



An Assessment of the Impact of Digital Technology (DT) on Small and Medium Enterprises (SMEs): A Case Study of Some Selected SMEs in Lagos State, Nigeria

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ABSTRACT

This research examines the impact of Digital Technology on Small and Medium Enterprises (SME) activities (in terms of profits and business expansion). The selected sample was 320 SMEs which included 150 SMEs that adopted Digital Technology in their business activities and 170 SMEs that did not adopt Digital Technology in their business but were in the same business field as those that adopted DT. Questionnaires are used to obtain information from these SMEs. Data were analyzed using descriptive statistics (frequency and percentage) and econometric analysis [Propensity Score Matching (PSM)]. The results obtained from the PSM analysis show that the implementation of DT has helped business expansion in the study area among SMEs that adopted DT compared to SMEs that did not adopt DT. However, the implementation of DT has not had a significant impact on the profits of SMEs in the study area compared to non-participating SMEs in DT. Therefore, it is suggested that the adoption of DT is highly recommended among SMEs as this tends to increase business expansion. On the other hand, so that the impact of DT can be felt on entrepreneurs' profits, the costs of implementing DT must be reduced through assistance in the form of grants, subsidies, tax exemptions, tax holidays, and free consultation services in the field. DT areas and loans at lower interest rates should be provided by authorities and stakeholders to encourage SMEs to adopt digital technologies in their businesses.

INTRODUCTION

Entrepreneurial activities have helped in business expansion, income generation, employment generation, and innovation of new ideals which often lead to new businesses and products, Technological development has been on stage since the time of the Industrial Revolution and this has been trending especially in most developed nations. In recent times, the increased rate of acceptance of technology in businesses in developing countries is however due to the Covid-19 pandemic which almost renders businesses, the economy, and other social activities to a halt. However, the need for continuation in businesses because of the social distancing rule that was imposed by many countries necessitated and also helped in the speedy and more adoption of digital technology. According to the Organization for Economic Cooperation, it is evident that the advancement of technology contributes significantly to economic growth and development, and the creation of technical entrepreneurship has resulted in the emergence of small and medium-sized businesses (Dahlstrand, 2007).

Nowadays digitalization has come to virtually every business landscape to the extent that it is rare to identify a business that cannot be digitalized. Given this, for enterprises not to be left out in the digital world, especially in this fourth industrial revolution age, and in line with the Sustainable Development Goals (SDGs), the application of digitalization in business activities is important.

Technology has helped in business development in the areas of expansion, income creation, employment, and new products among others. Recently, the post-COVID-19 era has seen the emergency of business development in the area of technology and this has also supported Goal 8 of the SDGs. However, most business activities in the developing world are not digitalized, as studies have observed that the application of digital technology in SME businesses has played a significant role in developed nations compared to developing nations (Niebel 2018; Rabayu, & Day 2017) This insignificant impact was as a result of the challenges faced by SMEs in developing countries compared to the developed countries according to the authors.

One of the advantages of digital entrepreneurship is that it can help in locating customers even before the start of business unlike conventional entrepreneurship (Acs et al., 2016). The authors observed that the identification of customers would help in the area of expansion, and continuity and prevent unsold goods, as a lack of readymade customers may lead to the failure of entrepreneurs.

Given their capacity to generate wealth, increase wages, and expand employment possibilities across a variety of industries, small and medium-sized businesses are thought to have the potential to drive economic growth (Naghizadeh, Allahy & Ranga, 2020). Importantly, compared to other businesses, innovative enterprises are more likely to develop and can also perform better through digital technology (Phan, Mian, & Lamine 2016).

It is also observed that the production, marketing, and distribution of goods and services by businesses are changing as a result of digital

technologies, which also raises living standards and the economy, given this, more chances are becoming available for business owners to take advantage of digital technology (Nambisan 2017; Zahra & Nambisan 2011).

However, the role of digital technology in the ecosystem is scanty, and still inadequate study done on how digital technology affects the ecology (Song 2019). Also, in contrast to the developed world, SMEs in developing nations have experienced slow and low adoption of digital devices (Zafar & Mustafa, 2017; Okundaye et al., 2019). The nature of this problem is becoming more and more difficult for SMEs and calls for further research (Tob-Ogu et al., 2018).

Eze and Chinedu-Eze, (2018) noted that micro businesses in Nigeria are expanding quickly, as they account for 99 percent of all micro, small, and medium-sized enterprises, and make up the majority of the country's output. However, SMEs unlike MEs have not been growing as expected though reports and studies have identified capital and ease of doing business among others as some of the challenges facing this sub-sector. This study assesses the impact of digital technology on SMEs as observed by the wide gap between MEs and SMEs in Nigeria based on the SMEDAN-NBS reports of, 2010, 2013, 2017, and 2021 This assessment is important as it will help to unleash the impact of technology on this subsector so that appropriate recommendation can be given to prevent the extinction of the SMEs in Nigeria. This study aims to bridge the gap by developing an integrated framework that will guide future studies on DT adoption in SMEs and help to improve the adoption rate of DT among SMEs.

Furthermore, Shettima and Sherma (2019) identified that the wave of digitalization in business is not short-lived but the beginning of a new way of doing business. However, the authors observed that despite the high prospect for growth of SMEs in Nigeria, they are being affected negatively by inadequate training in terms of technology, poor application of digital technology, and insecurity in the use of digital technology. The authors also explained that the digitalization of a business is not about bringing in new business but changing the current business in a new way to take advantage of the market.

In addition, despite the importance of digital technology, research on the effects of digital technology on entrepreneurship is limited (Elia et al. 2020), and there is little empirical evidence to back up the claim that such technology aids in enhancing entrepreneurship development in certain nations or regions. As observed by Shettima and Sharma (2019) in their studies in Nigeria the impact of technology on businesses is inadequately explored, therefore, the Nigeria situation warrants the encouragement of technology as this will help SMEs in the area of expansion, competitiveness, and sales and also for proactive recommendations to be given to appropriate authorities. Therefore, for SMEs to thrive in the new business economy the adoption of technology in business is sacrosanct (Rahayu and Day, 2017).

As the wave of COVID-19 is fading away, the cashless economy is being introduced and coupled with the fact that proactive steps need to be taken by stakeholders for SMEs not to go into extinction as evidenced by the wide gaps between MEs and SMEs in the surveys by SMEDAN-NBS as previously

mentioned. In developing countries like Nigeria, the incorporation of SMEs into digital technology is a welcome idea because of the need to have resilience during crisis periods like the covid 19 pandemic, the need for expansion, and the high cost of doing business. Also, the a need to reduce the diversion of SMEs to MEs to prevent the extinction of SMEs so that economic growth and development can be achieved, as it is expected that for growth and development to be enhanced, MEs need to grow into SMEs and SMEs also need to grow into large enterprises (LEs).

Similarly, in Nigeria, empirical findings on the impact of digitalization on small business holders are scarce in the literature. This study assesses the impact of the application of technology among SMEs in terms of their profits and business expansion to be able to determine if the adoption of DT among SMEs is worth venturing into or not. The first part of this paper presents the introduction, the literature review is presented in the second part. The methodology used by the study is presented in the third part of the study. The fourth part presents the analysis, conclusion, and recommendation made in the last section of the paper.

LITERATURE REVIEW

Impact of Digital Technology

Digitalization of business can help to reduce costs, and environmental pollution, and enhance inclusive participation of users (Gregori and Holzmann 2020; Lichtenthaler 2021). Some negative effects of digitalization have been identified by studies, for instance, digitalization promotes disruption in organizations (Wirts et al. 2022) and creates and enforces disruption in industry and society (Astrom et al., 2022). However, DT has enabled customers to play an active role through dialogue with the organization and stakeholders (Yeow et al., 2017) It therefore bridges the gap between the firm/its supply chain and the customers through digital connection (Gray et al. 2013). Furthermore, effectiveness in a profitable manner can be enhanced through DT (Chan et al., 2022). With digitalization, business can alter their strategies of doing business and routines (Alzamara et al. 2021) Astrom et al., 2022, Yeow et al., 2017, Gray et al. 2013, Chan et al., 2022.

In addition, Kabbogo and Okpara (2014) emphasized the potential impact of ICT in enhancing the competitiveness and growth of agribusiness. Social media enhances visibility for SMEs in terms of market and interaction with customers (Jones et al. 2015). Duffett (2017) also observed that social media usage among youth in Africa has enhanced the increase in e-commerce usage and marketing via social media. DT has also been found to help improve the supply chain (DeGroote & Max, 2013; Kim 2017).

METHODOLOGY

Study Area

The study is conducted in the commercial and business hub of the country - Lagos State. The state is located in Nigeria and has the highest number of MSMEs based on the SMEDAN- NBS survey in 2021.

Sampling Procedures

Two lists of SMEs were generated by the researcher in the study area: the first list is the list of SMEs that have adopted DT and the other list is for SMEs with no DT adoption. A total sample of 290 SMEs was selected systematically from the lists generated and this comprises SMEs that have adopted DT (150) and those that did not adopt DT (170). From this list, every 4th SME was systematically selected as a sample.

Model Specification

The models for estimating the impact of DT adoption on SMEs in its functional form are as:

Model 1:	$PR_m = (DC, SEC, DT)$	1
Model 2:	$BE = (DC, SEC, DTA)$	2

In econometric form, the models are stated as:

$PR_m = b_0 + b_1DC + b_2SEC, + b_3 DTA + E$	3
$BE = b_0 + b_1DC + b_2SEC, + b_3 DTA + E$	4

Where:

- PR_m = Monthly Profit of the SME
- BE= Number of business outlets
- B₀- b₄ = are Parameters to be estimated
- DC= Demographic characteristics of the SMEs
- SEC= Socio-economic characteristics of the SMEs
- DTA= Digital technology adoption by the SMEs (adoption-1, otherwise)
- Be= F (Demographic characteristics, social variables, and economic variables), monthly profit after sales, number of business outlets after the adoption of DT)

To assess the impact of DT adoption on SMEs in the study area, the profit and business expansion of SMEs in the study area were examined. Profit was measured by the monthly profit earned after all expenses had been deducted from income that accrued from the business at the end of the month. The number of outlets/branches was used to measure the business expansion of SMEs.

RESULTS AND DISCUSSION

Descriptive statistics was conducted through frequencies and percentages while the econometric analysis was carried out with Propensity Score Matching (PSM).

Descriptive Statistics

From Table, the descriptive statistics for the effect of DT on SMEs indicate that from the total sample of 320, a total of 150 and 46.88% represent the frequency and percentage respectively for the treated group while a total of 170 and 53.12% represent the frequency and percentage respectively for the control group.

As depicted from the table, the majority of the SMEs for both the treated and control groups were in their active age and this is shown by the frequency of 100 (68+32) and percentage of 66.66% (45.33% + 21.33%) for the treated group. The frequency and percentage for the control group stood at 104 (73+31) and 61.18% (42.94% + 18.24%) respectively. The frequency of 21(12+9) and percentage of 14% (8%+ 6%) represent those that are not in their active age for the treatment group. Similarly, for the control group, a frequency of 32 (20+ 12) and a percentage of 18.82% (11.76% + 07.06%) represent those that are in their inactive age. This indicates that the majority of SMEs for both the treatment group and control group fall within the age group of 26 to 45 years (active years) while few of the respondents are in their inactive age of 46-66 years.

Furthermore, in terms of gender for the two groups, we have more males than females as shown in Table 84 (56%) as frequency and percentage for the treatment group and 102 (60%) as frequency and percentage for the control group for male, while the frequency and percentage for female stood at 66 (44%) for the treated group and 68 (40%) for the control group. More of the respondents are married for both the treatment group and control group as shown by the frequency and percentage of 96 (64%) and 124 (72.94%) for the treated group and control group respectively. While those who are singles stood at 54 (36%) as frequency and percentage respectively for the treatment group and 46 (27.06%) as frequency and percentage respectively for the control group.

In the area of education, the majority of the respondents are educated for both the treated group and control group and their educational qualifications are in the range of primary to Degree/HND level of education. Over 80% of SMEs are literate in both the treated group and the control group with more of the respondents in both treated group and control group having OND/NCE level of education. The frequency and percentage of those not educated are just 17 (11.34%) for the treated group and 29 (17.05%) for the control group.

The majority of SME business experience falls within the range of 6-10 years as depicted by the frequency and percentage of 60 (40%) and 76 (44.71%) respectively for the treated group and the control group. However, those SMEs with over 20 years of experience have the least frequency and percentage for the treated and control groups as represented by 0.7 (04.67%) and 0.5 (02.93%) respectively as shown in Table 1.

Table 1. Descriptive Statistics

Variable	Total Samples: 320			
	Treated Group= 150		Control Group= 94	
	Freq.: 150	Per. - 46.88	Freq. (170)	per= 53.12%
<i>Age group:</i>				
<=25	29	19.33	34	20.00
26-35	68	45.33	73	42.94
36-45	32	21.33	31	18.24
46-55	12	08.00	20	11.76.
56-66	09	06.00	12	07.06

Gender:	84	56.00	102	60.00
Male	66	44.00	68	40.00
Female				
Marital Status:	54	36.00	46	27.06
Single	96	64.00	124	72.94
married				
Level of Education:				
<i>Literate-</i>				
Primary	12	08.00	19	11.18
Secondary	27	18.00	34	20.00
OND/NCE	62	41.33	58	34.12
Degree/HND	32	21.33	30	17.65
<i>Illiterate</i>	17.	11.34	29	17.05
No Years in Business				
< = 5 years	26	17.33	29	17.06
6-10 years	50	40.00	76	44.71
11-15 years	42	28.00	36	21.18
16-20 years	15	10.00	24	14.12
21-25 years	07.	04.67	05	02.93

Analysis- Propensity Score Matching (PSM)

The PSM analysis is carried out to determine the impact of Digital Technology adoption among SMEs in the study area. From the analysis, the region of common support also called the overlapping region is given by 1.12276526 and 0.96127451. At this point the characteristics of those that adopted digital technology matched with the characteristics of those that did not adopt digital technology. The balancing property is satisfied at point 3 which is the optimal number of blocks and here the mean propensity score for those who adopted digital technology is not different from those who did not adopt digital technology. Table 2 presents the indicator of matching quality. The Table shows that there are no pre-treatment differences between those who adopted DT and those who did not.

Table 2. Indicator of Matching Quality Before and After Matching

Sample	P- value	Mean bias	Mean bias Reduction
Unmatched	0.000	38.9	65.6
Matched	0.306	13.4	

The P value (Matched) in Table 2, Column 2 is not significant for the matched sample, this indicates the non-existence of pre-treatment difference between those SMEs that adopt DT and those that did not. Also, as suggested by Rosenbaum and Rubin (1985) the mean bias of the covariate X after the

matching was done lies below 20%. Also, the 65% indicates a substantial reduction in the mean bias as shown in Table 2 Colum 4. Shows that the self-selection into the program has been removed and the matching requirement fulfilled.

Since the number of observations in the control group is more than in the treatment group, the Kernel matching technique was used to match the characteristics of those SMEs that adopted DT with the characteristics of those that did not adopt DT. The Kernel matching possesses some advantage over other matching techniques (Ani, Chandler, koolwal & Samad, 2010) as the control observation is greater than the treated observation this enables us to match as many control observations with the treated observations and is based on the weight of the control observation indirectly related to the distance between the control and treated observation. After the matching was done, propensity score matching analysis was carried out with a focus on the Average Treatment effect on the Treated (ATT) among other estimators of the treatment effect [Average Treatment effect (ATE) and the Average treatment effect on the untreated (ATU)].

Table 3. Propensity Score Analysis- Average Treatment Effect on the Treated (ATT) - Kernel Matching

Outcome Variables	Matching Technique	Average Treatment Effect	Treated Control On Support Off Support		
Profit	Radius	0.1728	137	13	61
			09		
No of branches	Radius	0.1216***	137		13
			161	09	

From Table 3, it is observed that the adoption of DT has helped to expand the business activities of SMEs that adopted DT compared to those that did not adopt DT in the study area. The ATT result indicates that the adoption of DT by SMEs in the study area has helped to expand the business activities of those SMEs that adopt DT compared to those that did not adopt DT as given by figure 0.1216 which is highly significant in the 1% level. This result is in line with the findings of Kabongo and Okpara, (2014), however, the result of this study is not in line with the study of Haftu, 2019 and Donou-Adonson (2019).

The average treatment effect of the variable profit is not significant even at 1% though with the expected sign. This may be because the SMEs do not have enough experience in the use of DT, capital could hinder the business activities and also cost of operation especially internet services could lead to a high cost of doing business and thereby hinder profit.

CONCLUSIONS AND RECOMMENDATIONS

The results obtained from the PSM analysis indicate that the adoption of DT has helped in the expansion of business in the study area among those SMEs that adopted DT than those that did not adopt DT. However, the adoption of DT has not played a significant impact on the profit of SMEs in the study area compared to non-participant SMEs in DT. It is, therefore, recommended that DT adoption should be highly encouraged among SMEs as it tends to enhance business expansion. On the other hand, for the impact of DT to be felt on the profit of the entrepreneurs, the cost of adoption of DT should be reduced through assistance in the form of grants, subsidies, tax exemption, tax holidays, and loans at reduced interest rate should be provided by the authorities and stakeholders to encourage SMEs to adopt digital technology in their businesses.

FURTHER STUDY

This research still has limitations so further research on the topic still needs to be carried out "An Assessment of the Impact of Digital Technology (DT) on Small and Medium Enterprises (SMEs): A Case Study of Some Selected SMEs in Lagos State, Nigeria."

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