



THE INFLUENCE OF THE INTERNET ON EXPORT PERFORMANCE SUB-SAHARA AFRICA

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Authors' contributions

This work was carried out in collaboration between both authors. Author MM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript managed the literature searches.

Author HBJ managed the analyses of the study. Both authors read and approved the final manuscript

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ABSTRACT

With the used of panel-country level export data, this paper investigates the impact of the internet on export performance in 41(Sub-Sahara Africa countries). With the internet being measured on two fundamentals aspect email and website, the econometrics result from both the Random effect Ordinary Least Square regression (OLS) model and Pooled estimate concluded that the internet is efficiently an important tool to promote export performance. Further diagnostic test using the GMM Generalize Method of Moment to test for endogeneity problem signifies all variables used have a significant effect on export performance with giving more validation of the data indicating the absence of endogeneity. The empirical analysis allows us to take into consideration of Self-Selection biased on the reason for some firms weak export performance, which was due to their geographical locations creating a higher cost on the flow of weak Internet penetration. Therefore, the research concludes that firms with higher internet penetration are more likely to use email in promoting their export performance by 23% than firms that do not. With geographical location, which is seen as a natural phenomenon being sighted as the main problem towards inefficient internet penetration leading to higher cost, it is recommended that government policies are the best to mitigating this problem, that is, formulating a solid policies for those oligopolistic behavior of some large submarine cable operators that makes prices very high for connectivity and that government should also enforce quality investment into internet infrastructure to disrate the weight of firms marginal cost.

Keywords: Internet; export performance; Sub-Sahara Countries; influence.

1. INTRODUCTION

Export is the most common ways for marketing activities abroad since this practice requires fewer resources compared to other internalization methods [1]. The performance of a firm reflects a firm-specific behavior in leveraging its resources and capabilities in an international context at a given point of time. Firm export performance is regarded as one of the key

indicators of the success of a firm's export operations, and as such, it has been an extensively studied phenomenon [2]. The two major trends that have offered a tremendous shift in export marketing performance research are the advancement of the Internet and the rapid internationalization of firms [3]. [4] The percentage of individuals who use the internet continues to grow worldwide. This technology has profoundly affected almost all businesses [5].

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However ever [6,7,8] find that the internet is an important tool to globalization as it reduces costs, enhances competition, affect output price and encourages manufacturing exports and import that leads to openness. This process can also be used to decrease information cost for both sellers and buyers [4]. With relations to internet influence on export performance in recent time, it has eventually speed-up endless opportunities for firms to gaining market access and improving their efficiency in exporting and handling market orders on a day to day basis. [9] Find that, Internet penetration in developing countries is correlated with greater exports to developed countries. With the identification of two effect as relate to Internet capabilities as a bundle of skills to transform material and immaterial resources into particular online applications from a cross-national data from 215 middle-sized industrial exporting firms, [10] find that companies can use Internet capabilities to spur functional export marketing capabilities that eventually improves companies export marketing performance. Also [11] uses of conceptual model to modify the effect of Internet marketing capabilities on export market growth in an emerging market drawing analyses from cross-national sample of 204 export firms from a Latin American country (Chile), findings indicate that Internet marketing capabilities positively influence the availability of export which in turn impacts the development of business network relationships and export market growth. But according to [12] Antecedents of Online Contribution to Export Performance (OCEP), that is identifying internet capabilities extent to which an export firm's objectives are achieved via online activities, estimating from a cross-industry sample of 603 SMEs results shows that whilst some capabilities positively affect the performance of online export activities, others have a detrimental effect. Managers are advised to focus on relational online capabilities rather than necessarily invest in online transactions, as these do not seem to be associated with increased online performance. However, supporting the analysis [3] examining the drivers and performance outcomes of Internet use to supporting export marketing, that is the Internet as an alternative to a physical presence and the Internet as a sales channel, from a 115 UK-based SMEs, result infer that online channel support positively enhances export performance for SMEs but Internet used as an alternative to a physical market presence does not lead to higher export performance and that born-global firms that are relying too much on the Internet are prone to fall into the “virtually trap”. Therefore as internet capacities being used and analyze in many diverse ways to improving significant market opportunities and its advantage and disadvantage

towards firms export performance within other regions, the research contribute to the literature by investigating internet influence on firms export performance within Sub-regional locality such as Sub-Saharan Africa as there are few review papers on its internet influence towards firms export performance. With a higher flow of internet users within the region, it is very prudent to investigate its influence on the performance of firms export. The research also applies new ways to compute the internet in relation to export performance by using email and website estimated by both random and pooled model estimation and also going beyond why countries experience high cost for internet use that leads to weak export performance. The rest of the paper is divided into Methodology, Model, Empirical result and conclusion.

2. METHODOLOGY

In other to investigate the study, the research collected a panel data country level export data from 2000 to 2015. Our research finding, however, relates to [13] as they use e-mail and own website use as a determinant of the internet positive impact on the extensive margin of enterprise export and input import behavior that is, firms that use email and website are more likely to have efficient export performance than firms that do not. Controlling for self-selection biased on countries that lack efficient export performance, they find that higher cost on the internet was the main reason for poor performance in other countries. With probe investigation using similar variables, we categorize internet influence by, email as a medium of communication between the suppliers and the customers and website used for advertisement and sales as a path to promoting efficient export performance. In order to make the result plausible, we also take into consideration of self-selection Biased by going beyond the main reason for higher cost on the internet that causes to weak export performance. The research uses export performance as the dependent with other control variables being incorporated into the model to avoid unbiased. We also control for endogeneity, using the GMM estimated model techniques. The research model was derived using both random effect model and pooled estimated model. Export data source from the United Nations Statistical Division (UNSD) Commodity Trade (COMTRADE) database (2000-2015) while internet data and Fixed Broad Band, come from ITU World Telecommunication/ICT Indicators database (2015) and email and website data based collected from World Bank’s enterprise survey database for years 2000–2015 for 41 developing countries in Sub-Saharan Africa.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Export performance	640	27.56734	29.74184	0	108
FixedBB	640	36.71875	122.336	0	989
Email	640	37.76875	370.3411	0	9083
Website	640	260.1141	3658.889	0	89776
Electricity	639	14.96557	63.00591	0	988
FDI	640	60.70625	537.3646	0	9943
Tariff	640	1067.811	5546.246	0	90772
ForeXG	640	412.704	1690.373	0	9996
Corrupt	640	56.06834	165.0368	0	988
M2	640	8.565484	27.44713	0	595
Humancapital	640	16.8125	22.34666	0	212
Pstability	416	7.177885	21.87538	0	9

3. MODEL

The model can be estimate as follow

$$\begin{aligned} \text{export}_{ij} = & \alpha + \text{internet}_{ij} + \text{electri}_{ij} + \text{FDI}_{ij} \\ & + \text{Tariff}_{ij} + \text{Foex}_{ij} + \text{M2}_{ij} \\ & + \text{Hucap}_{ij} + \text{pinstability}_{ij} \varepsilon_{ij} \end{aligned}$$

Export serve as the dependent variable of merchandise produce (i) in country j . Internet_use i measure base on specific dimensions within country (j) . (i) represent the period (j) represent the country. Electricity measure the flow of electricity within a year, Foreign Direct Investment measure total FDI net inflow, Tariff measure the Weighted mean by product, Foreign exchange compute the level of inflation, Financial Access measure the proportion of firms access to finance, Human capital ij compute educated population into the Labor force, Political instability ij serve as a dummies if war exited during the period 2000-2015 take the value of (1) and (0) otherwise, and ε_{ij} represent the error term. It should also be noted that each of these variables becomes dummy variables in terms of comparison on countries export performance.

4. EMPIRICAL RESULTS

Table 2 estimate a panel and pooled OLS model, which both models computed output seems no much difference except for electricity. Internet influence on export performance analyzes a positive significant relationship. With being measured on these two fundamentals aspect, Email and website, email prove to be much more likely to improve export performance through the means of constant communications. That is firms with own email address will export more to customers than firms that do not, adequately providing a 39% in the Random effect model and 36% improvement in the Pooled estimates. Also with good Internet infrastructure of

Fixed Broad Band, 35% increase will arise within export performance from the random effect model and 32% from the pooled estimate given similar significant value. All reminder variables indicates a positive relationship with export performance within these countries except for tariff, corruption, political instability and foreign exchange indicating a less likely significant improvement on export performance as the estimate shows that as tariff increases, performance in export reduces by -1% in both models, Foreign exchange which were calculated on the rate of inflation reduces performance by -1% in the random effect model and -3% in the pooled estimate, Corruption at -17% in export performances from a one unit change in the random effect and -19% in the pooled estimate and Political Upheaval which create a stagnate economy has a larger effect on export performances at -25% in the random effect with a significant value less than 0.005 and -23% in the pooled estimate giving the same significant value but lesser coefficient estimate. On the flow of electricity, it gave an insignificant value in the random effect model but is seen significant in the pooled estimate given a 38% increase in export performance if the electric flow is constant.

4.1 Selective Biased

If it is suggested that firm having its own email will increase export performance, it should also be noted that these firms need efficient Internet infrastructure to facilitate the usage of email. Therefore by providing higher Internet infrastructure services within these countries, firms are mostly affected by the extreme cost for connectivity due to their geographical location within the region, which affect the process of frequent transaction process with customers that directly affect its international exporting performance. We estimate using simple economics method.

$$Internet_{ij} = \alpha + \beta G_{ij} + infras_{ij} + \beta M2_{ij} + Dd \gamma_{ij} + electricity_{ij} + Hcap_{ij} + Pinstability_{ij} + \epsilon_{ij} - 2$$

Internet_i serve as a dependent variable measure total flow of penetration in country_j, α is the constant, βG_{ij} measure geographical location taking a dummy variable on the domestic connectivity for receiving efficient internet (1) and (0) otherwise, infras_{ij} measure in area of full fixed broadband connectivity to facilitate competitions. [13] More competition in provision of internet infrastructure is expected to make internet access more affordable and accessible for the private sector. Therefore, higher level of competition in internet service infrastructure should increase internet adoption by enterprises. βM2_{ij} measure the proportion of firms access to finance, D^d γ_{ij} measure demand per population using the internet, electricity_{ij} measure the flow of electricity flow annually, Human capital_{ij} compute educated Labor force, Political instability_{ij} serve as a dummies if war exiting during the period 2000-2015 take the value of (1) and (0) otherwise, and ε_{ij} represent the error term.

From Table 3: It can be analyzed that geographical location is important as it is responsible for the slight internet influence on export performance. With Africa

been serve with only three fiber-optic link for global internet connection it is seen that countries that are much closer or directly connected to Subsea cables are much more efficient on internet usage for trending output towards internet marketing distribution than countries that find themselves in an out range location as proving by the data with a 2% less significant effect on export performance that leads to higher cost. According to the result less Internet users, is less likely to improve export performance at the proportion of 2%. Firm export is more likely to increase with efficient backbone Internet infrastructure at 22% which facilitate a competitive market between firms with greater human capacity at 41%. Also, the Internet is less likely to promote export performance with a 5% lack of access to financial market whereas electricity at 2% and political upheaval at 3%.

Table 4: The result for endogeneity suggests that the more firms use email, it facilitate export performance through the Internet with robust std err. 23% (.0130402). The two mechanism used for influential performance by the internet shows that website, increases performance by 1% (.0011161) but not as compare to email with 23% influence towards export performance. Nevertheless, even though the

Table 2. Internet facilitating export performance

Export	Panel OLS estimate		Pooled OLS estimate	
	Coefficient	P-value	Coefficient	P-value
FixedBB	.035327 (.0066036)	0.000***	.0329371 (.0083307)	0.000 ***
Email	.0394131 (.0149)	0.008***	.0360614 (.0185155)	0.052 *
Website	.0022299 (.0012827)	0.082*	.0074573 (.0015434)	0.000***
Electricity	.0085751 (.0119909)	0.475	.0385974 (.0157018)	0.014 **
FDI	.0556057 (.010693)	0.000 ***	.0724922(.0123434)	0.000***
Tariff	-.0015037 (.0003826)	0.000***	-.0013429(.0004646)	0.004 ***
ForeXG	-.0018335 (.0007375)	0.013**	-.0035891(.0008217)	0.000 ***
Corrupt	-.0177654 (.006737)	0.008**	-.0199962 (.0081419)	0.014**
M2	.098074 (.0286422)	0.001***	.143877 (.0382587)	0.000***
Humancapital	.1544496 (.0498671)	0.002***	.4602584(.0538592)	0.000***
Pstability	-.2583906 (.0597408)	0.000***	-.2315544(.0561609)	0.000***

Note:*** 1% **5% * 10% significant level. () indicating a Robust Standard Error

Table 3. Estimate for self-selection biased on internet usage

Internet	coef.	p - value
Geo	-.0027748 (.0014884)	0.086 *
Infrastructure	.0223506 (.0130164)	0.086*
Demand Per-pop	-.0026131(.0006759)	0.000 ***
M2	-.0005002(.0002998)	0.096*
Electricity	-.0021522 (.0012027)	0.074*
Humancapital	.0413954(.0113633)	0.000 ***
Pstability	-.0003621(.0002066)	0.080 *

Note:*** 1% **5% * 10% significant level. () indicating a Robust Standard Error

Table 4. General moment method (GMM) regression

Export	Coefficient	P-value
L1	.7139746 (.0346061)	0.000 ***
FixedBB	.0104728 (.0060508)	0.083 *
Email	.0231742 (.0130402)	0.076*
Website	.0018769 (.0011161)	0.093 *
Electricity	.0361776 (.011028)	0.001 ***
FDI	.0245708 (.009138)	0.007**
Tariff	-.0007508 (.0003361)	0.026 *
ForeXG	-.0010693 (.0005897)	0.070 *
Corrupt	-.0105057 (.005744)	0.067 *
Financial access	.054963 (.0275322)	0.046 *
Humancapital	.1095662 (.0418644)	0.009 **
Pstability	-.1035799 (.0410405)	0.012*
AR(1)	z = -3.04 Pr > z = 0.002	
AR(2)	z = 1.48 Pr > z = 0.138	
Sargan Test overid.	chi2(373) = 352.33 Pr= 0.772	
Instruments	386	
Wald chi2(12)	= 979.63	

Note: *** indicate a (1%) significance ** indicate a (5%) significance level and *(10%) significance level. The () estimate the st.Err indicates standard error

Internet has proven as a significant factor towards export performance other variables like Fixed Broad Band increases Internet by 10% (.0060508), that is when Internet infrastructure is efficient. FDI increases performance at 2% due to its characteristic it bring forth to host countries. With fluent electricity flow export performance increases by 3%. Also given an access to finance, export performance increase at 5% as these finances can be used on investment and productivity project. Human capital are more likely to improve export performance by 10% as most firms depends on proficient human capital to provides a long-term knowledge based value that leads to higher returns. Tariff, foreign Exchange, Corruption and political instability on the other hand has a negative impact towards export performance in these countries that is with more tariff levied on good exported reduces performance by -7% with a -1% reduction in performance due to inflation and -10% reduction for both corruption and political instability. Test for serial correlation the AR (1) and AR (2) infer that a higher p-value analyzes that the error term of the difference in the equation is not serially correlated with given preference to the AR (2) at (0.138). The Sargen test for overriding estimate for the model is 77% indicating the validity of the models.

5. CONCLUSION

The internet has become a major area of focus for many researchers. There has been several finding as to how the Internet has impacted trade, but how has it impacted export performance Sub-regionally, has

literally been unnoticed. The research computed country exports annually from the period 2000-2015 with other control variables, Fixed Broad Band, internet data come from ITU World Telecommunication/ICT Indicators database (2015) and email and website data collected from World Bank's enterprise survey database for years 2000-2015 for 41 developing countries in Sub-Saharan Africa. From the result, the Internet is efficiently an important tool to promote export performance within these countries but seems much more efficient by the use of email as a mechanism for fast communication frequency between both supplier and consumers. Result from the GMM test indicate 23% increased in export performance for firms that uses email than website. Our research finding however, relates to [13] as they used e-mail and own website use as a determinant of the internet that indicate positive impact on the extensive margin of enterprise export and input import behavior that is, firms that use email and website are more likely to have efficient export performance than firms that do not. Controlling for self-selection biased, it was find that countries that lack efficient export performance was due to higher cost. But the research goes further beyond the main reason why countries experience high cost leading to weak export performance. The estimated result analyze that, geographical location serve as one of the main obstacles to slow internet penetration leading to higher cost for connectivity in other countries. For secondary findings, other control variables were investigated, result shows that Internet Infrastructure has a 10% increase on export performance for every new upgrade, electricity indicates 36% improvement

when electricity has a normal supply, FDI indicates 24% for every change in the net-flow of Foreign Direct Investment. With more access to M2 firms are more likely to invest in production leading to 54% changes on export performance, Human Capital indicated a positive relationship with export performance that is with higher scale laborers firm export performance increases by 10%. For the variables tariff, foreign exchange, corruption, and political instability hinder firms export performance, which tariff hinders by 7% for every increase, foreign exchange by 1% and corruption and political instability by 10%. The Test for serial correlation the AR (1) and AR (2) infer that a higher p-value analyzes that the error term of the difference in the equation is not serially correlated with given preference to the AR (2) at (0.138). The Sargen test for overriding estimate for all the model is 77% indicating the validity of the models. But government policies can be the best to solve such problems, that is, to stop the oligopolistic behavior of some large submarine cable operator that makes prices very high. They should also invest in internet infrastructure because by creating a high capacity backbone internet infrastructure there is hope that technology can make a leap-frog to overcoming some of the internet shortcomings in Africa creating room for competition. Also with more demand and given more access to finance can also surge internet growth.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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