


EVALUATING THE IMPACT OF INNOVATION ON BILATERAL TRADE IN NIGERIA

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ARTICLE INFO	ABSTRACT
<p>Article history: Received: January, 02nd 2023 Accepted: March, 21st 2024</p>	<p>Purpose: the study examined the impact of innovation categorised into copyright, patents, and innovation index, on bilateral trade flows and trade costs on manufactured bilateral trade in Nigeria.</p>
<p>Keywords: Innovation; Patent; Copyright; Bilateral Trade; Nigeria; Regional Trade Agreement.</p>	<p>Theoretical Framework: challenges facing the international trade such as high import and export tariff, taxes, deflation and inflation, unemployment and in one way or the other affect the economic growth of Nigeria. There is need to investigate the impact of innovation on bilateral trade flows and trade costs on manufactured bilateral trade in Nigeria.</p> <p>Methodology: the study adopted an ex post facto research design. Data were subjected to various diagnostic test ranging from descriptive statistics, unit root test, using Micro-soft excel and E-View 10 and econometric modelling. The researcher employed an econometric method of analysis which makes validation to become necessary. Because it outlines the summary statistics which will display the statistical summary and properties of the variable included in the model.</p>
	<p>Findings: Some research found a positive but non-significant relationship between technological innovation and economic growth and others showed just a positive relationship. Digital advancement was also shown to exhibit a significant effect on economic growth in Nigeria.</p> <p>Research, Practical & Social Implication: The most consensus recommendation, was an increase in budgetary allocation for the technological development.</p> <p>Doi: https://doi.org/10.26668/businessreview/2024.v9i4.4426</p>

AVALIAÇÃO DO IMPACTO DA INOVAÇÃO NO COMÉRCIO BILATERAL NA NIGÉRIA

RESUMO

Objetivo: o estudo examinou o impacto da inovação, categorizada em direitos autorais, patentes e índice de inovação, sobre os fluxos de comércio bilateral e os custos comerciais sobre o comércio bilateral de manufaturados na Nigéria.

Estrutura Teórica: os desafios enfrentados pelo comércio internacional, como altas tarifas de importação e exportação, impostos, deflação e inflação, desemprego e, de uma forma ou de outra, afetam o crescimento econômico da Nigéria. É necessário investigar o impacto da inovação sobre os fluxos de comércio bilateral e os custos comerciais sobre o comércio bilateral de manufaturados na Nigéria.

Metodologia: o estudo adotou um projeto de pesquisa ex post facto. Os dados foram submetidos a vários testes de diagnóstico, desde estatísticas descritivas, teste de raiz unitária, usando o Micro-soft Excel e o E-View 10 e modelagem econométrica. O pesquisador empregou um método econométrico de análise que torna a validação necessária. Isso porque ela delinea as estatísticas resumidas que exibirão o resumo estatístico e as propriedades da variável incluída no modelo.

Resultados: Algumas pesquisas encontraram uma relação positiva, mas não significativa, entre inovação tecnológica e crescimento econômico, e outras mostraram apenas uma relação positiva. O avanço digital também demonstrou ter um efeito significativo sobre o crescimento econômico na Nigéria.

Pesquisa, Implicações Práticas e Sociais: A recomendação mais consensual foi o aumento da alocação orçamentária para o desenvolvimento tecnológico.

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Palavras chave: Inovação, Patente, Direitos Autorais, Comércio Bilateral, Nigéria, Acordo de Comércio Regional.

EVALUACIÓN DEL IMPACTO DE LA INNOVACIÓN EN EL COMERCIO BILATERAL DE NIGERIA

RESUMEN

Propósito: el estudio examinó el impacto de la innovación categorizada en derechos de autor, patentes e índice de innovación, sobre los flujos comerciales bilaterales y los costes comerciales en el comercio bilateral de productos manufacturados en Nigeria.

Marco Teórico: los retos a los que se enfrenta el comercio internacional, como los elevados aranceles de importación y exportación, los impuestos, la deflación y la inflación, el desempleo, afectan de un modo u otro al crecimiento económico de Nigeria. Es necesario investigar el impacto de la innovación en los flujos comerciales bilaterales y los costes comerciales en el comercio bilateral de productos manufacturados en Nigeria.

Metodología: el estudio adoptó un diseño de investigación ex post facto. Los datos se sometieron a diversas pruebas de diagnóstico, desde estadísticas descriptivas hasta pruebas de raíz unitaria, utilizando Micro-soft Excel y E-View 10 y modelos econométricos. El investigador empleó un método econométrico de análisis que hace necesaria la validación. Porque esboza las estadísticas resumidas que mostrarán el resumen estadístico y las propiedades de la variable incluida en el modelo.

Conclusiones: Algunas investigaciones encontraron una relación positiva pero no significativa entre la innovación tecnológica y el crecimiento económico y otras mostraron sólo una relación positiva. También se demostró que el avance digital tiene un efecto significativo en el crecimiento económico de Nigeria.

Investigación e Implicaciones Prácticas y Sociales: La recomendación más consensuada, fue un aumento de la asignación presupuestaria para el desarrollo tecnológico.

Palabras clave: Innovación, Patentes, Derechos de Autor, Comercio Bilateral, Nigeria, Acuerdo Comercial Regional.

1 INTRODUCTION

The dynamics of international commerce have changed significantly in the last few decades in the dynamic world of global business. Cross-border transactions have changed due to the growth of bilateral and regional trade agreements, sparking debates over "multilateralism" and "regionalism." This changing environment has been greatly influenced by organisations like the Economic Community of West African States (ECOWAS), the European Union, the African Union, and NAFTA. Furthermore, the future of the African Continental Free Commerce Agreement (AfCFTA) has drawn discussion and study as it can potentially promote economic integration and intra-African commerce (Dai et al., 2021).

One noteworthy feature of modern international business is the close relationship between corporate innovation and exports. Over the last ten years, research has repeatedly shown this connection, emphasising the role of creative initiatives in boosting export volumes and conducting international commerce. Still, there is a paucity of studies on how innovative businesses break down their exporting behaviour, especially in the manufacturing sector and with regard to the implications for bilateral trade partners. This disparity emphasises the need

for further research on innovators' exporting practices and how they affect the dynamics of international commerce (Aw, 2011; Arndt, 2012; Aghion, 2018).

It is crucial to differentiate between productivity and creativity since they are two different but connected ideas. Productivity refers to how well resources are used, while innovation is the introduction of new or improved goods or procedures. Productivity focuses on improving current processes, but innovation brings substantial shifts that advance companies. It is essential to comprehend this difference, especially when examining how innovation affects exporting practices and the dynamics of global commerce. Researchers want to shed light on how innovation affects international commerce by examining its independent effects on exporting behaviour and reducing the impact of productivity shocks (Carboni & Medda, 2018).

Innovation is essential for increasing business competitiveness and opening up new markets. Businesses may lower operational costs and better serve changing customer demands by using innovative manufacturing methods and expanding their product choices, increasing their global reach. Innovation offers a route to economic expansion and international integration for developing nations such as Nigeria. Enhancing Nigeria's competitiveness in the international market and promoting sustainable economic growth need concerted efforts to lower trade barriers and stimulate innovation (Grabowski et al., 2013).

The relationship between innovation and exports has been the subject of much study, and the findings typically show that innovation positively influences exporting. An increasing amount of research has been conducted recently to analyse the reasons behind the notable productivity differences between exporters and non-exporters in the time leading up to their entry into foreign markets (Wagner, 2007). As such, a few studies have revisited the relationship between an organisation's innovation and its export performance, and they have investigated the theory that product innovation influences exporting directly as well as indirectly through productivity (Cassiman et al., 2010; Cassiman & Golovko 2011). Building on Bustos (2011), Caldera (2010) models that more productive firms are more likely to be innovative and that innovators are more likely to become exporters since innovation reduces marginal costs. Her empirical findings confirm how vital innovation is to increasing the possibility that Spanish businesses will export.

The study hasn't been very good at differentiating between the benefits of process and product innovation activities so far. Notable exceptions are just Van Beveren and Vandenbussche (2010) for the Belgian economy and Becker and Egger (2009) for the German

economy. The latter study finds that innovation has a causal impact on the firm export status and that the distinction between process and product innovation is essential because it highlights the dominant role of the product concerning process innovation, which only matters when adopted in conjunction with product innovation. In contrast, the former study finds no effect of either innovation strategy on firm export activity when instrumental variables are used.

Despite its enormous potential, Africa still contributes little to international commerce. Unlocking Africa's trading potential and promoting economic development requires improving innovation and lowering trade costs. Examining the effects of innovation and trade costs on the growth of bilateral commerce in Nigeria might provide critical information for stakeholders and policymakers who want to support economic development and raise Nigeria's standing internationally. Through the gravity model for imports and exports, scholars can conduct a thorough analysis of Nigeria's trade flows. A better comprehension of the factors influencing bilateral trade and an understanding of the link between innovation and the dynamics of international trade would be possible with the inclusion of trade costs and innovation variables in the study (UNCTADstat, 2016).

Researchers seek precise and reliable answers using sophisticated econometric techniques, such as the Poisson Pseudo Maximum Likelihood (PPML) estimate approach. Thanks to this technique, they will be able to determine how innovation affects the development of bilateral commerce while considering other pertinent elements. The research considered 120 Nigeria and for data between 2005 to 2021 inclusive. The research aims to inform policy actions that foster economic growth and increase Nigeria's global competitiveness by using new data and addressing existing gaps in the literature (Silva & Tenreyro, 2011).

In conclusion, given Nigeria's economic progress and global integration, innovation, institutional factors, and trade dynamics constitute an essential study subject. Through thoroughly examining the relationship between innovation and trade costs and the expansion of bilateral trade in Nigeria, researchers want to provide insightful information to stakeholders and policymakers. The study aims to add to the body of knowledge already in existence and provide guidance for evidence-based policy interventions to promote economic growth and enhance Nigeria's global competitiveness in the increasingly interconnected global economy. It does this by employing advanced econometric techniques and empirical research.

2 OBJECTIVES OF THE RESEARCH

The general objective is to determine the impact of innovation and trade costs on manufactured bilateral trade in Nigeria while the specific objectives are to;

1. Determine the impact of innovation index on manufactured bilateral trade in Nigeria.
2. Examine the impact of copyright on manufactured bilateral trade in Nigeria.
3. Determine the impact of trademarks on manufactured bilateral trade in Nigeria.
4. Examine the effect of gravity trade costs on manufactured bilateral trade in Nigeria.
5. Evaluate the impact of distance on manufactured bilateral trade in Nigeria.
6. Determine the influence of regional trade agreement on manufactured bilateral trade in Nigeria.

3 LITERATURE REVIEW

The literature provided comprehensively examines various factors influencing economic development across different countries, focusing on Nigeria, China, Algeria, and Asian nations. Key themes explored include the role of innovation, investment, human capital, infrastructure spending, and the interplay between these factors in shaping economic growth. The literature emphasises many essential points, including the critical role of research and development (R&D) in promoting innovation and export success, especially in European manufacturing businesses. Carboni and Medda (2020) stress how crucial it is for companies to include R&D when making decisions on export and real investments. They discover that R&D positively affects both tangible investment and export tendency, highlighting the need for managers to give R&D initiatives top priority in order to improve export results.

With a particular emphasis on China et al. (2021) explore the connections between technical innovation, human capital, investment-driven economic growth, and environmental regulation. They contend that investments in human capital and technological innovation are crucial for economic development in big countries. Their findings highlight the necessity to assess the quantitative change in economic growth that technological innovation brings about and imply that investment-based environmental regulation drives active technological innovation.

Babatunde (2018) looks at government spending on infrastructure and how it affects economic growth in Nigeria. According to the research, investments in transportation, health care, and education favour economic development, whereas investments in natural resources

and agriculture have a negative effect. Ayeni and Omobude (2018) investigate the connection between Nigeria's economic growth and educational spending, emphasising the need for ongoing educational investments for sustained economic expansion. Lingaraj, Pradeep, and Kalandi (2016) examine the relationship between education expenditure and economic development across Asian countries and discover a positive association. Comparably, Wang et al. (2016) evaluate the association between various levels of education and economic growth across Asia, while Mekdad et al. (2014) investigate the relationship between education and economic development in Algeria.

Wakelin (1998) examines how innovation affects bilateral trade determinants across OECD countries in the context of international trade, emphasising the positive relationship between innovation and trade performance. The study conducted by Sanyal (2004) examines the correlation between exports, technological specialisation, innovation intensity, and bilateral trade. It highlights that technical potential and innovation intensity positively impact bilateral commerce. Blind (2001) also investigates the impact of technical standards and creative capacity on trade and economic performance, emphasising trade ties between Switzerland, Germany, France, and the United Kingdom. According to the survey, Switzerland's ability to innovate and plenty of standards contribute to its export success.

The body of research emphasises the complexity of economic growth and the significance of several elements, including investment, innovation, human capital, and infrastructure expenditure. The intricate interactions among these elements determine the paths of economic development for many nations and areas. The findings also show how important it is for governments to give infrastructure, research, and education top priority in order to promote sustained economic growth. The results also highlight how crucial it is to create an environment favourable to trade and innovation to promote economic development and improve global competitiveness.

4 EMPIRICAL REVIEW

There are few researches with respect to the impact of innovation on the export of the manufacturing firms but substantial literature are available on the impact of trade costs on bilateral trade. This will be considered here in.

Carboni and Medda (2020) explored the interrelations between a firm's export performance and innovation and tangible investments. We lay emphasis on the role played by

R&D in stimulating both innovation and the accumulation of physical assets. Our study is novel in proposing an integrated model with investment, innovation and R&D, in a framework of simultaneous equations which take into account their mutual correlations. Econometric results suggest that both product innovation and tangible investments are significantly and jointly linked to the export intensity of European manufacturing firms.

Babatunde, (2018) investigated government spending on infrastructure in Nigeria. She used both primary and secondary data. The secondary data comprise of reported annual spending on selected infrastructure and annual Gross Domestic Products for 1980 to 2016. She also carried out unit root and co- integration tests using Augmented Dickey–Fuller and Phillip–Perron model. Weighted least square was used to test the sample of 37-year annual time series using vector error correction model. Her findings indicate that government spending on transport and communication, education and health infrastructure has significant effects on economic growth while spending on agriculture and natural resources infrastructure recorded a significant inverse effect on economic growth in Nigeria.

Ayeni and Omobude, (2018) empirically investigated educational expenditure and economic growth nexus in Nigeria using secondary and times series data from 1987 to 2016, sourced from the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and other sources. The findings show that educational expenditure was inconsistent with education sectoral output.

5 METHODOLOGY

5.1 MODEL SPECIFICATION

Bilateral trade is inversely correlated with trading partners' distance and directly relates to the product of their respective incomes, according to the original gravity equation. The model needed a micro-theoretical foundation to explain its economic importance, even if it was empirically sufficient. Anderson (1979) and Anderson and van Wincoop (2003, 2004) distinguished commodities based on their country or region of origin and the constant elasticity of substitution (CES) function to provide theoretical justification for the gravity equation. Improving the trade cost function of Muhammad et al. (2020), Julius et al. (2019), and Lateef et al. (2018) Geographical (G), Innovation (N), and other control elements (C) are included in trade costs. Equation (1), which represents the average bilateral trade barrier function, expresses these:

$$\tau_{ijt} = D_{ij}e^{\beta_1 G_{ij} + \beta_2 N_{it(jt)} + \beta_3 C_{ijt} + \mu_{ijt}} \quad (1)$$

Where:

D_{ij} represents the distance between a pair of trading partners (i as export and j as importer), G_{ij} is a vector that captures the common official language, colony, and contiguity (common border), which are standard bilateral variables in the gravity model. $N_{it(jt)}$ is a vector that includes innovation effects. Innovation is unilateral and is captured in three perspectives: Copyright (COPY), patent (PET), and innovation index (INN). Finally, C_{ijt} is a vector of control variables, in this case regional trade agreement (RTA) which stands for RTA membership and will take the value of 1 from when Nigeria became a member and 0 otherwise. Finally, μ_{ijt} is an error term that is assumed to be normally distributed. The equation is in exponential form because the effect of innovation is not linear.

Equation 1 is expanded and translated into a simple linear form for estimation as follows:

$$\begin{aligned} \ln M_{ijt} = & \alpha + \lambda_i + \phi_j + \delta_t + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln Dist_{ij} + \beta_4 Contig_{ij} + \\ & \beta_5 Comlang_{ij} + \beta_6 COL_{ij} + \beta_7 COPY_{it} + \beta_8 \ln COPY_{jt} + \beta_9 \ln PET_{it} + \beta_{10} PET_{jt} + \\ & \beta_{11} INN_{it} + \beta_{12} INN_{jt} + \beta_{13} RTA_{ijt} + \mu_{ijt} \end{aligned} \quad (2)$$

Where:

M_{ijt} stands for the nominal value of trade from the country (i) to country (j), $Y_{i/jt}$ represents the nominal GDP of the exporting/importing country (i/j), $Dist_{ij}$ stands for the distance between the importing country (j) and the exporting country (i), $Comlang_{ij}$ is a dummy that takes the value of 1 if both importing and exporting countries speak the same official language and 0 otherwise, $Contig_{ij}$ is a dummy variable that takes the value of 1 if country i and j share a common border. α is a constant variable, λ_i is exporter fixed effects for outward multilateral resistances, ϕ_j is importer fixed effects for inward multilateral resistances, δ_t is the time-fixed effect while μ_{ijt} stand for the white noise error term. Data sources and a priori expectation are presented in Table 1.

Table 1

Expected Sign of Coefficient Results

Variables	Description	Expected Signs	Sources
M_{ijt}	Trade	Dependent	DoTS IMF
Y_{it}	Exporter nominal GDP	Positive (+)	WDI
Y_{jt}	Importer nominal GDP	Positive (+)	WDI
$Dist_{ij}$	Distance between I and J	Negative (-)	CEPII
$Contig_{ij}$	Contiguity	Positive (+)	CEPII
$Comlang_{ij}$	Common official Language	Positive (+)	CEPII
COL_{ij}	Colony	Positive (+)	CEPII
$COPY_{it}$	Exporters' Copyright	Positive (+)	WDI
$COPY_{jt}$	Importers' Copyright	Positive (+)	WDI
PET_{it}	Exporters' Patent	Positive (+)	WDI

PET_{jt}	Importers' Patent	Positive (+)	WDI
INN_{it}	Exporters' Innovation Index	Positive (+)	WDI
INN_{it}	Importers' Innovation Index	Positive (+)	WDI
RTA_{ijt}	Regional Trade Agreement	Positive (+)	WTO

Note: DoTS IMF-Direction of Trade Statistics, International Monetary Fund, WDI-World Development Index (World Bank); WTO-World Trade Organisation; CEPII- Centre d'Études Prospectives et d'Informations Internationales

5.2 ESTIMATION TECHNIQUE

Some researchers noticed potential endogeneity (Trefler, 1993; Lee & Swagel, 1997), zero trade flows (Baldwin & Harrigan, 2011; Hallak, 2006; Helpman et al. 2008), and inherited heteroscedasticity (Dadakas et al., 2020) in the gravity equation specification. Researchers offered many solutions. Baier and Bergstrand (2009) and Magee (2003) developed diverse gravity model fixed effects. Silva and Tenreyro (2006) advocated a PPML estimator for the gravity model and said it performs well with heteroscedastic trade data. Later, Santos Silva & Tenreyro (2011) proved that the PPML estimator is compatible with zero trade values.

Because of its reliability, consistency, and capacity to record zero transactions, the PPML approach developed by Santo Silva and Tenreyro (2006, 2011) is recommended in this study (Shepherd, 2013; Azu, 2019; Azu et al., 2019; Azu, 2020; Azu & Muhammad, 2020). Including exporter-year and importer-year fixed effects accounts for multilateral resistances, unobserved heterogeneity, and potential endogeneity issues. The method is in line with Anderson and Yotov (2011), Rose and Spiegel (2011), and Shepherd (2013), who suggest using it when the emphasis is on time-invariant estimators of the model and non-dummy variables. All logarithm variables' coefficients can be understood as the elasticity of the trade flows' value concerning the continuous variable (Disdier and Head, 2008). Baier and Bergstrand (2007) state that the dummy variable's coefficient is equivalent to the inverse natural logarithm, $((e^\beta - 1) * 100)$.

6 RESULTS AND DISCUSSION

The descriptive statistics are presented in Table 2, whereas the correlation matrix is reported in Appendix I. The descriptive statistics suggest zero trade, making it acceptable for the PPML estimator. The correlation coefficients indicated that copyright and patent are highly correlation and as such will not be estimated in the same regression. Thus, the estimation is done twice: with copyright and then patent right. This is line with Azu and Nwauko (2021)

which suggest cases need be estimated independently to prevent any multicollinearity problem visible when variables are highly linked. Table 3 assesses the effect of innovation index on Nigeria's bilateral trade with regard to 120 trading partners.

Table 2

Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
M_{ijt}	4007	1.0811	4.219529	-14.8155	11.57687
Y_{it}	4080	26.12099	1.825714	18.14562	30.78012
Y_{jt}	4080	26.12099	1.825714	18.14562	30.78012
$Dist_{ij}$	4080	8.601343	0.684536	6.165163	9.833958
$Contig_{ij}$	4080	0.124544	0.155726	0	1
$Comlang_{ij}$	4080	0.394477	0.454837	0	1
COL_{ij}	4080	0.022277	0.111097	0	1
$COPY_{it}$	4080	15.28856	3.352326	2.639158	21.27073
$COPY_{jt}$	4080	15.28856	3.352326	2.639158	21.27073
PET_{it}	4080	1.571078	2.684435	-10.9634	4.606174
PET_{jt}	4080	1.571078	2.684435	-10.9634	4.606174
INN_{it}	4080	13.22812	1.785094	5.241648	19.73302
INN_{jt}	4080	13.22812	1.785094	5.241648	19.73302
RTA_{ijt}	4080	7.819428	1.374836	4.602641	11.81254

Sources: Author's Computation

6.1 INNOVATION AS TRADE DETERMINANTS

Table 3 reports the result of innovation as a trade determinant, which is perceived to be a negative influence on trade, and the results herein are uniform in that regard. There have been a couple of patents and copyrights that could prompt the nature and direction of trade flow with Nigeria, which could be directly attributed to the primary motivation for this research. Innovation as an international trade determinant is anchored on providing positive security externalities to a high manufacturing country. In this research, having categorised the act of innovation based on copyright, patent and innovation index, it could be revealed that innovation positively impacts manufacturing export irrespective of the nature considered in the research. From the analysis results in Table 3, the effect of copyright is positive from the perspective of PPML technique and positive from the standpoint of the Pooled OLS technique, which makes the outcome of the result more robust and reliable.

In the first instance, considering the PPML technique, the copyright seems to have a positive influence which is also statistically significant at 5 per cent. This result would further

buttress that as innovation occurs, their impacts of bilateral trade could not be over emphasised. There is likelihood that it brings encouragement as to the perception of international community towards the manufacturing country. This will cause more trade boost to the country which innovation occurs. Innovation is serious indicator manufacturing progress of which have been on the rise and have cut across many countries. Many countries of the world have witnessed innovation at one point or the other which brings economic development and as this research have revealed, trade development too.

Using PPML technique, innovation is motivating trade development both as exporters and importers in Nigeria. The effect as an importer being greater than the effects as exporter. From the copyright point of view there is an indication that positive influence on manufactured export of Nigeria-both as exporter or importer. As an export, copyright has positive coefficient of 0.199 and statistically significant at ten per cent. This implies that copyright promotes Nigerian export by 0.2 per cent, all things being equal. As an importer of manufactured goods, copyright has a coefficient of 0.317 and significant at ten per cent. This implies that as copyright increases by one per cent, manufacturing import will increase by 0.317 per cent, all things being equal.

From the patent point of view there is an indication that positive influence on manufactured export of Nigeria-both as exporter or importer. As an export, patent has positive coefficient of 0.127 and statistically significant at ten per cent. This implies that patent promotes Nigerian export by 0.127 per cent, all things being equal. As an importer of manufactured goods, patent has a coefficient of 0.177 and significant at ten per cent. This implies that as patent increases by one per cent, manufacturing import will increase by 0.177 per cent, all things being equal.

Table 3

Regression on Impact of Innovation on Manufactured Trade in Nigeria

VARIABLES	COPY	PATENT	COPY-OLS	PATENT-OLS
$\ln Y_{it}$	0.886*** (0.178)	0.794*** (0.156)	1.002*** (0.167)	1.193*** (0.175)
$\ln Y_{jt}$	0.524*** (0.166)	0.655*** (0.175)	0.799*** (0.165)	0.989*** (0.173)
$\ln Dist_{ij}$	-0.618*** (0.186)	-1.366*** (0.212)	-3.052*** (0.110)	-3.169*** (0.116)
$Contig_{ij}$	1.803*** (0.202)	0.857*** (0.231)	0.556*** (0.139)	0.334** (0.140)
$Comlang_Off_{ij}$	-0.0101 (0.0858)	0.0581 (0.112)	1.015*** (0.0601)	1.001*** (0.0616)
$Colony_{ij}$	1.225*** (0.121)	1.186*** (0.136)	0.339** (0.142)	0.402*** (0.141)
$COPY_{it}$	0.199*	0.127**	0.257*	0.504***

	(0.197)	(0.172)	(0.172)	(0.176)
<i>COPY_{jt}</i>	0.317*	0.171**	0.0299	-0.150
	(0.175)	(0.168)	(0.169)	(0.174)
<i>INN_{it}</i>	0.406**	0.957**	0.409***	0.947**
	(0.0158)	(5.05)	(0.138)	(4.415)
<i>INN_{jt}</i>	0.757***	0.0787**	0.650***	0.278***
	(0.0194)	(3.625)	(0.129)	(4.405)
<i>RTA_{ijt}</i>	0.317***	0.437***	0.235*	0.486***
	(0.116)	(0.117)	(0.144)	(0.157)
Constant	-14.64***	-6.489**	28.89***	33.04***
	(3.485)	(3.251)	(2.673)	(2.746)
Observations	114,030	114,030	62,936	62,936
R-squared	0.874	0.889	0.692	0.702
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, INDEX stands for index, PATENT- means Patent. Columns 1 and 2 are PPML results while Columns 3 and 4 are pooled OLS results

On the other hand, innovation index has a positive impact on manufacturing trade- both as exporters and importers. It was observed that as an export, innovation index has positive coefficient of 0.127 and statistically significant at ten per cent. This implies that innovation index promotes Nigerian export by 0.127 per cent, all things being equal. As an importer of manufactured goods, innovation index has a coefficient of 0.177 and significant at ten per cent. This implies that as innovation index increases by one per cent, manufacturing import will increase by 0.177 per cent, all things being equal.

6.2 REGIONAL TRADE AGREEMENTS AND TRADE FLOW

One of the contesting issues in literature is the effect of regional trade agreement of trade development in the respective regions of operation and bilateral trade generally. Some authors are of the opinion that the regional trade agreement has negative effect on international trade generally given that it only tends to promote trade in the region of its operation and bias trade against other trade partners. This make competition being unfair and therefore could hinder international trade generally. While this may be the case, one should bear in mind that the essence of regional trade is to enhance bilateral trade in the region of operation and not necessarily to encourage international trade with the rest of the world. Even with this notion, the effect of regional trade has also been seen to be controversial dues to diverse results from diverse analyses. In other words, the consequences of regional trade agreement have been seen to differ region by region and that depends on the level of operationalism of the agreement in place.

Some regional trade agreements have reached an advanced stage where complete mobility of labour, materials and trade are being given freedom of movement. In this kind of situation, there is every tendency that bilateral trade will be improved in such regions and that will even help the region in general to improve in its trade relationship with the rest of the world. Despite, different opinions from authors in this regard, more regional trade agreement have continued to come into operation as the WTO seems to have approved even more. The world regulatory body in trade has moderated many other kinds of preferential trade agreements which could metamorphose to regional trade agreements. Nigeria lead the ECOWAS which is one of such cases which have metamorphose to a regional trade agreement with it approval or say operationalism coming into place since 2004 despite the organisation have been conceived since April 1980.

The result as to the effects of such regional trade agreement on trade with respect to SADC is seen to be positive give that the outcome as reported herein are positive and statistically significant. The magnitude of the effect differs between the PPML technique and OLS but the major important thing is that both techniques reported positive influence on the bilateral trade in the region. The coefficient from the OLS estimation is little higher than the coefficient from the PPML estimation. This argument has been in place and demonstrated by Shepherd (2013), which indicates that in many circumstances, the outcome of OLS seems to be higher in coefficient than the outcome of PPML. This is least of the problem here as the main intention of the research is to demonstrate the impact of ECOWAS as regional trade agreement, and its influence in redirecting trade flow in the region.

The result revealed that the impact of ECOWAS regional trade agreement on bilateral trade in the region is positive and statistically significant. With PPML the coefficient is 0.317 and statistically significant at one per cent. This implies that RTA in this region improves trade by over 37.1 percent all things being equal. With OLS technique, the coefficient is 0.235 and statistically significant at 10 percent which implies that RTA in this region motivates trade by over 26.5 percent approximately, *ceteris paribus*. The coefficients became much high when considering the patent. The coefficients reported to be 0.437 and 0.486 for PPML and OLS techniques respectively which represent impacts on bilateral trade in the region with over 54.81 percent and 62.58 percent respectively, all thing being equal. With these outcomes, one can reliable infer that the effect of regional trade agreement with respect to Nigeria is positive and statistically significant and therefore should be encourages.

7 CONCLUSIONS

This research emphasises how innovation and regional trade agreements have shaped Nigeria's commercial environment. The results show that innovation, as determined by copyright, patents, and the innovation index, positively correlates with manufacturing trade for importers and exporters. The paper also emphasises how the regional trade agreement among the ECOWAS has benefited bilateral commerce within the region. Policymakers should prioritise innovation investments, bolster the protection of intellectual property rights, encourage regional trade integration, improve infrastructure development, bolster corporate capacity building, and cultivate public-private partnerships to take full advantage of these results. Nigeria can improve its trade competitiveness, stimulate economic growth, and support the ECOWAS region's sustainable development by implementing these ideas.

Nigerian officials should prioritise several essential activities to create a favourable climate for the expansion of trade. First and foremost, investing in innovation via financing technology transfer programmes, encouraging industry-academia cooperation, and offering incentives for research and development is essential. Second, intellectual property rights protection systems must be strengthened to promote innovation and guarantee that those who do it are fairly compensated. Unlocking the full potential of intra-regional trade also requires developing regional trade integration within the framework of the ECOWAS. Investments in cross-border infrastructure, trade regulatory harmonisation, and introducing trade facilitation measures may all help accomplish this. Finally, strengthening capacity training programmes would help businesses—especially small and medium-sized ones—take advantage of new trade possibilities and successfully compete in the global economy. By putting these suggestions into practice, Nigeria can promote a more resilient and dynamic trading environment that propels economic growth and development.

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APPENDIX

Table 4

Correlation Matrix

Variables	$\ln M_{ijt}$	$\ln Y_{it}$	$\ln Y_{jt}$	$\ln Dist_{ij}$	$Contig_{ij}$	$Comlang_i$	COL_{ij}	$Copy_{it}$	$Copy_{jt}$	PET_{it}	PET_{jt}	INN_{it}	INN_{jt}	RTA_{ijt}	
$\ln M_{ijt}$	1														
Y_{it}	0.483	1													
Y_{jt}	0.367	-0.084	1												
$Dist_{ij}$	-0.031	0.229	0.234	1											
$Contig_{ij}$	0.088	-0.083	-0.084	-0.456	1										
$Comlang_{ij}$	-0.111	-0.116	-0.065	0.088	-0.019	1									
COL_{ij}	0.057	0.077	0.077	0.015	-0.022	0.197	1								
$COPY_{it}$	0.314	0.728	0.117	0.104	-0.035	-0.062	0.035	1							
$COPY_{jt}$	0.214	0.099	0.733	0.115	-0.034	-0.039	0.034	0.861	1						
PET_{it}	0.056	0.327	0.344	0.156	-0.078	-0.013	0.016	0.818	0.826	1					
PET_{jt}	0.196	0.327	0.355	0.149	-0.076	-0.018	0.017	0.823	0.831	0.846	1				
INN_{it}	0.324	0.584	0.036	0.308	-0.123	-0.126	0.088	0.256	-0.111	0.134	-0.112	1			
INN_{jt}	0.365	0.054	0.567	0.316	-0.122	-0.096	0.086	0.015	0.244	-0.122	0.145	-0.122	1		
RTA_{ijt}	0.055	0.267	0.303	0.225	-0.131	-0.018	0.046	0.255	0.243	0.721	0.133	0.285	-0.124	1	

Sources: Author's Computation