

The Business Performance Produce of Information and Communication Technology Utilization

The influence of Information and Communication Technology (ICT) utilization on business performance has been a debatable issue for decades now especially in developed countries. Businesses invest highly in ICT to be able to compete with other businesses. A large body of literature on the business performance effect of ICT utilization provides evidence concerning the importance of ICT in the current world. These studies, however, lack the technical inefficiency influence of ICT utilization on business performance. The current study, by estimating the frontier model, uncovered the influence of technical inefficiency on business performance. The analysis uses World Integrated Trade Solution data from World Bank where extensive ICT and non-ICT indicators are provided. The ICT utilization indicators have mixed results in influencing competence scores. But, in general, ICT utilization reduces technical inefficiency thereby improving business performance, the competence score. Future studies, however, should focus on either specific country to reveal business performance influence of ICT utilization especially in developing countries or utilize panel data to have a much more detailed analysis.

Keywords: International trade, business performance, information technology and communication, frontier model, technical inefficiency

JEL Code: L25, M15, M16

Introduction

Information and Communication Technology (ICT) utilization among businesses is argued to improve their business performance (Cumps, Viaene, Dedene, & Vandenbulcke, 2006). Nevertheless, performance among organizations and economic growth for some countries, as acknowledged in the study by Yunis, Tarhini, & Kassar, (2018), are highly driven by ICT utilization. A successful story is in developing countries where the use of information and communication technology, as reflected in Azam, (2015), has improved the performance of small and medium enterprises (SMEs). The growth in ICT Investment has proved to derive economic growth among OECD members (Ahmad, Schreyer, & Wölfl, 2004). Ahmad et al., (2004) compared the contribution of ICT growth to economic growth for the period from 1990 to 1995 and from 1995 to 2001. They revealed a higher contribution in the later period than the former period. The ICT capital investment continued to have a significant portion of capital investment even after the growth slowdown for 2001 and 2002.

Luo & Bu, (2016) also contend that enterprises in emerging market economies have developed due to ICT utilization. Due to the use of ICT, enterprises have increased their value addition in productivity. Nonetheless, they propose that a large impact of ICT utilization is much felt in an emerging

market economy which is economically less developed and when a focal firm reaches a foreign market or its quality control and assurance is superior. According to Limbu, Jayachandran, & Babin, (2014), ICT utilization also indirectly improves job satisfaction among workers. The implication is that ICT utilization improves labor productivity because job satisfaction induces effort among workers. For instance, Moen, Madsen, & Aspelund, (2008) revealed that SMEs in Denmark and Norway are highly satisfied with new market establishment. In these countries, ICT is largely for market searching rather than business to business sales.

The impact of ICTs on development depends on how companies or countries utilize technology. If it is on market searching, more markets get established. ICT utilization simplifies the way works get done and therefore uplifts the satisfaction of workers. Even in education, Noor-Ul-Amin, (2013), asserts that ICT utilization significantly reduced the role of teachers in ensuring student performance as the environment has changed from teacher-centered to student-centered learning. Students can easily access their learning materials, or even lectures through ICT. Education is not the focus of this article but rather showing how ICT has changed the world across sectors. According to Rodriguez, Peterson, & Krishnan, (2012), the use of social media, such as tweeter and LinkedIn, improved sales processing among industries due to network creation that enables reaching a large number of customers. When ICT utilization is accompanied by innovation, Gërguri-Rashiti, Ramadani, Abazi-Alili, Dana, & Ratten, (2017) uncovered that firms' performance improves. Berné, García-González, García-Uceda, & Múgica, (2015), found that ICTs utilization among tourism intermediaries improves their business performance by strengthening their relationship with suppliers. The use of social media to create a market link among Business performance and economic growth has been highly driven by ICT utilization.

Firms adopt ICT to compete with leading firms because leading firms have competitive advantages in lower costs, financial strength, better knowledge and business experience (Lee, Chu, & Tseng, 2011). It is established that countries with high business competition level have firms with high ICT diffusion rate (Ahmad et al., 2004). High business performance is due to information knowledge sharing and knowledge integration (Luo & Bu, 2016). Lee et al., (2011) assert that non-dominant firms adopt new ICT as it enables to quickly transfer market data into useful information and reduces the cost of production, administration, service, and distribution. Whalen, Milios, & Nussholz, (2018) observe that it is very important for any business to keep labor costs low by acquiring good quality ICT or by estimating repair time correctly. It is claimed that a shift in labor demand towards high-skilled labor is a result of ICT. That is, high skilled labor is the precondition for ICT usage. As a result, highly developed countries export their low technologies towards developing countries and focus on human capital intensive technology (Arvanitis & Loukis, 2015) because ICT, human capital, and physical capital positively influence labor productivity (Arvanitis & Loukis, 2009). As it was found that ICT personnel had a significant influence on both product and process

innovation among Greek firms (Arvanitis, Loukis, & Diamantopoulou, 2013). Even in the health sector, ICT infrastructure is playing a great role in the European hospitals' product and process innovation (Arvanitis & Loukis, 2016). Studies (Arvanitis & Loukis, 2020) have gone to the extent of analyzing the effect of economic crises on firms' performance through ICT investment channel. That is, due to economic crisis, firms withdrawing from ICT investment may reduce their product innovation as well. So ICT is that important for firms to survive in the business. The current study, however, seeks to analyze the effect of ICT on business performance using national level data for 218 countries. The use of aggregate data is unique because all the studies reviewed have applied firm-level data. But, in this study countries take the position of firms. Nevertheless, the study also employs frontier model to estimate factors influencing technical efficiency in these firms.

The rest of the study is organized as follows. Section 2 discusses methodological issues thereby explaining data and data source, variables used in the study, as well as the approach for model estimation. Section 3 is about the findings and discussion, and last but not least is section 4 which provides conclusion.

Methodology

Data and Data Source

World Integrated Trade Solution (WITS)

WITS is a software that provides access to data concerning international trade, trade competition, tariffs and non-tariff, and features built-in analytical tools that help assess the impact of tariff cuts. For this particular study, WITS provides sufficient information concerning ICT infrastructure, and trade logistics and trade facilitation among others, which are useful for the current study's analysis. The data in WITS are collected by several multinational institutions and published by the World Bank Group for all countries. Some of the institutions that have data in WITS include UNCTAD, for instance, on cyber law tracker. Other information in WITS is obtained from the World Economic Forum. The data used in this study fall into three categories, namely ICT infrastructure and services, trade logistics and trade facilitation, and E-commerce skills development.

ICT Infrastructure and Services

From this category, the study selected the number of internet users per 100 people as one of ICT utilization measures. The use of this variable lies on the fact that if a country has a large number of internet users, it is easy to apply ICT in business advertisements and product market searching. Nevertheless, an economy with a large number of internet users has high innovative capacity among her firms as they get feedback from clients. Integrating ICT into business becomes more profitable when customers use ICT extensively. This

involves data corresponding to the proportion of people using the internet. That is the number of internet users divide by the total population including individuals at the age of 5 years and above based on the results from the National Household Survey. Apart from internet users, four more indicators namely fixed broadband internet tariffs in purchasing power parity dollars per month, fixed broadband subscriptions per 100 inhabitants, active mobile broadband subscriptions per 100 inhabitants, and mobile cellular monthly subscription charge in US dollar of ICT infrastructure have been used in the analysis. All these factors affect ICT diffusion among businesses and how they interact with customers and other businesses. For instance, the fixed broadband subscription per 100 inhabitants improves the business performance of a particular country where internet utilization is common among businesses. As the number of subscribers grows, their business influence also grows. However, a subscription is also hampered by the subscription tariffs. As the initial subscription tariffs decline, the number of subscribers also increases. The subscription tariffs also negatively affect the ICT diffusion rate among businesses.

Payment Solution

For the payment solution, six indicators have been used in the analysis. These indicators include the percentage of the respondent with a debit card and those with credit cards from the age of 15 years and above. Having a debit card or credit card is not enough to make business performance improve. As a result, the study further included the percentage of those who used their cards either debit or credit to make a transaction for the past one year. The usage of debit or credit cards for the transaction is what makes business performance improve. These are not the only variables underpayment solution as already stated. Other indicators for payment solutions are the percentage of those who reported making transactions using their mobile phones, and the percentage of respondents who reported to use their account to make payments through their banks or other financial institutions. The use of a mobile phone to make a transaction is included as it can be done at one's convenient time. Nevertheless, payment through an account at the bank or any financial institution is much secured and many clients gain confidence if payment is done through the bank. This is due to more information displayed for the parties involved in the transaction. Therefore, payment through an account at the bank or other financial institution ought to improve business performance.

Trade Logistics and Trade Facilitation

The logistic performance indexes (LPI) are obtained in this category. The study used a relatively large number of indicators from this category as compared to other categories. The main model variables, namely competence score, international shipment score, timeliness score, and trace and tracking score are all from this category. The shipment score focuses on the easy of arranging competitively priced shipments, rated from "very difficult" (1) and "very easy" (5). The competence score targets on the competence and quality

of logistics services and are rated from "very low" (1) to "very high" (5). Rated the same way as competence score is the ability to trace and track consignments. The performance score, on the other hand, focuses on the frequency with which shipments reach consignees within scheduled or expected delivery time, rated from "hardly ever" (1) to "nearly always" (5). Other indicators from this category used in technical efficiency and idiosyncratic error term estimation. The percentage of the population with mail delivered at home seems to simplify logistics for the easy delivery of goods. The inclusion of the percentage of income linked to parcels and logistic services in the analysis is important as it assures the market for businesses. The postal reliability index has also been included in the analysis since the reliable postal address ensures client access to the ordered products. Nevertheless, the study included the percentage of the population without postal services with expectations that a large percentage of the population without postal services hampers logistic performance. This is the percentage of population leaving in regions in which there are no postal services. The last but not least indicator of the logistic performance index included in the analysis is the average number of days to clear exports. A high performing business clears exports in a very short time possible. Therefore, this indicator is as important in the analysis as other variables in this category. The last but not least variable extracted from this category for analytical purposes, in this study, is the average time to clear exports through customs in terms of days. This is just the average number of days to clear exports through customs. If enterprises are more efficient, then it is expected that a few days will be needed to clear exports. As a result, an inverse relationship between efficiency and export clearance days is expected.

E-Commerce Skills Development

The third component of WITS that provided data for the study is E-commerce skills development. Under this section, there are two subsections providing data from two different sources. The network readiness index subsection comes from the World Economic Forum and the Enterprise survey from the World Bank. From the network readiness index, three indicators of E-commerce skills development, namely business to business ICT use, business to client internet uses, and firms' technology absorption have been used. From the enterprise survey of the World Bank, the study used the percentage of firms using emails to interact with clients or suppliers. As has been the case in the previous portion of this section, these variables are worthy of describing. The business to business ICT use question intended to uncover the extent to which businesses within an economy use ICTs for a transaction with other businesses. The response rates for the business to business ICT use question are from "not at all" (1) to "to a great extent" (7). This variable is taken in this analysis because the aim is to uncover the effect of ICT utilization on business performance. Therefore, it is expected that higher business to the business transaction through ICT leads to innovation and efficiency thereby improving business performance. Nearly the same to the former variable is business to client internet use. This refers to the extent to which businesses use the internet

to sell goods and services to their customers. The response rates are, as for the former variable. The use of ICTs among businesses for selling goods and services to customers improves technical efficiency because customers give feedback on their level of satisfaction. Nevertheless, the use of the internet makes the business reach a large number of customers within a country and abroad. As a result, investment in ICT for production efficiency improvement for these businesses becomes more valuable. Lastly but not least is the extent to which firms adapt to new technology within a particular country. The ability to adopt new technology improves efficiency and therefore business performance. New products with high quality that meet customer desire result from adopting new technologies among businesses. This variable, like the second variable, has the same rate of response as the first variable in this category of WITS. As long as businesses use ICTs for a transaction with other businesses, it can be certain they get to learn new ways of operation from other businesses. Nevertheless, research as an engine of product innovation is well facilitated by ICT utilization. From the enterprise survey, the percentage of firms using email to interact with clients or suppliers has been used. This indicator is almost the same as the other communication-related variables. The use of email to interact with clients or suppliers helps to improve business performance as a result of customers' feedback. As a result, its inclusion in the analysis is important in informing how ICT utilization improves business performance.

Model

The current study uses the frontier model (van den Broeck, Koop, Osiewalski, & Steel, 1994; Belotti, Daidone, Ilardi, & Atella, 2013; Belotti, Daidone, Ilardi, & Atella, 2012) to capture the contribution of technical efficiency to business performance. Frontier models are well known econometric techniques for efficiency estimates (Greene, 2008) using macro as well as micro level data (Assaf & Josiassen, 2014). In production analysis, frontier models' application has been a practice for decades now (Aigner, Lovell, & Schmidt, 1977; Battese & Coelli, 1995; Löthgren, 1997; Griffin & Steel, 2007). The models are commonly used in farm (Bravo-Ureta et al., 2007) and firm (Kumbhakar, Parmeter, & Tsionas, 2013) production efficiency estimation. The model was proposed to account for the effect of technical inefficiency on production. That inefficiency reduces production to a level lower than potential output and raises production cost (Wang, 2008). This study does not deal with production but rather performance scores of businesses but rather uses the approach to uncover the effect of inefficiency on business performance. According to Wang, (2008), the producer is assumed to have a production function of the form.

$$\ln y_i = \ln y_i^* - u_i \quad (1)$$

Where

$$\ln y_i^* = f(x_i^*; \beta) + v_i \quad (2)$$

Equation (2) can be taken into equation (1) and simply be written in linear form as below.

$$y_i = \beta_0 + \sum_{j=1}^k \beta_j x_{ji} + v_i - su_i \quad (3)$$

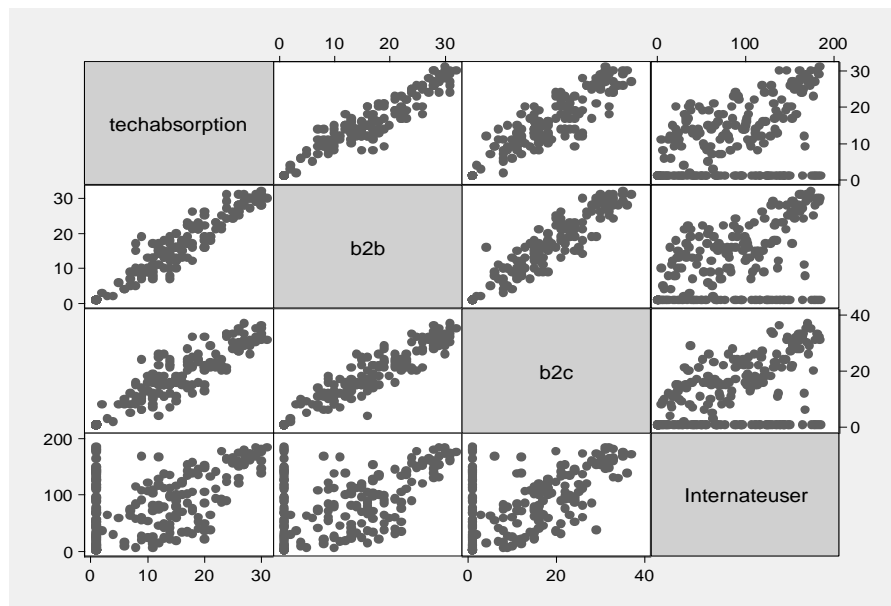
Equation (2) represents the potential output of a particular firm if production is on the production frontier in which producer is 100 percent technically efficient. But because of degrees of inefficiency, the output is reduced to a level lower than the frontier level. Thus, $s = 1$ for the production function and $s = -1$ for the cost function, implies that the inefficient coefficient u_i works to reduce output or increase the cost. As a result, the inefficiency makes firms perform below the frontier. The variable y_i represents the output of the firm. In this study, however, the focus is on competence, not output. But, the frontier model is adopted to bring in the issue of technical inefficiency. Because ICT utilization improves efficiency, then taking into consideration the effect of efficiency is important in highlighting the effect of information and communication technology utilization.

Findings

ICT Utilization and Technology Absorption

As highlighted in the introduction section of this article, businesses diffuse ICTs fast where there is high competition. Nevertheless, firms invest in ICT to be able to compete with leading firms. Non-leading firms, therefore, use ICT as a quick way of technology absorption so that they can be able to compete. Technology absorption, therefore, should be highly influenced by ICT utilization. From Figure 1 below, technology absorption, by firms, is highly influenced by the extent to which business uses the internet to communicate with other businesses. This creates an environment for business partnerships which makes it easier for the exchange of technology among businesses. That is why as businesses increase their level of internet usage for communication with other businesses, their level of technology absorption also increases. Countries with high levels of the business to business communication have higher levels of firms' technology absorptive capacity.

1 **Figure 1. Technology Absorption Influence of ICT Utilization**



2 Source: WITS, (2015)

3
4
5 Apart from business to business communication, the graph matrix shows
6 that business to client communication has almost the same influence on
7 technology absorption. The relationship is very strong and clear for every
8 country. Effective use of information and communication technology to
9 communicate with clients provides quick feedbacks to firms concerning
10 product quality. As they act to the clients' feedbacks, their products improve to
11 the standard expressed by the customers. Firms that are more close to their
12 clients improve their product quality at a very fast pace as compared to firms
13 that are not close to their clients. The latter do not have sufficient information
14 from their customers. As a result, they lag behind their internet users'
15 counterparts. This contends with Gërguri-Rashiti, Ramadani, Abazi-Alili,
16 Dana, & Ratten, (2017), where ICT use and the probability for firms to
17 innovate improves business performance. In this analysis, therefore, countries
18 with higher business to client communication have firms with higher
19 absorptive capacity compared to countries whose firms have a low business to
20 client communication. This is in line with what Azam, (2015) recommended
21 for the improvement of business performance among SMEs in Bangladesh.
22 Integration and ICT utilization degree significantly affect business
23 performance.

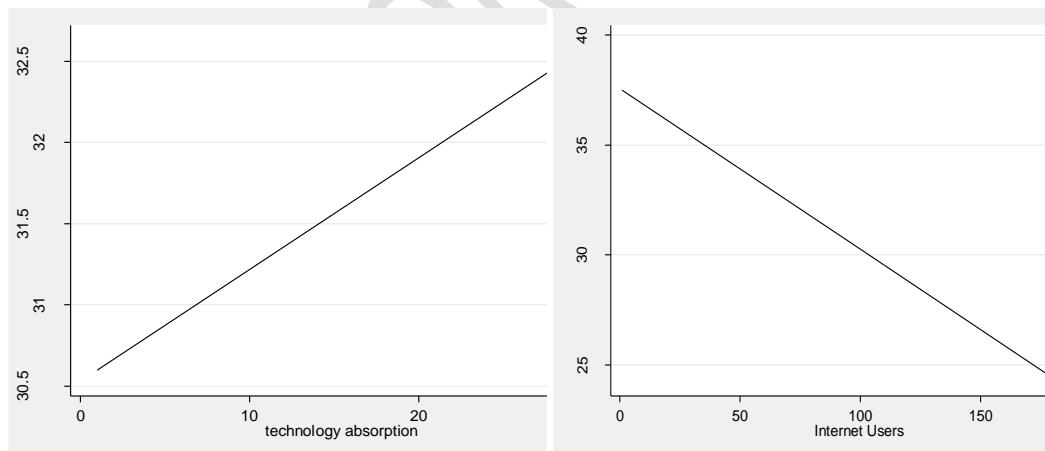
24 The number of internet users in a country is very important in influencing
25 the use of ICT among businesses. In the above figure, the number of internet
26 users has mixed results in technology absorption. Some countries have a very
27 low level of technology absorption even with a large number of internet users.
28 This is clearly illustrated in the graph matrix by a horizontal portion of the
29 scatter plot about internet users. However, many countries have shown a
30 positive effect of internet users on technology absorption. The number of
31 internet users is important but not sufficient in influencing the absorption of

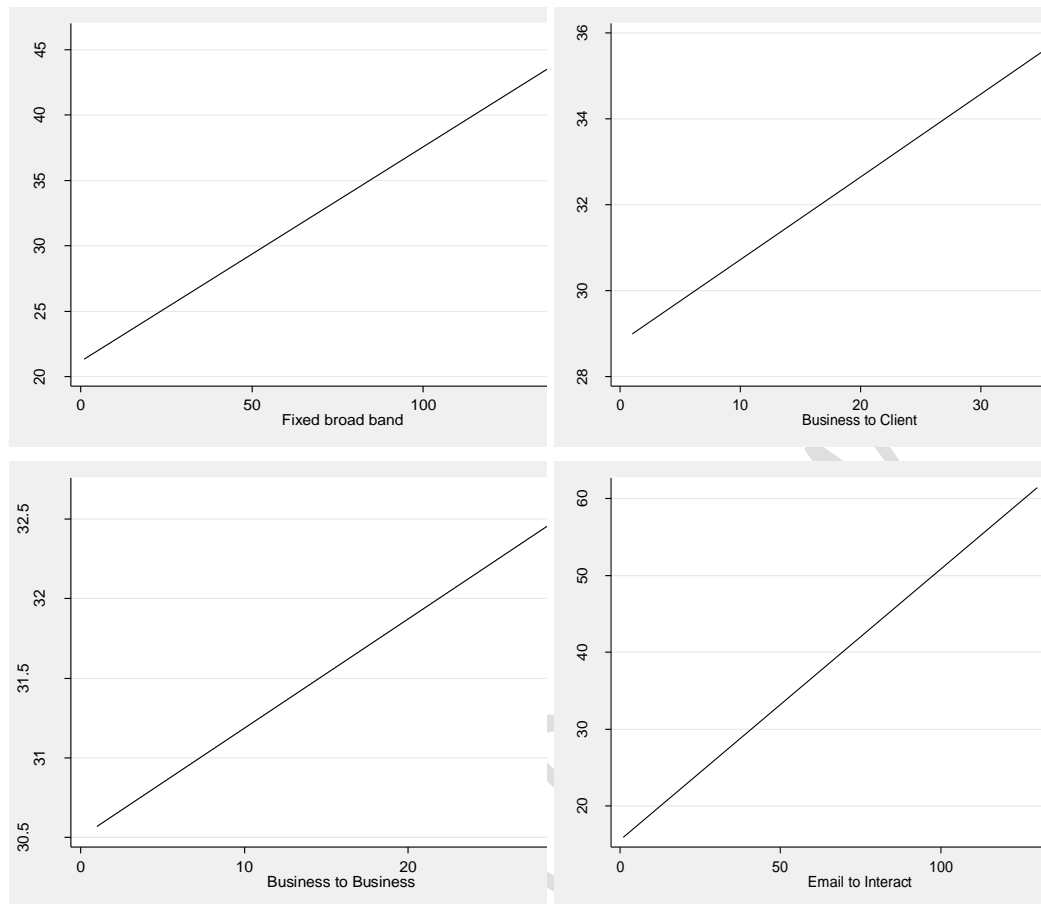
technology among firms. If the use of the internet is integrated into the business, more internet users enhance innovation through increased technology absorption capacity. The same effect is felt when internet users are related to the business to business communication, as well as business to client communication.

ICT Utilization and Export Clearance

To measure whether the use of ICT improves business performance, as acknowledged in many works including Yunis, Tarhini, & Kassar, (2018), this study uses the number of days to clear exports as one of the indications of international business performance. Since business performance includes, among others, how fast products reach customers, the number of days taken to clear exports in a particular country is an indication of how fast or slow goods and services cross borders. With the use of the internet, customers can order online from any country as long as the product meets the standards demanded by the client. The use of computers among businesses can reach clearance information at a faster rate than the use of papers. As compared to computer-based communication, paper-based communication can take days to reach intended departments. Figure 2 provides fitted values of export clearance days as a function of ICT indicator variables. The fitted plots provide a clear directional effect of ICT utilization on export clearance days.

Figure 2. *Fitted export clearance days as a function of ICT utilization indicators*



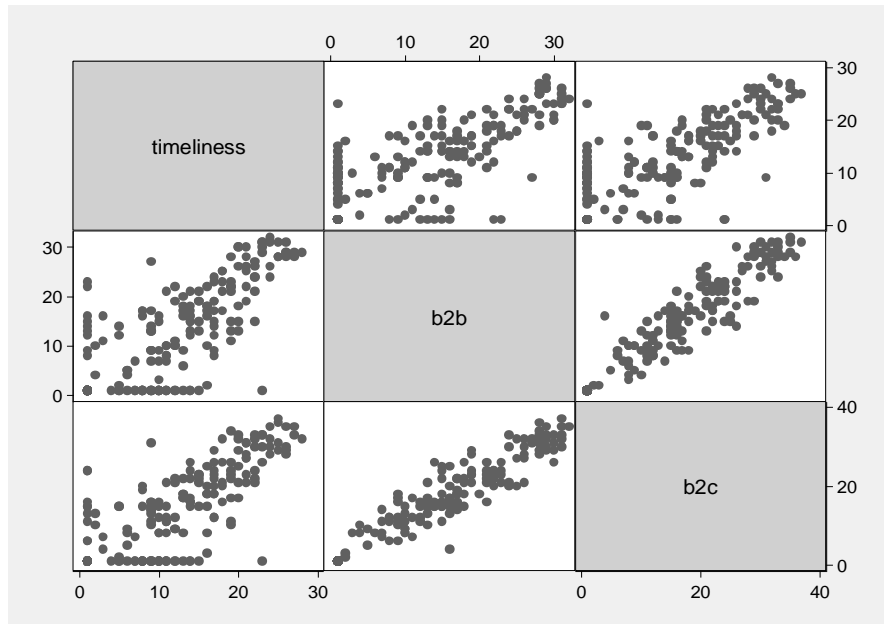


Source: WITS, (2015)

From Figure 2, it is only the number of internet users that seem to reduce the number of days to clear exports. All other variables seem to increase the number of export clearance days. This is contrary to what is anticipated because it is expected that as ICT utilization increases, businesses take a few days to clear export. Technology absorption is influenced by ICT variables like the use of emails for business to business interaction due to enhanced information flow. Due to diffusion lag, there are no instantaneous responses between ICT development and ICT investment by businesses.

Figure 3 shows how business to business interaction and business to client interaction influence timeliness. These ICT utilization factors positively influence timeliness. The frequency in which shipments reach consignments on time depends on the effectiveness of ICT utilization. The business to the business transaction through ICT reduces procedures and therefore has something to do with time management. Timeliness is positively affected by business to business communication as well as business to client communication. Their influence to timeliness from the plot matrix below is almost similar. It implies that business to business and business to client communication has a one to one relationship. As a result, each has the same influence on timeliness.

Figure 3. *The Effect of business to business with business to client interaction on timeliness*



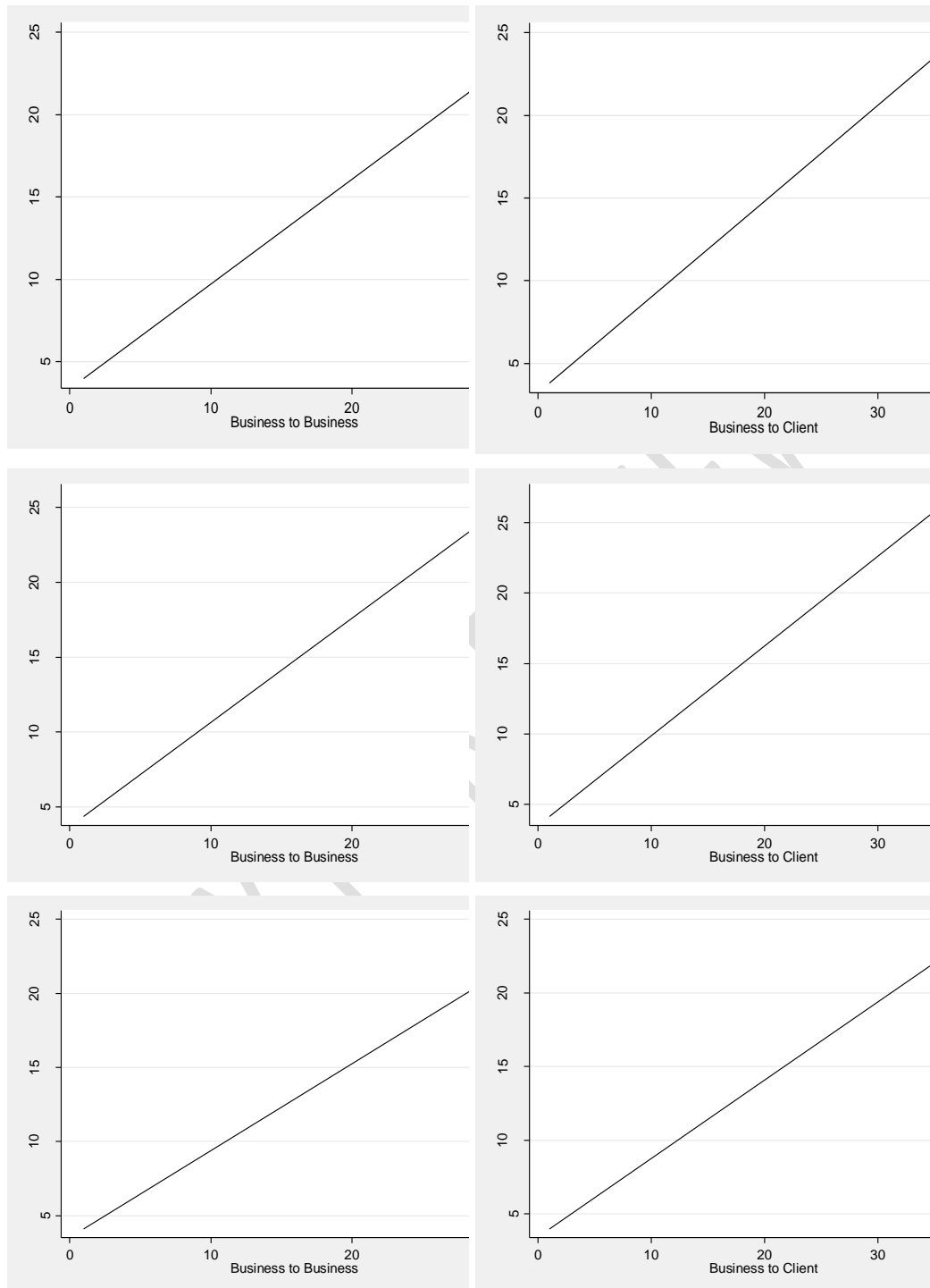
Source: WITS, (2015)

The business to business and business to client strong correlation makes their effect to other variables to be similar. A closer analysis can be made for the estimated plots in Figure 4 where the slopes of the two variables are almost similar in influencing competence, tracking and shipment. These are discussed in the following section.

ICT Utilization and Logistic Performance

This subsection highlights the effect of ICT utilization on logistic performance among businesses. The fitted logistic performance indicators with ICT utilization highlight their influence. From Figure 4, it is clear that ICT utilization improves business performance. Using ICT for transactions among businesses whether with other businesses or with normal clients improves logistic performance. The few indicators thus used in the graphical analysis above provide a clear picture that ICT investment among businesses is important in improving their performances.

1 **Figure 4. ICT transaction utilization and logistic performance**



2 Source: WITS, (2015)

3

4 International business improves with ICT utilization among businesses.
 5 Both scores for business competence, tracking, and shipment improve with
 6 business to the business transaction through ICT and business to client sales
 7 through emails. It can be concluded from the logistic performance perspective

that ICT utilization improves business performance. However, this analysis which is variable to a variable relationship does not give detailed information concerning the influence of ICT utilization on business performance. Factors other than business to business and business to client transactions through ICT play part in influencing logistic performance. The next section provides a regression analysis of the frontier model which includes the effect technical inefficiency has on business competence. The business competence score is a proxy variable for business performance.

Model Estimation

In the model that shows the effect of technical inefficiency on business competence, the variables of the main model, namely shipment, timeliness, and tracking are all statistically significant in influencing business competence. However, their influence is slightly lower, except for shipment, compared to when factors affecting technical inefficiency and idiosyncratic error term are included. The estimates in Table 1 for timeliness and tracking are slightly lower compared to those in Table 2. This implies that the variables used in the estimation of technical inefficiency and idiosyncratic error term are positively correlated with timeliness and tracking, while negatively correlated with the shipment. As a result, their exclusion from the model had a bias effect on the coefficient of shipment, timeliness, and tracking if it was the ordinary least square (OLS) estimator. Positive bias for shipment coefficient and negative bias for timeliness and tracking coefficients could have resulted in not including the technical inefficient and idiosyncratic error model estimations. But, since this is not an OLS estimator, the frontier model results of Table 1 are unbiased. The correlation concept, however, is important in showing how the ICT and non-ICT indicators, used in technical inefficiency and idiosyncratic error estimation, influence factors directly affecting competence.

The first model in Table 1 has been repeated 3 times to attain the desired results. The process has been repeated a few times due to less complication as few variables are included and technical inefficiency and idiosyncratic error are not included as models but rather as variables. Nevertheless, the nature of variables as seen in the graphical illustration makes the process of obtained desired results much simple. Therefore, for the variables at hand, the model estimation provided the desired results. For the second model in Table 2, however, the process was repeated more times to get the desired outcome. The process repeated 32 times which is quick a large number of repetitions compared to model 1. This is due to the complication of the model. The number of variables included in estimation is large and the models estimated increased from one to three models. The main model, technical inefficiency, and idiosyncratic error models have been considered in Table 2. This complication necessitated the process to repeat more times to get the desired results.

The regression analysis results in Table 1 show the effect of technical inefficiency on business competence. Since the study analyzes the frontier

model from a production perspective, the positive coefficient of the technical inefficiency factor indicates increased incompetence due to inefficiency. There are factors also which makes firms vary in terms of competence. However, in this analysis, the idiosyncratic error is statistically insignificant in influencing performance among businesses. Even though, it is a common knowledge that differences among firms influence competence disparities. Several factors make firms differ from one another in terms of competence. In this analysis, several factors have been considered in influencing firms' competence differences. But, it is a few of them that entail a significant influence. Out of 17 variables, only 8 are statistically significant in influencing competence disparities among businesses. Even though, the insignificant variables are very important in the model for convergence reasons. Their removal renders the model's inability to attain concavity. As a result, these insignificant variables are as important as significant variables for convergence purposes.

Table 1. *Frontier Half Normal Model Estimates*

Variable	Coefficient
Shipment	.3902***(.0586)
Timeliness	.1496***(.0578)
Tracking	.4496***(.0530)
Constant	1.0383***(.2015)
/lnsig2v	.0937(.2231)
/lnsig2u	.9352***(.2985)
sigma_v	1.0480 (.1169)
sigma_u	1.5961(.2383)
sigma2	3.6459 (.6119)
lambda	1.5231 (.3315)
Log Likelihood	-384.43511
Wald chi2(3)	6729.49
Prob. > chi2	0.0000
Likelihood-ratio test of sigma_u=0	
chibar2(01)	6.02
Prob.>=chibar2	0.007
Number of Iteration	3

Source: WITS, (2015)

Note: ***, **, and * indicates significant at 1, 5, and 10 percent levels of significance. Standard errors are in parentheses.

For the technical inefficiency, only 4 out of 10 variables are statistically significant. But, as for the case of idiosyncratic error, the insignificant variables are as important as significant variables are. In the analysis, their inclusion is useful for convergence attainment. Some of the variables used to estimate the idiosyncratic error are included in the technical inefficiency estimation. The influence of transaction ICT factors included in the estimation of technical inefficiency is statistically insignificant. However, possession of debit cards significantly reduces technical inefficiency. Debit card possession, therefore, has an indirect positive influence on business performance in terms of competence score. But when it comes to business performance disparities,

1 debit card possession seems to have a positive influence. Debit card
2 possession, therefore, increases competence disparities among businesses.

3
4 **Table 2.** *Frontier Half Normal with Technical Inefficiency and Idiosyncratic*
5 *Error Models*

Variable	Competence	Idiosyncratic Error	Technical Inefficiency
tracking	.3474***(.0419)		
timeliness	.1789***(.0440)		
shipment	.4597***(.0294)		
Internet users		-.0096**(.0039)	.04275*(.0254)
Fixed broadband tariff		-.0023(.0029)	.1178**(.0570)
Fixed broadband subscription		-.0173***(.0036)	.0107(.0118)
Active broadband subscription		.0007(.0029)	.0144(.0247)
Cellular subscription		-.1558(.3787)	
Debit card		.0283***(.0046)	-.1779**(.0896)
Debit card payment		.0023(.0050)	
Credit card		.0179***(.0038)	-.0836(.0891)
Credit card payment		.0033(.0046)	
Mobile account		-.0046(.0092)	.2323**(.1038)
Account transaction		-.0110*(.0059)	-.0517(.0564)
Mail delivered home		.0080(.0068)	
Income linked to parcel		.0040(.0038)	
Postal reliability		.0079***(.0030)	
Without postal address		.0702***(.0155)	
Export clear		.0110**(.0047)	
Email to interact		.0014(.0041)	
Business to business			-.2558(.6003)
Business to client			.6159(.5207)
Constant	.0304(.0312)	-1.9957***(.5639)	-23.9972***(.83323)
Observations	218		
Log-likelihood	-320.62242		
Wald chi2(3)	18041.42		
Prob > chi2	0.0000		
Number of Iteration	32		

6 Source: WITS, (2015)

7

8 It is also surprising to find that having a mobile account leads to inefficiency.

1 The fact that mobile account can be used any time to make transaction should
 2 reduce inefficiency among businesses. But in this analysis, it is a different case.
 3 Customers are not confident in making online transactions for security reasons.
 4 Therefore, this factor must be accompanied by a legal framework concerning
 5 cybercrimes. Security is very important as far as the transaction is concerned.
 6 Security is as important for mobile account transactions as it is for the paper
 7 transaction at the bank. People cannot make a transaction if they are uncertain
 8 about their account information safety. Once account information is disclosed,
 9 an individual is no longer protected against theft. Therefore, an increase in the
 10 percentage of the population with a mobile account may increase technical
 11 inefficiency thereby reducing business performance because the increasing
 12 possession of mobile accounts is not reflected in the level of cyber-security.
 13 Nevertheless, possession of mobile account may be reflected in the domestic
 14 transaction increase instead of international transaction. Many people in
 15 Tanzania, for instance, hold the mobile account for domestic rather than an
 16 international transaction.

17 The use of an account in making transactions significantly reduces
 18 competence disparities among businesses. The fact that many business partners
 19 prefer to make a transaction through their account in banks makes it effective
 20 in improving competence. Bulk transactions are easily done through bank
 21 account transfer. This is much safer than holding cash in hands. As a result,
 22 businesses prosper if they are involved in the account transaction instead of a
 23 cash transaction. Account transaction increases customer satisfaction due to
 24 increased confidence level. For businesses which have established goodwill,
 25 customers are much confident when making transaction through a bank
 26 account. Transaction through bank account provides solid evidence concerning
 27 a particular transaction undertaken. It provides details of business and the
 28 product under consideration. So any fault on the part of the business is
 29 answerable since sufficient information is at the customer's hand after the
 30 transaction is made. Since businesses have long run targets of growing into
 31 mega businesses, every customer is carefully treated to attract other customers.
 32 Therefore, any business which has long run goals cannot deviate from
 33 improving customers' satisfaction target.

34 Other factors thought of affecting business competence are those of
 35 payment solutions. When people are allowed to make the transaction directly
 36 from their bank account without visiting their bank branches, they can make
 37 large and many transactions without having to carry cash in their pockets. In
 38 this regard, it is expected that as the percentage of those possessing credit cards
 39 increase, the business becomes more efficient in terms of timeliness. However,
 40 in this analysis, an increase in the percentage of the population with debit cards
 41 increases inefficiency among businesses thereby reducing firms' competence.
 42 A plausible explanation for this deviation is appealing. It is possible for the
 43 population with debit cards to increase while businesses are not ready in terms
 44 of infrastructure to cope with inter-bank or intra-bank transactions. As a result,
 45 as the percentage of the population with debit cards grows, the businesses are
 46 not active in responding to the changing technology. If businesses do not have

the necessary infrastructure for this sort of technology, any development among citizens leads to competence retardation. Alternatively, if a large percentage of the population with a debit card is less involved in using their debit card for a transaction, an increase in the percentage of the population with a debit card cannot be reflected in business competence. Therefore, to capture the effect of debit cards on business performance, it is important to include debit card usage instead of ownership in the analysis.

Conclusion

This study analyzed the effect of ICTs utilization on performance among businesses. The competence score was taken as a proxy for business performance being affected directly by shipment, timeliness, and tracking. These are the factors that directly affect business competence in the frontier model together with technical inefficiency as well as business disparities. The study went further to uncover those factors which influence technical inefficiency among businesses and those which influence their disparity. The findings show that technical inefficiency reduces business competence as expected. Some of the factors included in the technical inefficiency model influence technical inefficiency positively thereby reducing business competence, while others reduce technical inefficiency thereby improving business competence. Both ICT and non-ICT indicators have been used in the analysis and it can be concluded that ICT utilization has competence improvement effect among businesses. This study improves on previous studies concerning the business performance effect of ICT utilization as it uncovered the influence of technical inefficiency on business competence. Investment in ICT is therefore very important in influencing business performance especially in countries where the level of ICT utilization is relatively high. However, the current study is limited in that it used cross-section data across 218 countries. A lot of information is left out with this kind of data since country-specific business performance could be uncovered with panel type of data. Nonetheless, firm-specific analysis of ICT utilization is appealing especially in developing countries where studies are scarce. Future studies, therefore, should either focus in particular countries analyzing business performance influence of ICT utilization within a country, or use panel data to be able to uncover how businesses have improved due to ICTs utilization.

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