IUT Journal of Advanced Research and Development

Volume 9, No. 1 (April 2023 - September 2023)

ISSN: 2455-7846

Published by

ICFAI University, Tripura

Kamalghat, Mohanpur, Agartala - 799210, Tripura (W)

Ph: 0381-2865752/62

Toll Free No. 18003453673

Website: www.iutripura.edu.in

ISSN: 2455-7846

ISSN2455–7846

INFORMATION AND COMMUNICATION TECHNOLOGY INFRASTRUCTURES AND EXPORT PERFORMANCE OF MANUFACTURING FIRMS IN SUB SAHARA AFRICA

Musa O. Oduola
Department of Economics, Olabisi Onabanjo, Ago – Iwoye, Nigeria
musaoduola@gmail.com

Adeyemi O. Babasanya
Department of Economics, Olabisi Onabanjo, Ago – Iwoye, Nigeria
babasanya.adeyemi@oouagoiwoye.edu.ng

Bukonla G. Osisanwo
Department of Economics, Olabisi Onabanjo, Ago – Iwoye, Nigeria
osisanwo.bukonla@oouagoiwoye.edu.ng

Abstract

This study investigated the impact of information and communication technology (ICT) adoption on the export performance of manufacturing firms in Sub-Saharan Africa (SSA). The research utilized a probit regression analysis based on data from the World Bank Enterprise Survey, which encompassed 20 SSA countries and a total of 8,910 manufacturing firms. The findings of the study provided compelling evidence that the adoption of ICT has a significant positive effect on the export performance of manufacturing firms in SSA. The results demonstrated that the usage of ICT tools such as email and webpages played a crucial role in enhancing the export activities of these firms. Furthermore, the adoption of ICT facilitated efficient access to information and reduced transaction costs, thereby creating seamless connections between buyers and exporters. These findings underscored the immense potential of ICT in bolstering the export capabilities of manufacturing firms in SSA. As such, it is imperative for policymakers and stakeholders to prioritize and invest in the integration of ICT within the operational processes of these firms. This study addresses a critical gap in the existing literature by shedding light on the ICT-exporting relationship in SSA and providing valuable practical implications for policymakers and enterprises operating in the region.

1 Introduction

Exporting is highly valued by countries because it plays a crucial role in driving economic growth and promoting development. Export activities have significant advantages both at the level of individual firms and the overall economy. For firms, participating in export markets improves their managerial skills and capabilities, leading to increased sales, opportunities for expansion, better financial positions, and enhanced competitiveness ((Filatotchev, Liu, Buck, & Wright, 2009; Singh & Maiti, 2020). These benefits at the firm level contribute to broader macroeconomic outcomes such as socioeconomic development, efficient allocation of resources, optimal utilization of capacities, job creation, acquisition of foreign exchange, and rapid economic growth and transformation, as demonstrated by China's recent successes in manufacturing exports (Filipe Lages & Montgomery, 2004; Lo Turco & Maggioni, 2015;

Pinho & Martins, 2010). Consequently, countries prioritize exports as evidenced by the increasing proportion of exports relative to gross domestic product (GDP). Over time, the global share of export GDP has grown from 18.22% in 1980 to 25.91% in 2000 and reached 26.71% in 2020 (World Bank, 2021). It is as a result that the internationalization of firms, particularly through exporting, has garnered significant attentionin recent years from researchers and other stakeholders across different spectrum of factors that contributes to or undermine the gains from exporting. For instance, access to finance (Kumarasamy & Singh, 2016)environmental information disclosure (Xie, Li, & Zhou, 2022); Women on board (Carbonero, Devicienti, Manello, & Vannoni, 2021); Environmental regulation (Shi & Xu, 2018); home country bribery (Lee & Weng, 2013); SO2 emissions trading (Liu, Ren, & Li, 2022) and many more. Thus, underscoring the strong scholarly attention towards firm exporting.

Information and communications technologies (ICT) comprise a broad array of tools used for facilitating communication between people, organizations, governments, and businesses. These technologies range from mobile devices and video conferencing to the Internet of Things. By leveraging the power of ICT, it is possible to improve efficiency in communication and reduce cost(Farhadi, Ismail, &Fooladi, 2012; OECD, 2004).The importance of participating in the export market with the aid information and communication technology (ICT) has generated increased literature contributions. Utilising ICT for export activities is essential for businesses in the age of globalisation since it increases their ability to compete in both domestic and international markets (Gomez-Sanchez, Máñez Castillejo, & Sanchis-Llopis, 2023). The argument is that the introduction of ICT to a firm's operations can bring significant benefits: overcoming financial barriers to market entry, lowering production costs, improving comparative advantages, reducing marketing expenses, facilitating market research and networking capabilities, and enabling efficient connection between buyers and exporters with accessible information access. For example, the utilization of an extranet facilitates the sharing of internal information between a business and its clients, while the adoption of the Internet reduces transaction costs. Moreover, establishing a website alleviates traders' concerns and the extensive integration of advanced ICT enhances the efficiency of transactions, resulting in a smoother process. Studies by Basu& Fernald (2007); Puri (2007); Rangan & Sengul (2009); Singh & Maiti (2020); Koutroumpis et al. (2020); Racela &Thoumrungroje (2020)all point to the significant cost savings and technological improvements made possible with ICT. The foregoing underscores continuous incorporation of ICT adoptions into the explanation of firm’s internationalisation.

While this role of ICTs is vital to the discussion of firm export market participation, the investigation of ICTs contribution to general economic growth and development by the mainstream technological literature has only been argued at an excessively general level, while knowledge of its channels like firm export market participation is rare and, more importantly, for the SSA region, a region that has been characterised by a recent surge in both mobile phone and internet penetration. The scarcity of research on the ICT–manufacturing firm export market participation relationship represents a gap in the firm export discourse, particularly in SSA. The potential for ICT in Sub-Saharan Africa (SSA), especially with its recent increase in adoption, brings to the fore its potential contribution towards efficient access in the region. Significantly, ICT penetration in SSA has risen significantly over a consistent period. For instance, both mobile phone and internet penetration have increased tremendously over the last two decades. Internet penetration grew from 0.068% in 1996 to 30.04% in 2020 (World Bank, 2021). Its annual penetration rate (21%) over the past two decades (2001–2020) has seen it pass that of East Asia and the Pacific (EAS) (12%), Central Europe and the Baltics (CEB) (11%), Latin America and the Caribbean (LCN) (14%), the Middle East and North Africa (MENA) (20%), and slightly behind South

Asia (SAS) at 23% (World Bank, 2021). A similar trajectory also exists for mobile phone penetration. To this end, this study asks to what extent does ICT use affects firm exporting activity in SSA.

By investigating this ICT-exporting relationship, the study contributes to existing argument in the following ways: first, it would address a crucial research gap by focusing on the specific context of SSA, where there is a scarcity of literature on this topic. Secondly, by exploring the extent to which ICT use affects firm exporting activity in SSA, the study would contribute to a deeper understanding of the impact of ICTs on economic growth and development in this specific region. It would provide a more nuanced perspective on how ICT penetration, particularly in mobile phones and internet usage, is influencing trade and economic outcomes in SSA. Finally, the study would have practical implications for policymakers and businesses. If a positive association between ICT use and firm exporting is found, it would underscore the importance of investing in ICT infrastructure and encouraging its adoption among businesses. This knowledge could inform policy decisions aimed at promoting export-led growth and development.

The rest of the paper is organized as follows. The next section presents the literature review. Section 3 presents our data and explains our treatment effects framework, as well as our IV approach. Section 4 presents the results and several robustness checks. Section 5 concludes the study.

2 Literature review

The influential work of Posner (1961) has laid a solid foundation for subsequent research in the field, with scholars like Verspagen and Wakelin (1997) and Laursen and Meliciani (2002) building upon his findings. These studies emphasize that trade dynamics are primarily shaped by the ability to foster technological innovations and leverage technological interconnections. These factors are pivotal sources of competitive advantage, while considerations related to costs and prices play a relatively minor role in driving trade patterns. Additionally,Gomez-Sanchez et al. (2023) explored the direct effect of ICT on exports and proposes a new indirect effect that operates through imports. Using a dynamic generalized linear model, they found that different ICT components on export intensity are always positive, and previous experience in ICT use on import activity affects the firm's current export performance.Chaibi et al. (2015) conducted a study examining the relationship between e-skills, the usage of Information and Communication Technologies (ICT), and firm performance in Luxembourgian manufacturing and services firms. Their findings indicate that the utilization of e-applications has a positive impact on the likelihood of successful implementation of new projects. They also highlight an asymmetric effect of e-commerce and e-administration usage, aligning with previous literature in this field. This result of the role of ICT adoption is not unsimilar to Arvanitis and Loukis (2009)who in their comparative study found positive effects for physical capital, ICT capital, human capitalfor both Swiss and Greek firms' samples, with being Swiss firms more efficient than Greek firms in creating, using, and combining these production factors. Furthermore, Bertschek et al. (2013)examined the impact of broadband internet on the performance of German firms. They found that broadband internet has no impact on firms' labour productivity, but it has a positive and significant impact on their innovation activity.This result is similar to Gërguri-Rashiti et al. (2017) despite the differences in context especially the economies under investigation (transition economies) and dataset employed (Business Environment Enterprise Performance Survey (BEEPS)). Bianchi and Mathews (2016)contributed to this discourse by evaluating how internet could be used to increase export market growth for Chilean firms. Using a structural equation modelling, positive association between the use of internet marketing and export market growth

in Chile were found, indicating that firms that utilized internet marketing effectively had higher rates of export market growth compared to those that did not.Makanyeza and Ndlovu (2016), in a similar study to Bianchi and Mathews (2016), examined the effect of ICT usage on SMEs' exporting in Zimbabwe. The study used a multiple regression estimation technique to find that ICT use is a strong predictor of manufacturing SMEs' export success. However, in a contrary study to the above, Sun (2021) study found internet development to have a deleterious impact for SMEs export. Specifically, when analysing data collected between 1997 and 2014, it was determined that the internet has a significant, negative impact on exports by the top 5% or 25% of exporters. Contrary to Sun (2021), the relationship between financial sector development, internet use, and export value in China during the 2000-2018 period was demonstrated in the research conducted by Shetewy, Shahin, Omri and Dai (2022). Via the Gaussian Process Regression (GPR) they uncovered that an increase of between 6.82% to 18.8%, on average, in exports from pilot cities was caused by broadband related internet policies. In addition, Rifin and Nauly (2021)discussed the importance of ICT in a firm's ability to export their products, particularly in the era of globalization. The results showed that firms using email and website have a higher percentage of exporting their products compared to those who do not use email and website. The study also indicates that there is a relationship between ICT and where the firms sold their products, whether in domestic or international markets. Ashrafi et al. (2014)explored how Small and Medium Enterprises (SMEs) in Oman can achieve business value through effective management of Information and Communication Technologies (ICT). The study identified seven key factors that assess the business value of ICT adoption in SMEs, including organization and management practices, strategic, informational, transactional and organizational change benefits, impetus for ICT investment, and support from the government. Ahmad et al. (2011) in the case of Malaysia using a gravity model found that ICT infrastructure development serves as the key facilitating role in achieving higher levels of exports in Malaysia.To Cassetta et al. (2020) , digital technologies promote internationalisation. Hagsten and Kotnik (2017) showed that basic ICT tools (such as a website) are more important for exporting than more advanced ones (such as the use of broadband or e-commerce) for 12 European countries. Kneller and Timmis (2016) found a strong positive causal impact of broadband use on the propensity to export business services for firms in the UK.

3 Data and methodology

To explore the connection between ICT adoption and export, we employed data from the World Bank Enterprise Survey (WBES) encompassing 20Sub-Saharan African countries. The WBES utilizes a standardized core questionnaire and employs a consistent sampling methodology to collect data from businesses that are representative of their respective nations in the developing world. The WBES contain information for both service and manufacturing firms. Since the focus of this study is the manufacturing firms, this study restricts its observation to only the manufacturing firms. In aggregate, the dataset comprises an extensive sample of 8,910firms after a meticulous data cleansing and outliers' removal.

3.1 Empirical methodology

To analyse the relationship between our dependent variable, which is measured as export propensity, we employed a probit regression model.

$$\text{Prob}\,(\text{EXPT}_{it} = 1) = \emptyset\,(\alpha + \rho_1 ICTWEB_{it} + \rho_2 ICTMAIL_{it} + \gamma_1 AGE_{it} + \gamma_2 SIZE_{it} + \gamma_3 OWN_{it} + \vartheta\varphi_{it} + \varepsilon_{it}) \quad ---(1)$$

The World Bank's Enterprise Surveys are unique because they provide information on firm's business environment along with standard information on production. In particular, the surveys collect information on exporting. The exporting variable (EXPT) used in this paper is presented in the WBES as "Percent of firms exporting directly or indirectly (at least 10% of sales)." It is a categorical variable and indicates whether the firm exported or not, with a binary representation of "Exported equalling 1" or "Not Exported equalling 0." Our ICTvariable is captured with $ICTWEB$ and $ICTMAIL$ that are also binary in nature. $ICTWEB$ take the value of 1 if the firm own a website and 0 if otherwise. Similarly, $ICTMAIL$ represent 1 if the firm employs E-mail in its operation and 0 if otherwise. We take into consideration the scale effect by adjusting for the firm's size ($SIZE$), which is measured by the logarithm of the number of employees.OWN represent ownership. We anticipate that larger firmswill have significant advantages when it comes to engaging in export market. There is a well-established understanding that foreign-owned companieshave distinct advantages compared to domestic firms when it comes to accessing resources and technology. As a result, foreign-owned firms are more inclined to engage in international trade. In this study, the variable representing foreign private ownership takes the value of 1 when private foreign individuals, companies, or organizations own more than 10% of the shares, and 0 otherwise. The variable "AGE" indicates the age of the firm. Previous research has presented a diverse range of findings concerning the impact of firm age. Some studies suggest that older firms, having successfully navigated competition, benefit from established networking connections, leverage scale effects, and encounter lower sunk costs, all of which contribute to increased participation in export activities.φ is the region-specific variable; $\alpha, \rho_1, \rho_2, \ \gamma_1 \ldots \gamma_3, \vartheta$ are parameter estimates. ε is the error term; t is time (year) measurements respectively.

Table 1 Variables and descriptions

Acronym	Variable	Definition and measurement
EXPT	Firms export	a categorical variable and indicates whether the firm exported or not, with a binary representation of "Exported equalling 1" or "Not Exported equalling 0."
ICTWEB	Website usage	do you currently communicate with clients a supplier via your website.
ICTMAIL	E-mail usage	represent 1 if the firm employs E-mail in its operation and 0 if otherwise.
AGE	Firm age	Number of years the firm has been in business
SIZE	Firm size	logarithm of the number of permanent employees
OWN	Foreign ownership	A binary 1 when private foreign individuals, companies, or organizations own more than 10% of the shares, and 0 otherwise.

Source: Authors computation, 2023.

ISSN2455–7846

4 Empirical results

4.1 Descriptive statistics and correlation

Table 2 presents the descriptive statistics for all the variables employed in this study. It provides insights into the central tendencies, variabilities, and ranges of the variables, highlighting the differences in proportions and distributions among them. The mean for the export variable is 0.121, indicating that on average, only a small proportion of the respondents engage in exporting activities. In comparison, both ICTWEB and ICTMAIL have higher means of 0.691 and 0.407, respectively, suggesting that a larger proportion of the firms use a website and email in their operation. The standard deviations for all three variables indicate a relatively high degree of variability among the variables. The AGE variable has a mean of 26.441, indicating a relatively young sample overall, although the high standard deviation of 16.941 suggests a wide age range. The average SIZE of exporting firms in SSA is 78.456. However, the variable's large standard deviation of 285.049 suggests a significant variation in the organization sizes. Lastly, the foreign ownership has a mean of 0.162, suggesting that a relatively small percentage of the respondents' organizations are privately owned. A correlation matrix was used to assess if multicollinearity existed among the independent variables, and the results are shown in Table 3. The correlation matrix shows that the independent variables don't exhibit any notable multicollinearity.

Table 2 Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
EXPT	0.121	0.327	0	1
ICTWEB	0.691	0.462	0	1
ICTMAIL	0.407	0.491	0	1
AGE	26.441	16.941	1	199
SIZE	78.456	285.049	1	8000
OWN	0.162	0.368	0	1

Source: Authors computation, 2023.

Table 3 provides insights into the relationships between the variables, allowing for a preliminary understanding of their associations and potential patterns prior to the main estimation of the study. Among these, EXPT exhibits a weak negative correlation with both ICTWEB (-0.150) and ICTMAIL (-0.139). This suggests that as internet usage for web browsing and email increases, exporting activities tend to decrease marginally. AGE, on the other hand, shows a weak positive correlation with EXPT (0.074), indicating that older respondents demonstrate slightly higher levels of exporting activities. Additionally, SIZE demonstrates a weak positive correlation with

Table 3 Correlation

	EXPT	ICTWEB	ICTMAIL	AGE	SIZ	OWN
EXPT	1					
ICTWEB	0.150***	1				
ICTMAIL	0.139***	0.504***	1			
AGE	0.074***	-0.245***	-0.218***	1		
SIZE	0.087***	-0.226***	-0.175***	0.249***	1	
OWN	0.115***	-0.205***	-0.215***	0.092***	0.130***	1

Note: ***P < 0.01, **P < 0.05.
Source: Authors computation, 2023.

EXPT (0.087), indicating that larger organizations tend to engage more in the export business. Lastly, OWN exhibits a weak positive correlation with EXPT (0.115) suggesting that organizations with high ownership tend to have slightly higher levels of exporting activity. Notably, the variables are not strongly correlated with each other leading us to conclude no multicollinearity exists which ensures stable and unbiased parameter estimates for our models going forward.

4.2 Baseline regression result

This study's second objective is to empirically investigate how ICT use affects manufacturing firms' export performance, measured by export intensity, in sub-Saharan Africa. This study employs the standard Probit model to accomplish this goal. The intuition for adopting the Probit model for this objective mainly lies in the binary nature of our dependent variable (export propensity EXPT**.** Table 4 presents the results.

Table 4 Result of the empirical investigation of the effect of ICT on manufacturing firms' export performance in SSA
Dependent Variable: Export Performance **(Export Propensity(**EXPT**))**

Variables	**Coeff.**	**Std. err**	**z**	**Prob.**
ICTWEB	0.185	0.046	4.060	0.000***
ICTMAIL	0.215	0.049	4.380	0.000***
AGE	-0.086	2.250	-0.040	0.970
SIZE	0.111	0.017	6.670	0.000***
OWN	0.240	0.047	5.070	0.000***
Constant	-0.761	17.108	-0.040	
Log pseudolikelihood		-2844.68		
Wald chi^2 (Prob.)		236.64 (0.000***)		
Regional dummies		Yes		

Note: ***P < 0.01; **P < 0.05; Coeff. represents marginal effects; Std. err represents the standard error; z is the z-statistics; Prob. is probability; LR is the likelihood ratio
Source: Authors computation, 2023.

The Wald test results, significant at the 5% level, indicate the rejection of the Wald null hypothesis. Consequently, all coefficients are deemed to be distinct from zero, demonstrating the overall significance of our model. Further, the relationship between website usage measure of ICT and the export performance of manufacturing firms is positive and conforms with the a priori expectation. Similarly, a positive relationship observed for the relationship between the Email usage measure of ICT and the export performance of manufacturing firms is consistent with the a priori expectation. Although the a priori expectation of the relationship between firm age and firm export performance is unclear, the study records a negative relationship. This negative sign is contradictory to the negative relationship returned for the relationship between firm size and export performance. Furthermore, the study records a positive sign consistent with the a priori expectation for the relationship between foreign ownership structure and the measure of export performance.

In terms of the magnitude, the marginal effect of 0.185 obtained for the relationship between website usage measure of ICT and export performance implies that a unit increase in website usage use raises the level of export performance of manufacturing firms by 18.5 percentage points. This result is significant at the 1 per cent level of significance. In resemblance, the marginal effect of email usage measure of ICT, another proxy of ICT, is 0.215, and it explains that a one percentage point increase in internet use will raise the level of manufacturing firms' export performance in SSA by about 21.5 percentage points. This result is also significant at the 1 per cent level of significance. The result is plausible because ICT have the capability to reduce operational cost and reduce information barriers between export market participants. The result also confirms the theoretical position of Hamill (1997), that proclaims that information and communication technology can help facilitate the flow of information and processing required to deal with market uncertainty. Thus, the use of information and communication technology (ICT) tools may not only help firms to reduce costs, it may also enable firms to take advantage of new markets and opportunities at a lower rate. As a result, firms who use ICT find it easier to choose to export their products and services. The result is consistent with the result of Makanyeza and Ndlovu (2016); Nath and Liu (2017); Shetewy et al. (2022). In terms of the control variables, the marginal effect of firm age is -0.086, although insignificant in probability. Firm size has a marginal effect of 0.111 and significant at 1% level of significance. The size of a firm, represented by the logarithm of its employee count, plays a crucial role in determining firms exports, as larger companies enjoy advantages such as reduced production expenses, economies of scale, and the capacity to overcome initial expenses associated with entering foreign markets, including meeting product standards, conducting market research, enhancing product quality, modifying packaging, implementing additional marketing strategies, and establishing valuable contacts and distribution channels. Further, foreign-owned is at a 1 per cent level of significance significantly related to the export performance of manufacturing firms in SSA. Given a marginal effect of 0.240, a 1 unit increase in foreign or private-owned firms would imply a 24.0 percentage point more likely to perform in the export market. Even though the result of this objective is not primarily for new firms, the result still reinforces the assumption of the theory of international new ventures attributed to Oviatt and McDougall (1994). The theory asserts that optimising the advancement of communication and information technologies is a critical driver of firms' internationalisation.

5 Conclusion

This study explores whether the usage of ICT has an impact on export propensity of manufacturing firms in sub-Sahara Africa. To research this issue, we employed the world bank enterprise survey dataset for 20 sub-Saharan countries which amounts to 8,910 firms and estimated our model using a probit regression estimation. The key findings of our study reveal that the adoption of information and communication technology (ICT) in manufacturing firms within Sub-Saharan Africa (SSA) has a noteworthy and beneficial effect on their export performance. This positive impact demonstrates that the ongoing development and widespread use of ICT present substantial opportunities for enhancing the export capabilities of manufacturing firms in SSA. As a result, our research underscores the critical importance of integrating and prioritizing ICT within the operational processes of manufacturing firms in SSA, as it is an essential factor in driving their success in international markets.

The findings of our study indicate a crucial need for policymakers and stakeholders in Sub-Saharan Africa (SSA) to prioritize and invest in the integration of information and communication technology (ICT) within the operational processes of manufacturing firms. To achieve this, policies should be geared towards enhancing access to ICT infrastructure, promoting digital literacy, and creating an environment that supports ICT adoption. Governments must take initiatives to develop and upgrade ICT infrastructure, especially in underserved regions.

Additionally, capacity-building initiatives and training programs must be implemented to enhance the workforce's digital skills, ensuring they can effectively use ICT tools. Policymakers should encourage collaboration among academia, industry, and government bodies to foster research and innovation in ICT for manufacturing firms. By prioritizing ICT integration and creating an enabling environment conducive to growth, SSA can leverage the immense opportunities presented by ongoing ICT development to boost international market competitiveness while driving economic growth through boosted export capabilities of manufacturing firms.

References

1. AhMAd, N. A., Ismail, N. W., & Hook, L. S. (2011). The role of ICT infrastructure on Malaysian trade. *Journal of Economics and Management*, *5*(1), 140–148.
2. Arvanitis, S., &Loukis, E. N. (2009). Information and communication technologies, human capital, workplace organization and labour productivity: A comparative study based on firm-level data for Greece and Switzerland. *Information Economics and Policy*, *21*(1), 43–61. https://doi.org/10.1016/j.infoecopol.2008.09.002
3. Ashrafi, R., Sharma, S. K., Al-Badi, A. H., & Al-Gharbi, K. (2014). Achieving business success through information and communication technologies adoption by small and medium enterprises in Oman. *Middle-East Journal of Scientific Research*, *22*(1), 138–146.
4. Basu, S., & Fernald, J. (2007). Information and communications technology as a general-purpose technology: Evidence from US industry data. *German Economic Review*, *8*(2), 146–173.
5. Bertschek, I., Cerquera, D., & Klein, G. J. (2013). More bits – more bucks? Measuring the impact of broadband internet on firm performance. *Information Economics and Policy*, *25*(3), 190–203. https://doi.org/10.1016/j.infoecopol.2012.11.002
6. Bianchi, C., & Mathews, S. (2016). Internet marketing and export market growth in Chile. *Journal of Business Research*, *69*(2), 426–434. https://doi.org/10.1016/J.JBUSRES.2015.06.048
7. Carbonero, F., Devicienti, F., Manello, A., & Vannoni, D. (2021). Women on board and firm export attitudes: Evidence from Italy. *Journal of Economic Behavior& Organization*, *192*, 159–175.
8. Cassetta, E., Monarca, U., Dileo, I., Di Berardino, C., & Pini, M. (2020). The relationship between digital technologies and internationalisation. Evidence from Italian SMEs. *Industry and Innovation*, *27*(4), 311–339. https://doi.org/10.1080/13662716.2019.1696182

9. Chaibi, A., Ben Youssef, A., & Peltier- Ben Aoun, L. (2015). E-Skills, Brains And Performance Of The Firms: ICT And Ability Of Firms To Conduct Successful Projects In Luxembourg. *Journal of Applied Business Research (JABR)*, *31*(3), 781. https://doi.org/10.19030/jabr.v31i3.9202
10. Farhadi, M., Ismail, R., &Fooladi, M. (2012). Information and Communication Technology Use and Economic Growth. *PLoS ONE*, *7*(11), e48903. https://doi.org/10.1371/journal.pone.0048903
11. Filatotchev, I., Liu, X., Buck, T., & Wright, M. (2009). The export orientation and export performance of high-technology SMEs in emerging markets: The effects of knowledge transfer by returnee entrepreneurs. *Journal of International Business Studies*, *40*(6), 1005–1021. https://doi.org/10.1057/jibs.2008.105
12. Filipe Lages, L., & Montgomery, D. B. (2004). Export performance as an antecedent of export commitment and marketing strategy adaptation. *European Journal of Marketing*, *38*(9/10), 1186–1214. https://doi.org/10.1108/03090560410548933
13. Gërguri-Rashiti, S., Ramadani, V., Abazi-Alili, H., Dana, L.-P., &Ratten, V. (2017). ICT, Innovation and Firm Performance: The Transition Economies Context. *Thunderbird International Business Review*, *59*(1), 93–102. https://doi.org/10.1002/tie.21772
14. Gomez-Sanchez, A. M., Máñez Castillejo, J. A., & Sanchis-Llopis, J. A. (2023). On the Direct and Indirect Effects of ICT on SMEs Export Performance: Evidence from Colombian Manufacturing. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-023-01378-7
15. Hamill, J. (1997). The Internet and international marketing. *International Marketing Review*, *14*(5), 300–323. https://doi.org/10.1108/02651339710184280
16. Kneller, R., & Timmis, J. (2016). ICT and Exporting: The Effects of Broadband on the Extensive Margin of Business Service Exports. *Review of International Economics*, *24*(4), 757–796. https://doi.org/10.1111/ROIE.12237
17. Koutroumpis, P., Leiponen, A., & Thomas, L. D. W. (2020). Small is big in ICT: The impact of R&D on productivity. *Telecommunications Policy*, *44*(1), 101833. https://doi.org/10.1016/j.telpol.2019.101833
18. Kumarasamy, D., & Singh, P. (2016). *Does access to finance facilitates the firm's ability to export? Experience from Asia-Pacific countries*. ARTNeT Working Paper Series.
19. Laursen, K., &Meliciani, V. (2002). The relative importance of international vis-à-vis national technological spillovers for market share dynamics. *Industrial and Corporate Change*, *11*(4), 875–894.
20. Lee, S., & Weng, D. H. (2013). Does bribery in the home country promote or dampen firm exports? *Strategic Management Journal*, *34*(12), 1472–1487.
21. Liu, D., Ren, S., & Li, W. (2022). SO2 emissions trading and firm exports in China. *Energy Economics*, *109*, 105978.
22. Lo Turco, A., & Maggioni, D. (2015). Imports, Exports and the Firm Product Scope: Evidence From Turkey. *The World Economy*, *38*(6), 984–1005. https://doi.org/10.1111/twec.12201
23. Makanyeza, C., & Ndlovu, A. (2016). ICT usage and its effect on export performance: Empirical evidence from small and medium enterprises in the manufacturing sector in Zimbabwe. *Botswana Journal of Business*.
24. Nath, H. K., & Liu, L. (2017). Information and communications technology (ICT) and services trade. *Information Economics and Policy*, *41*, 81–87. https://doi.org/10.1016/j.infoecopol.2017.06.003
25. OECD. (2004). *The Economic Impact of ICT*. OECD. https://doi.org/10.1787/9789264026780-en
26. Oviatt, B. M., & McDougall, P. P. (1994). Toward a theory of international new ventures. *Journal of International Business Studies*, *36*(1), 29–41. https://doi.org/10.1057/palgrave.jibs.8400128
27. Pinho, J. C., & Martins, L. (2010). Exporting barriers: Insights from Portuguese small- and medium-sized exporters and non-exporters. *Journal of International Entrepreneurship*, *8*(3), 254–272. https://doi.org/10.1007/s10843-010-0046-x
28. Puri, S. K. (2007). Integrating scientific with indigenous knowledge: Constructing knowledge alliances for land management in India. *Mis Quarterly*, 355–379.
29. Racela, O. C., &Thoumrungroje, A. (2020). Enhancing Export Performance through Proactive Export Market Development Capabilities and ICT Utilization. *Journal of Global Marketing*, *33*(1), 46–63. https://doi.org/10.1080/08911762.2018.1549302
30. Rangan, S., & Sengul, M. (2009). Information technology and transnational integration: Theory and evidence on the evolution of the modern multinational enterprise. *Journal of International Business Studies*, *40*, 1496–1514.
31. Rifin, A., &Nauly, D. (2021). Information and Communication Technology (ICT) and Firms Export in Indonesia. *Economics Development Analysis Journal*, *10*(1), 32–42. https://doi.org/10.15294/edaj.v10i1.37878
32. Shetewy, N., Shahin, A. I., Omri, A., & Dai, K. (2022). Impact of financial development and internet use on export growth: New evidence from machine learning models. *Research in International Business and Finance*, *61*, 101643. https://doi.org/10.1016/J.RIBAF.2022.101643

33. Shi, X., & Xu, Z. (2018). Environmental regulation and firm exports: Evidence from the eleventh Five-Year Plan in China. *Journal of Environmental Economics and Management*, *89*, 187–200.
34. Singh, P., & Maiti, D. (2020). ICT, Access to Finance and Firm Exports: A Cross-Country Study. In *Digitalisation and Development* (pp. 161–181). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-13-9996-1_6
35. Sun, M. (2021). The Internet and SME Participation in Exports. *Information Economics and Policy*, *57*, 100940. https://doi.org/10.1016/j.infoecopol.2021.100940
36. Verspagen, B., & Wakelin, K. (1997). Trade and technology from a Schumpeterian perspective. *International Review of Applied Economics*, *11*(2), 181–194.
37. World Bank. (2021). World Development Indicators | DataBank. Retrieved February 7, 2023, from https://databank.worldbank.org/source/world-development-indicators
38. Xie, D., Li, X., & Zhou, D. (2022). Does environmental information disclosure increase firm exports? *Economic Analysis and Policy*, *73*, 620–638.

ICFAI University, Tripura
Kamalghat, Mohanpur, Agartala - 799210, Tripura (W) Ph: 0381-2865752/62
Toll Free No. 18003453673 Website: www.iutripura.edu.in