EFFECT OF TECHNOLOGY INTELLIGENCE ON PERFORMANCE OF SELECTED MANUFACTURING FIRMS IN FCT-ABUJA, NIGERIA

By

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Abstract

The fundamental aim of manufacturing firms adopting technology intelligence is to identify, evaluate and apply latest technologies to cover for the ever-changing technological challenges with the hope to improve the overall level of performance of their enterprises, yet the level performance of most of manufacturing firms in Nigeria is still low as majority of them struggle to get the latest technologies in place. The study examined the effect of technology intelligence on performance of selected manufacturing firms in FCT-Abuja, Nigeria. This study adopted a survey research design with population of 155 employees from 31 selected manufacturing firms in FCT-Abuja, Nigeria. The sample size used was same as population of the study and convenient sampling technique was used to select the respondents. The data collected for the study was analyzed using Partial Least Square Structural Equation Modeling in determining the measurement, structural models and hypotheses testing through SmartPLS 3.0 software. The study found that technology identification and technology evaluation have positive and significant effect on performance; while technology application have negative but insignificant effect on the performance of selected manufacturing firms in FCT-Abuja. Based on its findings, the study concludes that technology intelligence can influence the performance of manufacturing firms in FCT-Abuja, Nigeria. The study thus recommended among others, that manufacturing firms in FCT Abuja, Nigeria should improve on their technology application by way of ensuring that technologies are implemented effectively and integrated seamlessly into existing operations. This may require providing adequate training and support to employees, addressing any resistance to change, and actively monitoring and evaluating the outcomes of technology implementation.

Key words: Technology, Intelligence, Identification, Evaluation, Application, Performance.

Introduction

Globally, continuous improvement in overall performance is the major concern of every manufacturing firm because of the diverse competition in the industry. In developed nations like Japan, China, Germany and United State of America, manufacturing industry keep booming and contribute largely to their economy. In Africa particularly Nigeria with

abundant natural resources, it is expected that manufacturing sector should be the larger contributor to the economic growth, but the situation is different as performance of the majority manufacturing sector is poor and therefore contributing less to the economic growth. Performance is critical for every firm, as it enhances shareholder's value and capability to generate earnings from invested capital. Therefore, the performance of manufacturing firms has become a great concern to managers and all other stake holders as the business environment becomes more competitive and dynamic.

Firm's performance refers to the ways by which they achieve their organizational set goals. It is the ability of an organization to achieve the expected results and attain its set goals by effectively utilizing its available resources (Matin & Sabagh, 2015; Chang, & Chuang, 2016). This implies that for every firm to gain or attain high performance level, such firm must have capability to contend with the ever increasing competitive and dynamic business environment, and this can be achieved through technology intelligence.

Technological intelligence refers to exercises that provide basic and practical knowledge about technological patterns and realities (dangers and open doors) outside the association by collecting, investigating and disseminate relevant and applicable data, thereby supporting the direction and organization of processes related to technology issues. than business management (Ranjbar and Cho, 2016). According to Ranjbar and Cho (2016), technology intelligence includes a number of direct activities, such as discerning data needs, collecting, examining, disseminating, and applying important technology data in appropriate, which will ultimately encourage value creation for an association through a superior. dynamic interaction.

The fundamental aim of manufacturing firms adopting technology intelligence is to identify, acquire, evaluate and apply or implement latest technologies to cover for the ever-changing technological challenges with the hope to improve the overall level of performance of their enterprises, yet the level performance of most of manufacturing firms in Nigeria is still low as majority of them struggle to get the latest technologies in place. This gave raise to this study's mind set to investigate effectiveness of the moderating role of technology capability on the relationship between technology intelligence and performance of the selected manufacturing firms FCT Abuja, Nigeria.

In furtherance, while there have been a number of researches in this area (Kilic, et al. 2016; Manzini & Nasullaev, 2017; Ezuma et al., 2019; Mallinguh, et al., 2020) there appears to be paucity of empirical research studies on the moderating role of technology capability on the relationship between technology intelligence and performance of manufacturing firms in

developing nations like Nigeria. Hence, based on the above problem and identified gap, the objective of this study is to examine the moderating role of technology capability on the relationship between technology intelligence (proxy by technology identification, technology acquisition, technology evaluation and technology application) on the performance of selected manufacturing firms in FCT Abuja, Nigeria. In order to achieve the above objective, the study hypotheses as follows:

HO_1: technology identification has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria.

HO_2: technology evaluation has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria.

HO_3: technology application has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria.

Literature Review

Technology Intelligence

Technology intelligence is a set of activities that enable an organization to examine technological advances affecting its products, raw materials, cycles and markets, as well as examine the current state of its organization to take advantage of possible technological changes (danger or potential doors opening) (Arman & Foden, 2010). Essentially, Gonçalves and de Almeida (2019) described technology intelligence as exercises that support decision-making related to general technological and management concerns by leveraging the availability highly planned of relevant data about the reality and technological patterns (open doors and dangers) of the current state of the association through classification, examination and dispersion. Similarly, Asikhia et al. (2019) defined technology intelligence as information sensitive to firm about the development of external sciences and technology that can affect the company's competitive position. They further stated that adopting technology intelligence is nothing more than an informal technology monitoring and is also a structured process that involves four major steps: firstly, planning, organizing and conducting competitive intelligence efforts, secondly, intelligent information gathering, thirdly, analysis of data and lastly, dissemination of results for practical uses.

Technology intelligence permits firms to respond to threats from, as well as to identify and exploit opportunities resulting from technological and scientific changes. It is usually focused on technological trends and scientific breakthroughs and can develop information on opportunities as well as threats for the firm. Technology intelligence, support innovation

strategies as well as research and development, and has become a growth area that grants firms competitive edge (Santo & Correia, 2010). Other advantages of technology intelligence include better communication, easy access to information, social networking, efficiency and productivity, improved decision making and encourages innovation and (Majidfar & Salami, 2011).

According to Kilic, et al. (2016), technology intelligence (TI) encompasses the activities related to the collection, analysis and communication of relevant information on technological trends to support technological and more general decisions of the company. They see TI as the capture or acquisition and delivery of technological information as part of the process whereby a company develops an awareness of technology threats and opportunities. They further state that TI involves four processes namely, technology ignition/identification, technology acquisition, technology evaluation and technology application. The goal of technology intelligence is to exploit potential opportunities and to defend against potential threats, through prompt delivery of relevant information about technological trends in the environment of the company in order to stay competitive (Kilic, et al., 2016). This study therefore adopts the process of technology intelligence suggested by Kilic, et al. (2016).

Technology Identification

Technology identification consists of initiation of the needs of technology information compliant with the objectives of the organization. Identification can be done through the information from external and internal environment of the organization such as the customers, the experts in the organization or even with the evolution of the products and environment. Identification of the need is followed by the identification of the sources for the data to be watched (Kabiru et al., 2015). Tasks and data sources are relocated through the plans and work breakdown structures (Veugelers at al., 2010). Ranjbar and Cho (2016) propose a distinction between inside-out and outside-in viewpoints for assessing technological information needs. The first focuses on technology observation within the present activity area. The latter is a non-biased assessment of technology trends in general. In most situations, technology planning activities, such as technology road mapping and scenario analysis, include technological and market factors and are cross-functionally coordinated. New important challenges, such as upcoming technology or competitors, are found as a result of this process. Also mentioned are the primary drivers of industry

development and product functioning from the customer's perspective (Ranjbar & Cho, 2016).

Technology Evaluation

Technology evaluation, this has to do with the evaluation of information generated by extrapolative, explorative or normative ways (Karimi et al., 2011). Methods such as frequency analysis, publication citation and quantitative conference analyses are often taken into consideration. Other indices include, patent frequency analyses, S-curve analyses, benchmarking, portfolio analyses, roadmap analyses, experience curve analyses, Delphi studies, expert panels, flexible expert interviews, lead user analyses and quality function deployment etc. are used to evaluate technology required (Lichtenthaler, 2015). The objective of the information evaluation is to analyze the importance of the gathered information in order to arrive d at the needed technology. Filter, integration, and assessment of information are the three functions of evaluation. The purpose of the filter function is to limit the amount of information by determining its relevance to the firm and assessing its quality. The integration function is responsible for integrating information in the context of the firm, which necessitates the acquisition of relevant prior knowledge. The assessment function then determines the strategic significance of data for the company. At this point, information transforms into intelligence (Manzini & Nasullaev, 2017).

Technology Application

Technology application describes the analysis and implementation of technology intelligence. The analysis on the information should be put together in the reports in order to be included in the decision-making process (Pena, 2009). The key factors that will be considered in the relevance of the information will be; awareness, risk reduction, required developments, innovation and cooperation and fit with the organization objectives. Not only will the information treated individually, but also synergy between different areas of knowledge should be explored. A close look will be held to check signs and factors that can impact the organization (Ezuma et al., 2019).

Performance

There is no generally accepted definition and measurement for performance. Each definition comes from a specific perspective and is based on the context and features of a firm performance system (Yıldız et al. 2012). Kakhki and Palvia (2016) define performance as the

set of metrics used to quantify both the efficiency and effectiveness of actions. According to Ezuma et al. (2019), performance can be conceptualized as the level at which the firm effectively meets its planned objectives through efficient utilization of its fewest available resources, together with the development of its capacity to meet future opportunities and challenges to satisfy the stakeholder needs, as well as innovation of quality products. Performance is thus an important concern of organizations because it reflects the extent to which their mission, vision and goal statements are achieved (Ogunyomi & Bruning, 2015). The success of all enterprises whether small or medium or large enterprises can be seen through their performance. According to Samat, et al. (2019), enterprises perform can be defined by their capability to lead in creating employment, wealth creation business survival and sustainability.

Yıldız et al. (2012) identifies profitability, sale growth, market share, new product launch, return on sale (ROS), return on investment (ROI) and customer satisfaction as the most important quantitative criteria for firm performance. While, Kihara, et al. (2016) identify Total Profits, volume of sales, number of employees, geographical market size, returns from assets invested (ROA), returns from borrowed money (ROE), number of customers, size of organization, quality service/product and internal work processes as performance measurement.

Empirical Review

This season covered the reviews of relevant empirical literatures related to the objectives of this study. The reviews were presented based on the objectives and was arranged based on the arrangement of objectives as presented below:

Technology Identification and Performance

Waithaka, et al. (2016) examined technology oriented competitive intelligence practice proxy by technology identification and firms' performance in Nairobi, Kenya. The study adopted a mixed design of descriptive and explanatory survey research. The study used firms listed on the Nairobi Securities Exchange. The target population for the study was all the sixty firms listed on the Nairobi Securities Exchange (NSE). The study targeted the manager or director in-charge of planning /strategy in each firm as the unit for observation. The study used primary data which was collected by the use of a semi-structured questionnaire and secondary data was obtained from published financial reports. The data collected was analyzed using descriptive and inferential statistics tools such as correlation and regression

analysis. The study found that technology identification has a positive and statistically significant relationship with the performance in firms listed on the Nairobi Securities Exchange. The study failed to explain whether it's used the entire population as the sample size or failed to determine the sample size. In addition, the study used both primary and secondary data which is not appropriate for the data analysis and therefore limits the reliability of the findings from the study. Also, the study was done in Nairobi, Kenya and focused on the firms listed on the Nairobi Securities Exchange but failed to differentiate the type of the firm its concentrated on.

Technology Evaluation and Performance

Donat (2017) investigated the impact of technology intelligence on the business strategy performance relationship in building core competence in Uganda small medium enterprises (SME's). The study examined the moderating effect of technology intelligence on the relationship between business strategy and performance of SMEs in the Uganda's manufacturing sector. The study adopted qualitative method. The study relied on the previous researches. The study found that technology intelligence has significant impact on the business strategy performance. The findings of the study also indicated that the performance of SME vary with the choice of the business strategies they adopted that result to building core competences with regard to the competitive advantages. Additionally, to a certain degree, the findings of the study suggest technology intelligence as measured by technological complexity of process moderates the relationship between business strategy and the performance of SME's. The study only relied on the previous studies and did not conduct any statistical analysis, therefore limited the relevancy and the generalization of the findings.

Technology Application and Performance

Ezuma et al. (2019) examined whether network competence matters in the relationship between technology usage and organizational performance of medium-sized manufacturing enterprises in the state of Lagos, Nigeria. The study adopted survey research design. The population used in the study comprised of the total 619 registered medium-sized manufacturing enterprises in Lagos. The data for the study were based on the responses to structured questionnaires that were completed by 245 owners/managers of medium sized manufacturing enterprises in Lagos, Nigeria. Descriptive analysis (mean values, frequencies and percentages), and Structural Equation Modelling (SEM) using AMOS was employed for inferential statistics to analyzed the data gathered and test the hypothesis. The findings from

the study showed that the integration of network competence practices and technology intelligence usage did translate to improved organizational performance. Network competence served to promote a degree of trust within and outside interdependent firms. The findings of the study also indicated that network competence partially mediated the relationship between technology intelligence usage and organizational performance of medium-sized manufacturing enterprises. The study focused only on registered medium-sized manufacturing enterprises in the state of Lagos, Nigeria, as such the findings from the study cannot be generalized to other states in Nigeria.

Manzini and Nasullaev (2017) examined technology intelligence practice toward firms' performance, a systematic literature review of empirical studies and agenda for further research. The study presented a systematic literature review of empirical studies on Technology intelligence with an objective to identify main characteristics and trends of the literature on the implementation of Technology intelligence toward firm's performance. To achieve this objective the study reviewed 138 documents systematically (following a scientifically robust methodology) in terms of research methodology, research context and content. Citation network analysis was adopted to generate thematic clusters. The presented investigation provides (i) an overview of the methodologies used in literature and the types of empirical studies (case studies, surveys, evolution investigations, interviews, experiments, etc.) as well as the related diffusion; (ii) a summary of the research content (topics, thematic areas) in the practice of Technology intelligence; (iii) a picture of the various contexts and levels in which the practice of Technology intelligence has been studied (industries, sectors, technologies, countries). The study found that knowledge on implementation process of TI toward firm's performance is still yet to rich it's potential. The study relied only on empirical studies and did not conduct any statistical analysis, therefore there is a huge demand for contributions which will aims to conduct empirical studies on TI and use statistical tools for data analysis.

Theoretical Framework

The underpinning theory for this study is dynamic capabilities theory which was propounded by Teece et al. (1997). The ability of a company to integrate, build, and reconfigure internal and external capabilities in response to a quickly changing environment is known as dynamic capability. Dynamic capabilities develop from the firm's assets, evolutionary path, and managerial routines (Teece et al. 1997; Barney, 2001; Zello & Winter 2002). Dynamic capability consists of organizational and managerial processes with three roles: coordination

/integration; learning; and reconfiguration (Teece et al., 1997). In this perspective, the ability of a company to identify, acquire, evaluate and apply or implement the appropriate technology intelligence will aid the company to be up-to-day technological therefore serve as a competitive advantage for such firm within the industry.

Research Methodology

This study examined effect technology intelligence (proxy by technology identification, technology evaluation and technology application) on the performance of selected manufacturing firms in FCT Abuja, Nigeria. This study adopted a survey research design. According to Olawale (2022), there are 95 registered Manufacturing Companies in Abuja as at January 20, 2022. However, this study covered only 31 registered Manufacturing Companies in Abuja and randomly selected 5 senior staff of each firm. Therefore, the population of this study comprised of 155 staff from the selected firms. The justification for choosing this location was based on the fact that FCT-Abuja being the Capital of Nigeria attracts concentration of manufacturing firms. Also, the justification for choosing senior staff was based on the fact that they are in best position to respond to issues relating to the variables used in this study. Since the population for this study is not too large, the sample size used was same as the population and convenience sampling technique was used to select the respondents for the study.

The study utilized questionnaire as the instrument for data collection. The questionnaire was administered equally (155 divided by 31 is equal to 5), therefore, five (5) copies of questionnaire was administered to the 31 selected registered Manufacturing Companies in Abuja. The questionnaire was adapted from the work of Kilic, et al. (2016), Halac (2015), Kihara, et al. (2016). The independents variables are technology identification (5 items), technology evaluation (5 items) and technology application (5 items) adapted from the work of Kilic, et al. (2016). The dependent variable (performance) questionnaire was adapted from the work of Kihara, et al. (2016) with 8 items. The reliability of the instrument used was accessed using Cronbach alpha. Cronbach alpha value of greater than 0.7 is appropriate (Hair, et al., 2014). Out of one hundred and fifty-five (155) copies of questionnaire administered, ninety-seven (97) copies which constituted 62% of total questionnaire administered were valid for the analysis. The data was analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM) in determining the measurement, structural models and hypotheses testing through SmartPLS 3.0 software (Hair, et al., 2016). Validity and reliability of the measures were first of all ascertained before testing the hypothesized relationships using

algorism and bootstrapping techniques (Hair, et al., 2014). The model for the PLS-SEM is depicted pictorially below:

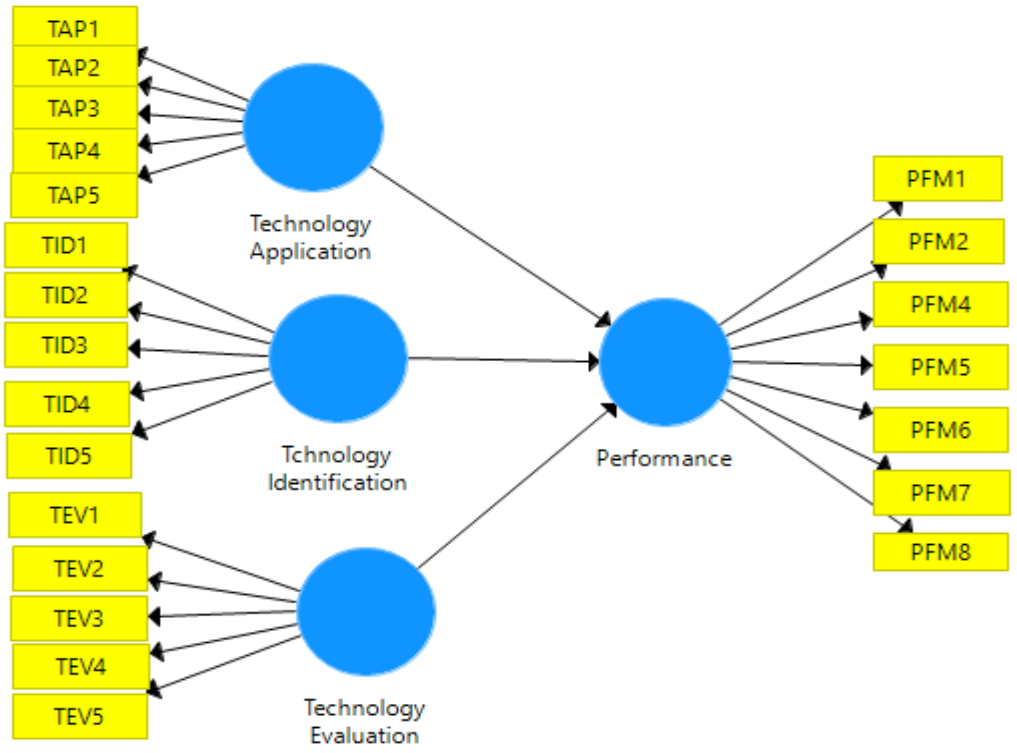

Fig. 1: Model Specification

Measurement of Variables

Performance (dependent variable), measure by increase in market shares, increase in annual profit, increase in sales, access to further markets, increase in experience workforce, meeting up with customers demand, timeliness and increase in output, is improvement on internal work processes and increase in number of customers, Adapted from Kihara, et al. (2016).

Technology intelligence (independent variable), proxy by identification, evaluation and application.

Technology identification was measured by Participating in technical societies, industrial platforms, Participating in technical seminars, conferences, fairs etc. Networking with young firms, Monitoring industrial and technology websites. Adapted from Kilic, et al. (2016).

Technology evaluation measurement items are: Patent analysis is held concerning technology need, Bibliometric analysis is held concerning technology, Technology trend analysis is held based on technology need, Roadmap analyses are held based on technology required, Benchmarking processes are held based on technology need. Adapted from Kilic, et al. (2016),

Technology application measurement items are: Technology are put to used base on recommendation from top management, used of the new technology are discussed on daily basis, use of the new technology is shared within whole organization, Technology is put to use only on required unit. Adapted from Kilic, et al. (2016),

Results and Discussion

Measurement Model Evaluation

The measurement model was evaluated using convergent validity. Convergent validity is determined by examining the factor loadings, composite reliability and average variance extracted (AVE) (Gholami, et al, 2013). The questionnaire items used in this study has achieved the acceptable factor loadings of above 0.6 except questionnaire item 3 for performance; as a result, the questionnaire item 3 for performance was deleted due to low factor loading. composite reliability (CR) of the variables used were all above 0.7, and average variance extracted (AVE) for all the variables were all above 0.5 as recommended by Hair et al. (2019). The above result is shown in the fig. 2 and the table 1 below.

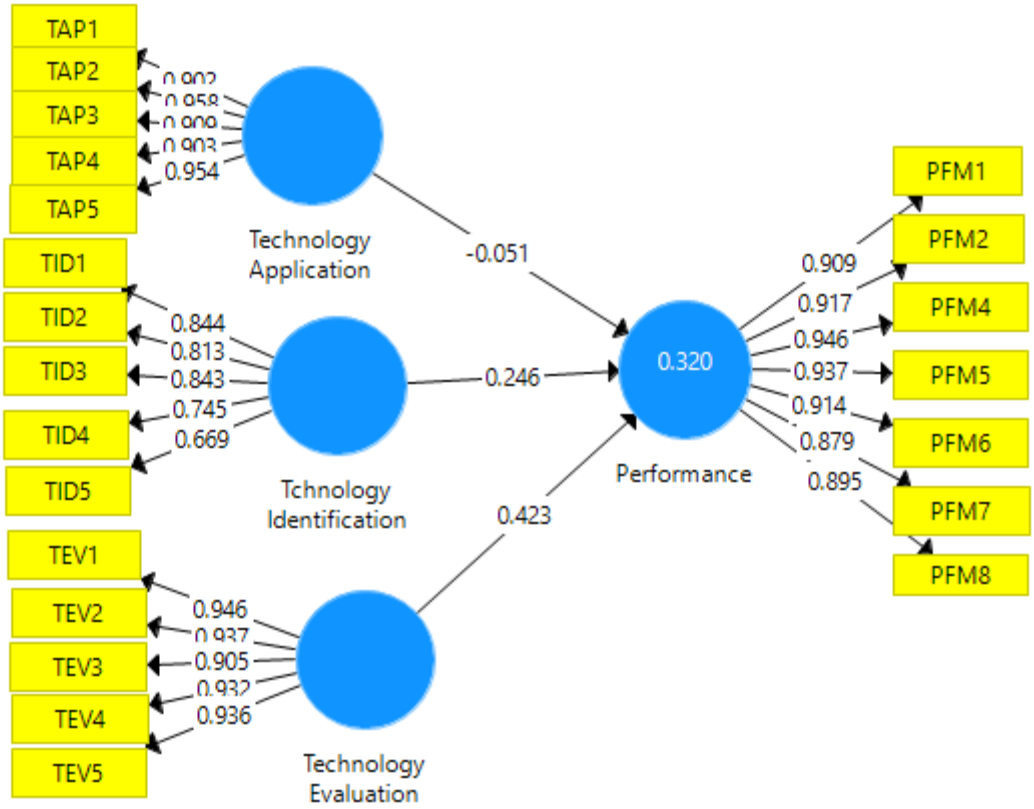

Fig. 2: Measurement model of the study constructs and indicators.

Table 1: Convergent Validity

Variables	Indicators	Loadings	Cronbach's alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Tchnology Identification	TID1	0.844	0.843	0.853	0.889	0.618
	TID2	0.813				
	TID3	0.843				
	TID4	0.745				
	TID5	0.669				
Technology Evaluation	TEV1	0.946	0.962	0.966	0.970	0.867
	TEV2	0.937				
	TEV3	0.905				
	TEV4	0.932				
	TEV5	0.936				
Technology Application	TAP1	0.902	0.959	0.983	0.968	0.856
	TAP2	0.958				
	TAP3	0.909				
	TAP4	0.903				
	TAP5	0.954				
Performance	PFM1	0.909	0.967	0.968	0.973	0.836
	PFM2	0.917				
	PFM4	0.946				
	PFM5	0.937				
	PFM6	0.914				
	PFM7	0.879				
	PFM8	0.895				

Source: SmartPLS Output, 2023

Table 2 Heterotrait-Monotrait Ratio (HTMT)

	Performance	Technology Identification	Technology Evaluation	Technology Application
Performance				
Technology Identification	0.384			
Technology Evaluation	0.137	0.135		
Technology Application	0.367	0.379	0.131	

Source: SmartPLS Output, 2023

The table above shows the results of Heterotrait-Monotrait (HTMT) ratio for the variables used in this study. From the table, the result in all the respective cases show that values in all respective cases are less than 0.9, this therefore indicated that there is absence of discriminate validity problems. That is, the result revealed that there is no problem of discriminate validity in all respective cases as suggested by Henseler, et al. (2015). Discriminate validity problems are present when HTMT values are high than 0.90 for structural models (Henseler, et al., 2015).

Table 3: Model Goodness of Fit (GoF)

	Saturated Model	Estimated Model
SRMR	0.060	0.060
d_ULS	2.412	2.412
d_G	15.767	15.767
Chi-Square	11,297.402	11,297.402
NFI	0.470	0.470

Source: SmartPLS Output, 2023

The table above shows the result of model goodness of fit. Sequel to the need to validate the PLS model, there is a need to assess the goodness of fit of the model as suggested Hair, et al., (2017). This study used the standardised root mean square residual's (SRMR). The choice of this index was based on the fact that the SRMR provides the absolute fit measure where a value of zero indicates a perfect fit. The study adopted Hu and Bentler (1998) suggestion that

a value of less than 0.08 represents a good fit while applying SRMR for model goodness of fit. This study result indicates an SRMR value of 0.060 which is less than 0.08, therefore indicated the fitness of the model as suggested by Hu and Bentler (1998).

Structural Model and Hypotheses Testing

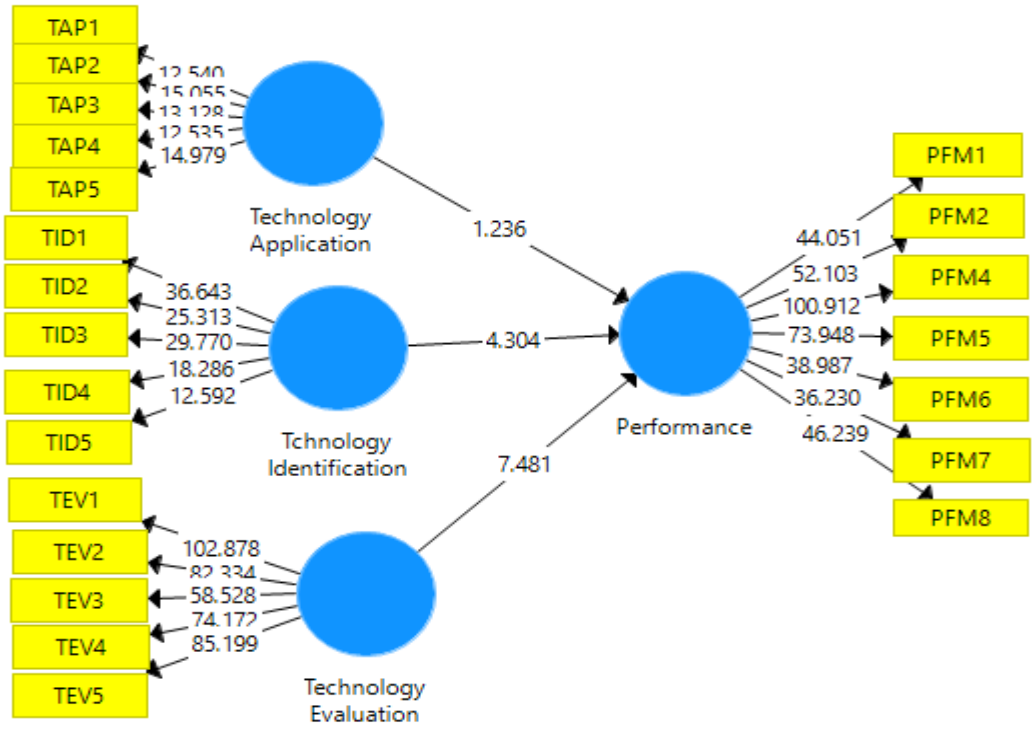

Fig. 4.2: Structural Model and Hypotheses Testing

Table 4: Results of the Structural Model Analysis (Hypotheses Testing)

Hypotheses	Relationship	Path Coefficient Beta (β)	Standard Error	T Statistics	P value	Decision
HO1	Technology Identification -> Performance	0.250	0.057	4.304	0.000	Rejected
HO2	Technology Evaluation -> Performance	0.417	0.056	7.481	0.000	Rejected
HO3	Technology Application -> Performance	-0.051	0.041	1.236	0.217	Accepted

Source: SmartPLS Output, 2023

The fig. 4.2 and Table 4 above depict the structural model and hypotheses testing for this study. The table 4 shows the values for Beta (β), standard Error, T statistics and P Value. The beta value and the corresponding t-values were used in assessing the structural model in this study. This was done through the bootstrapping procedure.

The bootstrapping output from the Smart PLS shows that path coefficient of technology identification and performance (Technology Identification -> Performance) is positive and statistically significant. The result from the analysis indicates that technology identification has positive and significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria at 5% significant level with a positive beta (β) value of 0.250 (25%), t-value of 4.304 which is greater than 1.96 and its corresponding p-value of 0.000 (β Value = 0.250, T-Value = 4.304 and P-Value = 0.000). This result has provided the basis for rejection of the null hypothesis (HO1) which states that technology identification has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria. This has proved that the relationship between the two variables (technology identification -> performance) is positive and significant at p <0.05 with a weak positive beta value and t value above 1.96. This result is shown in figure 4.2 and table 4 above. This finding is in line with the finding of Waithaka, et al. (2016) who examined technology oriented competitive intelligence practice proxy by technology identification and firms' performance in Nairobi, Kenya and found that technology identification has a positive and statistically significant relationship with the performance in firms listed on the Nairobi Securities Exchange.

The bootstrapping output from the Smart PLS shows that path coefficient of technology evaluation and performance (technology evaluation->performance) is positive and statistically significant. The result from the analysis indicates that technology evaluation has positive and significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria at 5% significant level with a weak and positive beta (β) value of 0.417 (42%), t-value of 7.481 which is greater than 1.96 and its corresponding p- value of 0.000 (β Value = 0.417, T-Value = 7.481 and P-Value = 0.000). This result has provided the basis for rejection of the null hypothesis (HO2) which states that technology evaluation has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria. This has proved that the relationship between the two variables (technology evaluation-> performance) is positive and significant at p <0.05 with a fairly positive beta value and t value above 1.96. This result is shown in figure 4.2 and table 4 above. This finding is in line with the finding of Donat (2017) who investigated the impact of technology intelligence on the business strategy

performance relationship in building core competence in Uganda small medium enterprises (SME's) and found that technology intelligence has significant impact on the business strategy performance.

The result of the test of the hypothesis in respect to technology application and performance (technology application -> performance), the bootstrapping result from the Smart PLS reveals that path coefficient of technology application has negative but insignificant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria at 5% significant level with a weak negative beta (β) value of -0.051 (5%), t-value of 1.236 which is less than 1.96 and its corresponding p-value of 0.217 (β Value = -0.051, T-Value = 1.236 and P-Value = 0.217). This result has not provided the basis for rejection of the null hypothesis (HO3) which states that technology application has no significant effect on performance of selected manufacturing firms in FCT Abuja, Nigeria therefore the HO3 is accepted. This has proved that the relationship between the two variables (technology application -> performance) is negative but insignificant at p <0.05 with a negative weak beta value and low t value below 1.96. This result is shown in figure 4.2 and table 4 above. This finding is in line with the finding of Ezuma et al. (2019) who examined whether network competence matters in the relationship between technology usage and organizational performance of medium-sized manufacturing enterprises in the state of Lagos, Nigeria and found that network competence partially mediated the relationship between technology intelligence usage and organizational performance of medium-sized manufacturing enterprises. The finding contradicts the finding of Manzini and Nasullaev (2017) examined technology intelligence practice toward firms' performance and found that knowledge on implementation process of TI toward firm's performance is still yet to rich it's potential.

Table 5: R Square Result

	R Square	R Square Adjusted
Performance	0.320	0.313

Source: SmartPLS Output, 2023

The table above explains the predictive relevance of the model, R^2 value from the table shows the variance in the dependent variable (performance) as explained by the independent variables (technology identification, technology evaluation and technology application). The result shows a low R^2 value of 0.320 (32%) accounted by the predictive variables on the criterion variable of the model. That is, the coefficient of determination (R^2) of 0.320

indicates that about 32% of variation in performance of selected manufacturing firms in FCT Abuja, Nigeria can be explained by the combined effects of technology identification, technology evaluation and technology application. While the remaining 68% variation in performance of selected manufacturing firms in FCT Abuja, Nigeria can be explained by other factors or variables not included or captured in this study.

Table 6: Collinearity Statistics (Variance Inflation Factor (VIF))

Variables	VIF
Technology Identification	1.347
Technology Evaluation	1.558
Technology Application	1.375

Source: SmartPLS Output, 2022

The Variance Inflation Factor (VIF) values of 1.347, 1.558 and 1.375 for all the respective cases from the table above indicated that the explanatory variables are not highly correlated. These therefore, show absence of multicollinearity among the independent variables since multicollinearity exists only when the VIF Value is greater than 5. The Variance Inflation Factor (VIF) was used to evaluate collinearity of the formative indicators. All the VIF values were less than 5 indicate the absence of critical collinearity issues among the indicators of formatively measured constructs (Hair, et al., 2019).

Conclusion and Recommendations

This study examined the effect of technology intelligence (proxy by technology identification, technology evaluation and technology application) on the performance of selected manufacturing firms in FCT Abuja, Nigeria. The study found that technology identification and technology evaluation have positive and significant effect on performance; while technology application has negative but insignificant effect on the performance of selected manufacturing firms in FCT Abuja, Nigeria. Based on its findings the study conclude that technology identification and technology evaluation positively and significantly influence the performance of manufacturing firms in FCT Abuja, Nigeria. While technology application negatively but insignificantly influences the performance of selected manufacturing firms in FCT Abuja, Nigeria. This could be because the selected manufacturing firms in FCT Abuja, Nigeria has the capability to initiate and evaluate the technology intelligence required but does not apply the technology intelligence to the fullest.

Based on the findings and conclusion drawn from this study, the study recommends that:

i. Manufacturing firms in FCT Abuja, Nigeria should prioritize and invest in robust mechanisms to identify relevant technologies. This could involve actively monitoring technological trends, engaging in research and development activities, and fostering collaborations with universities, research institutions, and industry associations.

ii. Manufacturing firms in FCT Abuja, Nigeria should develop effective evaluation frameworks. This includes assessing the potential impact of new technologies on their existing operations, evaluating the feasibility of implementation, and considering factors such as cost, scalability, and compatibility with existing systems. Regularly reviewing and updating technology evaluation processes can help firms make informed decisions about adopting new technologies.

iii. Manufacturing firms in FCT Abuja, Nigeria should improve on their technology application by way of ensuring that technologies are implemented effectively and integrated seamlessly into existing operations. This may require providing adequate training and support to employees, addressing any resistance to change, and actively monitoring and evaluating the outcomes of technology implementation.

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