutions. The covariates – from Sekkat and Varoudakis’ model - that is relevant to this study are the exchange rate and investment. The main reason for the choice of these covariates include the fact that exchange rate will reflect the relevant price for trade as an increase in the exchange rate will mean an appreciation of the exporter’s currency and this will have a negative effect on trade. Likewise, the inclusion of investment variable is based on the grounded assumption that investment will improve manufacturing output and consequently, trade (Liu, Wang and Wei, 2001; Liu, Burridge and Sinclair, 2002; Makki and Somwaru, 2004).

Therefore, the empirical model for this study is presented as:

$$\alpha_{0i} + \alpha_1 \cdot \log(E_{it}) + \alpha_2 \cdot \log(I_{it-1}) + \alpha_3 \cdot \text{Infras}_{it} + \alpha_4 \cdot \text{Inst}_{it} + \alpha_5 \cdot \text{Infras} \times \text{Inst}_{it} + \mu_{it} \quad (2)$$

It is expected that infrastructure ‘*Infras*’ and institution ‘*Inst*’ will have a positive effect on manufacturing export. This – in no gainsay – is expected due to the role of infrastructure and institution on export (Meon and Sekkat, 2008; Cissokho et al, 2013). The main focus of this study is the behavior of the interactive variable ‘*Infras* × *Inst*’, which presents the multiplicative between institutions and infrastructural provision. A positive variable connote that the improvement of institution will improve infrastructural provision that affects growth. In essence, the complimentary effect is being portrayed by a positive sign. On the contrary, a negative sign connote that our argument is flawed and the relationship between the variables is substitutive.

## 4.2 Variable Definition and Source

The variables that were included in the model (equation 2) are defined in Table 5 and the sources were also presented.

**Table 5 Variables Definition and Source**

Variable	Identifier	Definition	Source
Manufacturing Export	$X_{it}$	Manufacturing export, measured as percentage of merchandise export	WDI
Exchange rate	$E_{it}$	Real exchange rate	WDI
Investment	$I_{it-1}$	We applied the growth rate of the manufacturing value added as a proxy for the extent of investment in the manufacturing sector. Gross fixed capital formation as a percentage of GDP would have being used but this is more generic.	WDI
Infrastructure	$\text{Infras}_{it}$	Measured as the average of internet users per 100 persons, mobile and fixed line telephone subscribers per 100 persons, and telephone users per 100 persons	WDI
Institutions*	$\text{Inst}_{it}$	<i>Corruption (CC)</i> is the extent of corruption and the extent to which public offices are misused for private gains; <i>Government Effectiveness (GE)</i> captures the quality of government policies and the commitment of the government to such policies	WGI

**Note:** The institutional variables are standardized on a scale from -2.5 (weakest institutions) to +2.5 (strongest institutions). WDI: World Development Indicators; WGI: World Governance Indicators

### 4.3 Method of Analysis

To ensure that the estimated results are not spurious, alternative econometric methods was applied in the estimation. The Ordinary Least Square (OLS) regression will be applied in the estimation. Noting the issues – like heteroscedasticity and autocorrelations – related with the OLS technique, the Feasible Generalised Least Square (FGLS) technique was also applied because it allows for the presence of heteroscedasticity across the sampled countries and autocorrelation within the panels. This provides for panel-corrected standard errors. These two approaches will be relevant for sensitivity checks. As a matter of importance, the Systems type of GMM estimation technique, which has been favoured by some studies such as Asiedu and Lien (2011); Bandyopadhyay, Sandler and Younas (2014). The uniqueness of the SGMM technique is that it uses internally generated instruments to addresses issues of endogeneity (Blundell and Bond, 1998, 2000). For the SGMM technique to be relied upon, it is expected that the test for autocorrelation  $AR(2)$  and the Sargan test for instrument over-identification must be  $\geq 0.05$ .

The SGMM equation type for equation (2) is as follows:

$$\log(X_{it}) = \alpha \log(X_{it-1}) + \alpha_1 \log(E_{it}) + \alpha_2 \log(I_{it-1}) + \alpha_3 \text{Infras}_{it} + \alpha_4 \text{Inst}_{it} + \alpha_5 \text{Infras} \times \text{Inst}_{it} + \eta_i + \varepsilon_i \quad (3)$$

The other variables are as earlier defined and the lag of the explained variable has ‘ $\alpha$ ’ coefficient. The variable ‘ $\eta$ ’ is the unobserved country-specific effects and the error term is ‘ $\varepsilon_i$ ’.

### 4.4 Sample

The 15 ECOWAS countries were included for the period 2000 to 2012. The sampled countries include: Benin, Burkina Faso, Cape Verde, Cote D’Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. The period chosen was based on data availability for the chosen variables.

## 5 Juxtaposing the Relationship: Atleast for ECOWAS

### 5.1 Empirical Results

The summary statistics of the main variables for ECOWAS countries are presented in Table 5.1.

Name	Description of Variables	Mean	Std. Dev	Min.	Max.
<i>Mafex</i>	Ratio of Manufacturing Export to Total Merchandise Export	25.85	21.33	0.08	95.68
<i>Magr</i>	Manufacturing Value Added	8.16	4.73	2.24	21.68
<i>Exch</i>	Real Exchange Rate	793.09	1161.88	0.54	6658.03
<i>Infra</i>	Indicator of Infrastructural provision	10.58	10.80	0.08	44.27
<i>CC</i>	Control of Corruption (an indicator of institutions)	-0.60	0.48	-1.37	0.80
<i>GE</i>	Government Effectiveness (an indicator of institution)	-0.79	0.49	-1.84	0.33

**Source:** Authors’ computation

As a first check, we considered the validity of the internal instruments that was used in the SGMM. The checks of interest are the Sargan and  $AR(2)$  test. Considering the statistics of the two tests [ $Sargan$  and  $AR(2)$ ], in all the columns in Table 5.2, the instruments are valid and were

not over-identified. This confirmation renders the result from this study relevant and reliable for inference.

To be concise, we focus on only the interactive variables (Control of Corruption  $\times$  Infrastructure; Government Effectiveness  $\times$  Infrastructure) that shows the juxtaposing between institutions, infrastructure and manufacturing export, displayed in the last segments of Table 5.2. The signs and significant values of these interactive variables show that when considering the development of institutions (i.e. corruption), infrastructure and manufacturing export, we perceive that institutions and infrastructure play a substitutive role. As a matter of fact, infrastructural development will impact less on manufacturing export in countries where the control of corruption is improved. The coefficient of this variable is ‘-0.761’ and it is significant at 1 percent level of significance.

This result contradicts the prediction in this paper as we expected that institutions are complimentary factors in the infrastructure-manufacturing export nexus. Put different, infrastructure development was expected to improve manufacturing export in countries where the control of corruption is improved. Likewise, when considering government effectiveness and the role it plays in the infrastructure-manufacturing export nexus, we also perceive that infrastructure impacts less on manufacturing export in countries where the government effectiveness is improved. In essence, institutions play a substitutive role with infrastructure in influencing manufacturing export. The coefficient of this variable is ‘-0.552’ and it is significant at 10 percent level of significance.

**Table 5.2 SGMM Results (Dependent Variable: Manufacturing Exports)**

	1	2	3	4
Manufacturing Exports (-1)	0.381 <sup>a</sup> (0.000)	0.364 <sup>a</sup> (0.000)	0.373 <sup>a</sup> (0.000)	0.350 <sup>a</sup> (0.000)
Manufacturing Value Added	0.564 <sup>b</sup> (0.025)	0.453 <sup>c</sup> (0.073)	0.585 <sup>b</sup> (0.018)	0.544 <sup>b</sup> (0.032)
Real Exchange Rate	0.245 (0.347)	0.250 (0.337)	0.101 (0.698)	0.1458 (0.549)
Infrastructure	0.103 (0.325)	-0.291 <sup>c</sup> (0.095)	0.120 (0.252)	-0.190 (0.327)
Control of Corruption	1.887 (0.487)	8.971 <sup>b</sup> (0.016)		
Control of Corruption $\times$ Infrastructure		-0.761 <sup>a</sup> (0.005)		
Government Effectiveness			-4.124 (0.140)	1.340 (0.741)
Government Effectiveness $\times$ Infrastructure				-0.552 <sup>c</sup> (0.058)
Constant	9.152 (0.016)	14.465 (0.001)	5.460 (0.148)	9.968 (0.028)
AR (1)	0.005	0.003	0.001	0.001
AR (2)	0.657	0.718	0.639	0.647
Sargan Test	0.393	0.568	0.435	0.473

**Note:** The values in parenthesis are the probability values. The superscript a, b and c are the significant levels of 1, 5 and 10 percent levels of significance.

Faced with this somewhat contradiction, we raise a very important point: despite the fact that institutional development is supposed to enhance the influence of infrastructural development on

manufacturing export, the case of ECOWAS is different. Possibly, mere institutional development is not enough to enhance infrastructural improvement for manufacturing export. As it is evidence from this study, there are other undertones that affect the expected result. We suspect the available structures to drive institutions are not readily available and so, institutions are not able to achieve its objective of complementarity. In most developing countries – for which ECOWAS is no exception – institutions are measured by the policies that shows government’s objective in reducing corruption and enhancing their effectiveness (see Henry and Miller, 2008). Not to forget, the measures of institutions (control of corruption and Government effectiveness) are based on the perception of some groups, whose opinions are not distant from the public policies that support institutional growth. Like Acemoglu and Robinson (2012) observed in their blog on “Why Nations Fail: The Origins of Power, prosperity and Poverty”, institutions should go beyond policies and focus on structures that constraint, enhance and facilitate the application of policies. Most likely, ECOWAS countries are lacking in this regard and that’s why the measures of institutions are not in sync with the improvement of infrastructure for enhanced manufacturing export.

Another important undertone is the ‘power’ of public officers who are supposed to enforce public policies. In African countries and ECOWAS, we find public officers who are very powerful and most times, they use their power to inform the dictates of public policies (Jo-Ansie, 2007). In situations like this, it is expected that institutional development will most likely not achieve its objective. In this case, the submission of Acemoglu and Robinson (2012) that institutions should create a structure that drives incentives for the implementation of policies and in the case of Africa, create a cost for non-compliance. The situation in Africa is that: it is not as if cost and incentives are not embedded in the institutional structures, but such structures are not compelling to curtail excessiveness of public officers. Probably, the regional community can begin to play oversight to check political leaders of these countries; a further discussion in this light will be enlightening.

## **5.2 Sensitivity Checks**

The first sensitivity check is to ascertain the consistent of the result when excluding Nigeria from the sample of countries estimated for. The main reason for this check is due to the economic size of Nigeria in the region. As it is, Nigeria’s economic size is more than 57 percent of the entire ECOWAS’ economy (World Bank, 2010) and this imply that their presence in the composition of the sample will likely affect the result. However, the result in Table 5.3 contradicts this expectation and it was obvious that – irrespective of the inclusion or exclusion of Nigeria, the interactive variable was signed similarly. In the last rows of the Table, the behaviour of the interactive variables (Corruption  $\times$  Infrastructure; Government Effectiveness  $\times$  Infrastructure) was negative in all the columns. This further validates our earlier findings and submissions.

**Table 5.3 SGMM Results Excluding Nigeria**

	1	2	3	4
Manufacturing Exports (-1)	0.376 <sup>a</sup> (0.000)	0.363 <sup>a</sup> (0.000)	0.369 <sup>a</sup> (0.000)	0.343 <sup>a</sup> (0.000)
Manufacturing Value Added	✓	✓	✓	✓
Exchange Rate	✓	✓	✓	✓
Infrastructure	✓	✓	✓	✓
Corruption	✓	✓		
Corruption × Infrastructure		-0.733 <sup>c</sup> (0.009)		
Government Effectiveness			✓	✓
Government Effectiveness × Infrastructure				-0.514 <sup>c</sup> (0.083)
Constant	10.274 (0.010)	14.647 (0.001)	6.988 (0.082)	11.102 (0.018)
AR (1)	0.004	0.004	0.011	0.002
AR (2)	0.655	0.714	0.644	0.649
Sargan Test	0.471	0.633	0.494	0.555

**Note:** The values in parenthesis are the probability values. The superscript a, b and c are the significant levels of 1, 5 and 10 percent levels of significance. The sign ‘✓’ imply that the variables were included in the estimated model. When this sign is not included, it imply that the variable was not included.

The second sensitivity check is to confirm whether the interactive variable still maintains its signs – as it is in the earlier Table 5.3 – by checking the effect of alternative estimation technique and measure of investment. The alternative estimation technique is the use of OLS and FGLS, which both present the same sign for the interactive variable. As it is, column 1 - 4 of Table 5.4, where the alternative estimation technique was used for the baseline model that was estimated in Table 5.3, still presents negative signs. In essence, the stance that institutions in ECOWAS countries do not play a complimentary role in the infrastructure-manufacturing export nexus is valid and not informed by the estimation technique applied in reaching such conclusions.

**Table 5.4 Sensitivity Checks (Dependent Variable: Manufacturing Exports)**

	Control of corruption		Government effectiveness		control of corruption		Government effectiveness	
	OLS	FGLS	OLS	FGLS	OLS	FGLS	OLS	FGLS
Exchange Rate	✓	✓	✓	✓	✓	✓	✓	✓
Manufacturing Value Added	✓	✓	✓	✓				
Gross Fixed Capital Formation (% of GDP)					✓	✓	✓	✓
Infrastructure	✓	✓	✓	✓	✓	✓	✓	✓
Institution	✓	✓	✓	✓	✓	✓	✓	✓
Infrastructure × Institution	-0.139 (0.226)	-0.139 (0.205)	-0.227 <sup>c</sup> (0.060)	-0.227 <sup>b</sup> (0.047)	-0.117 <sup>a</sup> (0.000)	-0.117 <sup>a</sup> (0.000)	-0.161 <sup>a</sup> (0.009)	-0.161 <sup>a</sup> (0.006)
Constant	2.203 (0.000)	2.203 (0.000)	2.178 (0.000)	2.178 (0.000)	2.805 (0.000)	2.805 (0.000)	2.547 (0.000)	2.547 (0.000)
R <sup>2</sup>	0.199		0.241		0.237		0.191	
Wald	20.320		26.040		31.720		24.150	
Prob. Value	(0.004)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)

**Note:** The values in parenthesis are the probability values. The superscript a, b and c are the significant levels of 1, 5 and 10 percent levels of significance. The sign ‘✓’ imply that the variables were included in the estimated model. When this sign is not included, it implies that the variable was not included.

In the same Table 5.4, the fifth to the eighth Column present a scenario where an alternative measure of investment and estimation technique was used. In these columns, the main variable of interest (Infrastructure  $\times$  Institution) still maintains its negative sign and significant in all the columns. We can re-emphasise at this point that irrespective of the covariate applied (especially with regards to the measure of investment), the interactive variable still maintains its negative sign.

## **6. Conclusion**

The main result from this study is that contradictorily, institutions in ECOWAS countries do not play a complementary role to infrastructural development for improved manufacturing export. This result is robust, despite the alternative estimations. In the light of this finding, two main issues were identified as possible reasons for this contradictory result: the unavailability of structures that drive institutions may be a possible cause and the powerfulness of public officers who are supposed to enforce public policies.

Based on this finding, it is recommended that ECOWAS – as a regional economic community – can begin to play a supervisory role for countries in the community. By supervisory role, we imply that despite the ‘beautiful’ policies made by countries to forestall institutional development, there is the need for ECOWAS to ensure that related public officers adhere to the enforcement of such policies. Apart from this, the regional community can begin to develop frameworks that put public officers in member countries to check. The reason for this policy recommendation is that; ECOWAS countries are not lacking in the development of policies – that shows institutional development – but the political will to put in place structures that ensures the accomplishment of the policies is not there. Therefore the regional community can act as an enforcing body.

Just like it is obtainable in most empirical studies, we identified an area for future studies: that is, future empirical studies can focus on the consistency of our result when other measures of infrastructure are applied in our empirical model. The realisation of such study will be faced with data constraint. The widely patronised data on macro economy (i.e. the World Bank’s World Governance Indicator) is currently not able to salvage this situation.

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## Appendix

**Table A1: Logistics Performance Index on Quality of Trade and Transportation and related Infrastructure**

	2007	2010	2012
Benin	1.89	2.48	2.57
Burkina Faso	1.89	1.89	2.40
Cape Verde	NA	NA	NA
Cote D'Ivoire	2.22	2.37	2.31
Gambia	2.33	2.17	2.19
Ghana	2.25	2.52	2.05
Guinea	2.33	2.10	2.34
Guinea Bissau	2.25	1.56	2.68
Liberia	2.14	2.00	2.41
Mali	1.90	2.00	2.00
Niger	1.40	2.28	2.45
Nigeria	2.23	2.43	2.27
Senegal	2.23	2.43	2.27
Sierra Leone	2.09	2.64	2.31
Togo	1.83	1.61	2.50
ECOWAS	2.07	2.18	2.34
World Average	2.58	2.64	2.76

**Source:** Authors' compilation from World Trade Indicators

**Table A2: Institutional Quality of ECOWAS Countries**

	Control of Corruption		Government Effectiveness		Rule of Law	
	2001-05	2006-10	2001-05	2006-10	2001-05	2006-10
Benin	-0.664	-0.614	-0.393	-0.522	-0.462	-0.625
Burkina Faso	-0.088	-0.354	-0.616	-0.621	-0.598	-0.314
Cape Verde	0.283	0.746	-0.042	0.098	0.309	0.508
Cote D'Ivoire	-0.987	-1.119	-1.089	-1.234	-1.390	-1.379
Gambia	-0.496	-0.677	-0.560	-0.664	-0.167	-0.372
Ghana	-0.236	0.033	-0.121	0.009	-0.044	-0.044
Guinea	-0.774	-1.138	-0.896	-1.194	-1.221	-1.493
Guinea Bissau	-1.026	-1.078	-1.279	-1.079	-1.248	-1.348
Liberia	-3.032	-0.630	-3.954	-1.563	-4.369	-1.289
Mali	-0.527	-0.509	-0.676	-0.815	-0.224	-0.341
Niger	-0.921	-0.731	-0.839	-0.811	-0.779	-0.654
Nigeria	-1.248	-0.970	-0.955	-1.069	-1.380	-1.145
Senegal	-0.006	-0.552	-0.157	-0.366	-0.012	-0.311
Sierra Leone	-0.908	-0.915	-1.333	-1.181	-1.273	-0.980
Togo	-0.810	-0.991	-1.452	-1.469	-0.943	-0.894

**Note:** the three measures are valued from -2.5 (weak institutions) to +2.5 (strong institutions).

**Source:** Authors' Computations from World Governance Indicators (World Bank, 2013)