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# EFFECTS OF PERCEIVED INFORMATION TECHNOLOGY OBJECT, PERCEIVED INFORMATION TECHNOLOGY KNOWLEDGE AND PERCEIVED INFORMATION TECHNOLOGY OPERATION ON EMPLOYEES PRODUCTIVITY

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**ABSTRACT:** *The study investigated the effects of information technology capability dimensions: IT objects (infrastructure), IT knowledge and IT operation on employee's productivity. The entire population (N=51) of the School of Business, FCET Gombe were considered for the study. The sample is deemed adequate going by the software used. SmartPLS version 3 was used for the analysis. The result from the analysis and hypotheses testing suggest that three IT dimension have positive effects on employee's productivity. The study offers some recommendation and propose avenues for future researches.*

KEYWORDS: information technology, object, perceived information technology knowledge, perceived information technology operation, employees, productivity

## INTRODUCTION

The emergence of computers and other information communication technologies (ICT) was considered perhaps among the biggest initiative that impacted on education institutions in the past decades. Information Technology (IT) is enormously contributing to the quality of educational institutions globally and it is one of the factors that is leading the dramatical changes taking place in the educational sector (Palladan & Abdulkadir, 2016). ICT adoption by organizations necessitate the condition for employees productivity and competency in the information age (Al-Gahtani, 2004). Advancements in information communication technology (ICT) tools have allowed employees specifically faculties to perform many functions related to their primary assignment that hitherto are performed manually. Therefore, improvements in the information technology and advancement of computer and computer softwares have facilitates the use of computerized and digitalized method for lectures and research purposes in tertiary institution in Nigeria. In this sense, use of ICT tools like computer systems has helped employees especially faculties working with tertiary institutions of learning to employ information technology more effectively.

Employees productivity in any organization is a critical issue. Through employee's productivity an organization can grow and achieve its objectives (Sabuttey, Nkuah & Awal, 2013). Unfortunately, productivity among employees in the Nigeria public tertiary institutions, is reported to be low (Akinyele, 2007). One of the factors attributed to this ugly development is lack of embracement and integration of information technology into their operation the operation of their faculties. It is an undisputable fact that productivity of employees in an organization depends upon the satisfaction level of its workforce and to a larger extend their capability to use IT facilities (Buchanan & McCalman, 2018). Hence, there has been a great interest in the assessment of variables related to



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employee's IT capability as they impact on productivity (Perry, 1997). Erastus (2013) argued that there are several factors that are tipped to have been influencing the productivity of employees in organizations. These factors comprise of managerial factors and employee's motivation, among others.

The impacts of information technology on productivity has been one of the significant issues discussed from the 1990s onwards. Many different theoretical and empirical studies have been conducted in developed and developing countries so far in this regard. Although most studies have emphasized the positive effects of IT on labour productivity, some results do not match what is expected and they have led to some inconsistencies about productivity (Rezaei, et al. 2014). For that reason, the present study attempted to provide a systematic framework about the way IT potentially affect productivity. The framework consists of IT capability that encompasses three dimensions i.e. object, knowledge and operation and how they individually relate to employee's productivity. Taking this systemic approach to this issue can pave the way for the assessment of IT capability variables, and productivity, and the interaction between these two variables.

**The Concept of Information Technology Capability**

Ross, Beath and Goodhew in 1996, promulgated the concept of IT capability. They defined IT capability as the organization's ability to bring together, assimilate and exploit IT based resources. Bharadwaj (2000) widened the description by proposing the most accepted view of IT capabilities. IT capability argued Bharadwaj (2000) is the organization ability to mobilize and deploy IT based resources combined with other resources and capabilities. Information technology-based resources comprise of technical and managerial IT skills, as well as intangible IT-enabled resources like knowledge, assets, customer orientation and synergy i.e. the sharing of resources and capabilities across organizational departments. Consequently, capabilities refer to the ability of organization or an individual to combine resources to promote superior performance and achieve competitive advantage (Amit & Schoemaker, 1993). The dimension measurement of the IT capability in this research is based on IT knowledge (skills) and IT operations as postulated by Tippins and Sohi (2003). These measurement concepts are defined as IT objects (infrastructure, IT knowledge and IT operation.

**IT Knowledge**

IT Knowledge is information combined with experience, context, interpretation, and reflection that an organisation possesses that is difficult to be measured (Davenport, De Long, & Beers, 1998). IT knowledge could be defined as the extent of which an employee obtains a body of technical knowledge about machineries, infrastructures or objects such as a computer-based system. On the other hand, technical knowledge is expressed as contextual based know how. IT knowledge is categorised as a subset of the more general conceptional set of knowledges. Moreover, and in line with this, employees can be motivated to adapt to the new IT, assimilate IT knowledge and apply it in their daily work, which are of beneficial to the enhancement of their performance (Shao, Feng, Hu & Liu, 2008). The Knowledge Based View (KBV), postulated that systems of knowing refers to the structures of interaction among team members for sharing their perspectives, gathering of knowledge, and development of collective understanding. It is suggested that system of knowing provides a forum for top management members to exchange their strategic IT and business knowledge ideas, and blend them together to promote higher levels of IT dissemination within the organization



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**IT Operations**
This refers to operations techniques, made up of activities that are carried out that facilitate the achievement a particular goal. Operations techniques are manifestation of technical knowledge and skills that are the outcome of results in technical operations or skills. In this context, IT operations are the degree to which an individual utilizes IT resources within his organization for teaching and research purposes. These activities supported by skills that summarize the knowledge within the institution.

**IT Objects**
IT objects are the 'enablers' and are largely responsible for the current increases in information and communication production and ploferation (Glazer, 1991). As a tool, technical objects refer to gadgets which assist in the 'obtaining, processing, storage, dissemination, and use' of information (Martin 1988). For this research, IT is conceptualized as the objects represented by computer-based hardware, software, buildings and support personnel.

**The Concept of Employees Productivity**
Employees productivity in any organization is a critical issue. Through employee's productivity an organization can grow and achieve its objectives (Quinn, 2018). Ammons (2018) defined productivity as the output and input ratio within a given time frame and with special attention to quality and the efficient use of resources. Kwiek, (2016) in his own part defines productivity as doing the right things the right way, getting more output within less input, getting more output with the same input, punctuality and promptness, elimination of wastes in all forms, justifying your pay, improvement in all aspects of life, producing more and more of better quality. The summary of all definitions of productivity is the balance between all factors of production that will give the greatest returns for the smallest efforts (Kariuki & Ochiri, 2017).

The common practice across the tertiary education sector is conceptualization of lecturers (faculty members) work to encompasses three main segments, viz research, teaching, and service (Eni-Olorunda & Adesokan, 2015; Gaus & Hall, 2016 ). Since staff personnel are the essential elements in all organizations, especially in the educational sector; effective management of these assets will no doubt has a great influence on their productivity (Certo, 2018; Ramdhani, Ramdhani & Ainissyifa, 2017). Productivity is a measure produced by input/output analysis. It can be expressed as the Naira value output per man-hour work. Measurement experts on work management agree that productivity could and can be measured (Ekienabor, 2016).

However, there is differing opinion amongst experts as how precise the productivity of the individual could be ascertained especially in such areas as the service industry like the school system (Benos & Karagiannis, 2016; Solaja, Idowu & James, 2016). Productivity can be measured at the national, organizational and individual levels. Technically speaking, when productivity is measured, we are actually measuring the efficiency of the organization or the individual in question (Dall'Ora, Ball, Recio-Saucedo & Griffiths, 2016). Given different industries as well as the fact that there are many interpretations of productivity, the different industries employ different yardsticks to measure productivity. It is generally accepted that productivity measure indicates a rate of growth in capabilities of respective companies and organizations to accomplish and indeed fulfil their mission goals and ensuring that consumers receive the goods and services in good condition, promptly and at affordable prices (Quinn, 2018).


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In the service industry, the relationship between output and input is complex hence it is not to be viewed in a simplistic manner. Arnold, Javorcik, Lipscomb and Mattoo (2015) submitted that experts opined that outcome resulting from the input/output calculations and the standards by which outcomes are measured are often ambiguous. In education industry, as a sector in the service industry, one preoccupation with productivity is to look at the main causes of low productivity with a view to promoting higher production. According to Nwachukwu (2012) and Ebere, Amarachukwu, Wirnkor and Ngozi, (2017) posited that the major causes of low productivity in Nigeria are economic, sociological, managerial and technological. Sociological Factors: Employees treasure a sense of belonging to their organization and would resent any effort on the part of management to perceive and treat them only as agents of production. Many Nigerian employees lack a sense of belonging to their organization and they behave as strangers (Oghene, 2016).

Based on the literature, information technology capability is a well-known factor that wields a momentous impact on several of organizational intangible resources. These include organizational learning (Asiyai, 2014), knowledge management (Intelligence, 2008), effective communication (Ahuja, Yang & Shankar, 2009; Hackler & Saxton, 2007), top management functions (Ghobakhloo, Hong, Sabouri & Zulkifli, 2012), productivity (Gurbaxani, Kraemer & Melville, 2004), absorptive capacity (Bryan, Sinkovics, & Kim, 2008), competitive advantage (Ringim, Razalli, & Hasnan, 2012), organizational innovation (Intelligence, 2008). Furthermore, information technology capability is positively related to strategic leaders functions e.g. decision making (Dimitris, Sakes & Vlachos, 2013), information processing (Raddy, Srinivasu, Rikkula & Rao, 2009), knowledge management (Kamal, 2015), communication (Ahuja, Yang & Shankar, 2009). It also positively related to organizational innovativeness, e.g. flexible work arrangements and outsourcing (Gera & Gu, 2004), innovative learning (Langlois, 2001), lecturer's creativity (Bassey *et al.*, 2009). Hence, there is great tendency that employees with high levels of IT capability are more likely to engage in more productivity. Despite these empirical studies on the role of IT capability in explaining variety of organizational intangible factors, extensive literature review returns no study that was carried out considering IT capability dimensions (i.e. IT Object, IT Knowledge and IT Operation) as it wields it impact on employee's productivity in Nigerian tertiary institutions.
The following shows the conceptual framework for the study.

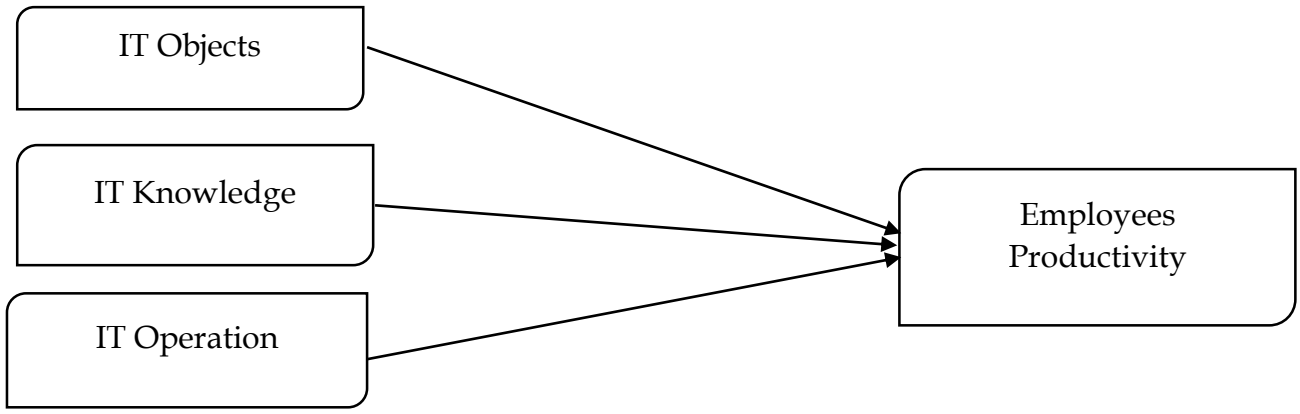


***Figure 1***
***Research Framework***

Based on the above literature, the following hypothesis were stated;
i. IT objects has positive effect on employee's productivity



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ii. IT knowledge has positive effect on employee's productivity
iii. IT operation has positive effect on employee's productivity

## MATERIAL AND METHOD

### Measurements

A structured self-administered questionnaire consisting of 32 closed ended multiple choice-questions was employed for the survey. The instrument comprises 28 questions related to the three constructs of this study and three (4) questions related to demographical variables. 6 question measured IT objects, 6 questions measured IT knowledge and 7 questions measured IT knowledge. The popular indicators from Tippins and Sohi (2003) to measure the variables of IT capability. To measure employees productivity, 9 items were adapted from the works of (Appelbaum & Schettkat, 1995). The questionnaires were administered to lecturers of the School of Business education FCET Gombe.

### Sampling and Statistical Technique

The study used SEM- PLS 3 for the analysis of the study and Hypotheses are tested using the same software. The PLS method is particularly interesting when studies include scales that previous works have validated, and when dealing with complex models (Joseph, Hair Jr, Tomas, Christain, & Serstedt, 2016). PLS-SEM is particularly deemed appropriate for this research because it enable the simultaneous estimation of several causal relationships between one or more independent variables and dependent variable (s) (Hair et al., 2015). For the requirement of requisite sample size, the sample of fifty-one (51) responses in this study exceeds both the requirements of ten times the greater the number of indicators used to measure one construct and as well ten times the largest number of structural paths directed at a latent construct in the structural model as proposed by Hair et al., (2015). To derive path coefficients, the path weighting scheme algorithm is applied, which provides standardized regression coefficients. Statistical significance of structural paths is evaluated through the bootstrap procedure, using 5000 resamples.

## RESULT PRESENTATION AND ANALYSIS

### Assessing the measurement model

An assessment of a measurement model connotes determining individual item reliability, content validity, internal consistency reliability, convergent validity as well as discriminant validity (Henseler *et al*., 2009).



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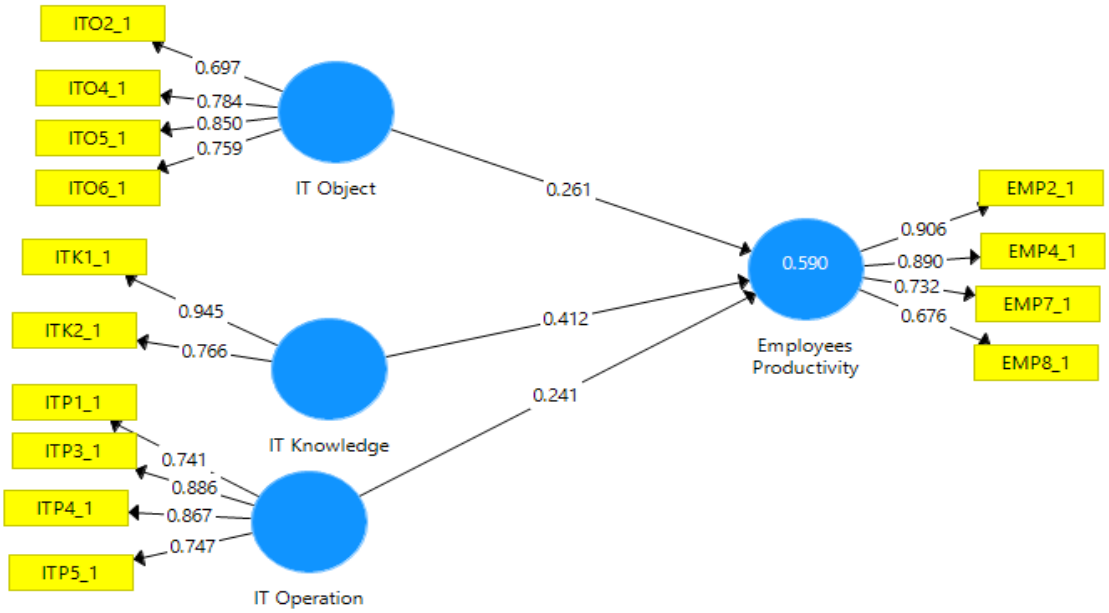


***Figure 1***
***Measurement Model***

The reliability of individual items as shown in figure 1 above was ascertained by looking the outer loadings of every construct's measure (Hair et al.,2014). Adhering to the rule of thumb for keeping items with loadings from 0.70, it was discovered that out of 28 items, 14 items were deleted.

**Table 1**
**Cross Loadings**

| | Employees Productivity | IT Knowledge | IT Object | IT Operation |
|---|---|---|---|---|
| EMP2 | 0.906 | | | |
| EMP4 | 0.890 | | | |
| EMP7 | 0.732 | | | |
| EMP8 | 0.676 | | | |
| ITK1 | | 0.945 | | |
| ITK2 | | 0.766 | | |
| ITO2 | | | 0.697 | |
| ITO4 | | | 0.784 | |
| ITO5 | | | 0.850 | |
| ITO6 | | | 0.759 | |
| ITP1 | | | | 0.741 |
| ITP3 | | | | 0.886 |
| ITP4 | | | | 0.867 |
| ITP5 | | | | 0.747 |


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Discriminant validity can be assessed by comparing the indicator loadings with cross-loadings (Chin, 1998). To attain sufficient discriminant validity, all the indicator loadings should be higher than the cross-loadings.

**Table 2**
**Reliabilities**

| | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Employees Productivity | 0.818 | 0.864 | 0.880 | 0.651 |
| IT Knowledge | 0.679 | 0.899 | 0.849 | 0.740 |
| IT Object | 0.782 | 0.808 | 0.856 | 0.600 |
| IT Operation | 0.826 | 0.831 | 0.885 | 0.661 |

Table 2 depicts the results of AVE calculations with resulting coefficients that range from 0.600 to 0.740, signifying that convergence validity has been attained for all the variables. By obtaining the results of the convergence validity that signifies satisfactory item loadings, composite reliability satisfactory AVE coefficients for the individual indicators, it was clearly enough to prove that the items stand for distinct latent constructs, therefore establishing their convergence validity.

**Table 3**
**Variables Correlation**

| | Employees Productivity | IT Knowledge | IT Object | IT Operation |
|---|---|---|---|---|
| Employees Productivity | **0.807** | | | |
| IT Knowledge | 0.698 | **0.860** | | |
| IT Operation | 0.633 | 0.659 | **0.861** | |
| IT Object | 0.574 | 0.488 | 0.774 | **0.813** |

The results of the constructs discriminant validity analysis used in this study is displays Table 3. Beside the diagonal, the table depicts square roots of AVE for all the variables connoting higher square roots of AVE for (0.860), as well as lower AVE for (0.807). Nevertheless, all the square roots of AVE for the constructs on the table are greater than the off-diagonal elements in the corresponding rows and columns, hence, establishing a proof of discriminant validity.

**Hypotheses Testing**

The hypotheses for the study were also tested using the SmartPLS 3 algorithm. The result of the hypotheses is depicted in Table 4 below:



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**Table 4**
**Hypotheses Testing**

| Relationships | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics | P Values | Decision |
|---|---|---|---|---|---|
| IT Knowledge_ -> Employees Productivity | 0.409 | 0.121 | 3.403 | 0.000*** | Supported |
| IT Object_ -> Employees Productivity | 0.257 | 0.124 | 2.102 | 0.018** | Supported |
| IT Operation -> Employees Productivity | 0.251 | 0.129 | 1.861 | 0.032** | Supported |

***p<.01, **p<.05

Hypothesis 1 assumed that IT object is positively related to employees productivity. Hypothesis 2 proposed that IT knowledge is positively related to employees productivity., while Hypothesis 3 hypothesize that IT operation is positively related to employees productivity. The result displayed supported all the three hypotheses with $\beta = 0.124$, $t = 2.102$, $p < .0018$; $\beta = 0.121$, $t = 3.403$, $p < 0.000$; $\beta = 0.129$, $t = 1.861$, $p < 0.032$ respectively. Hence, supporting the three Hypothesis.

**Assessing the Variance Explained in the Latent Variables**

Another important yardstick for examining PLS- SEM structural model is the *R*squared Value. The *R*-squared value stands for the share of variation in the dependent variable that can be described by one or more predicting variable (Elliott & Woodward, 2007). Chin (1998) opined that 0.67, 0.33, and 0.19 *R*-squared value in PLS-SEM can be regarded as substantial, moderate, as well as weak, respectively. Table 4.10 depicts the *R*-squared values of the latent variable.

**Table 5**
**Variance Explain**

| Endogenous Variables | R Square |
|---|---|
| Employees Productivity | 0.59 |

As shown above, the research model explains 60% of the total variance in employees performance. This indicates that the three set of the latent variables of IT capability i.e. IT object, IT knowledge and IT operation jointly explain 60% of the variance of employees performance. Thus, adhering to Falk and Miller's (1992) criteria, the latent variable showed 0.59 or 0.70% acceptable levels of *R*-squared values, which was regarded as substantial.

**Assessing the Effect Size**

Cohen (1988) posited that *f*2 values that stands for 0.020, 0.15 and 0.35 are having small, moderate, strong effects respectively. Table 6 shows the individual effect sizes of the latent variables of the structural model.



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**Table 6**
**Effect Size**

| Employees Productivity | Effect Size |
|---|---|
| IT Operation | 0.076 |
| IT Object | 0.121 |
| IT Knowledge | 0.217 |

As displayed in Table 6, the effect sizes for IT object, IT knowledge and IT operation on employee performance were 0.121, 0.217, and 0.076, respectively.

**Practical Implication and Recommendation for Future Research**

The study was conducted to investigates of how information technology capability dimensions i.e IT objects, IT knowledge and IT operation affects employees performance. The result of the research showed that the three IT dimensions had positive effects on employee's performance. Hence there is potential practical application in the improvement of the three variable in order to boost the performance of tertiary institutions lecturers in Nigeria since anecdotal literature suggest that the essentiality of IT in the activities of tertiary institutions in Nigeria (Palladan, Kadir, & Chong, 2016)

First, educators and managers as well as other relevant agencies should make an effort in boosting tertiary institution lecturer's information technology (IT) usage self-efficacy. Support should be provided to build up in IT and IT related technologies self-efficacy through a kind of seminar or workshop for the students to know more the benefits of the technology because majority of the students don't know the power that IT possess in enhancing their economic pursuit.

Secondly, subjective norm like IT operation have been found to be an important construct that affects the IT usage by the lectures. Therefore, it will be of good help for the institutions management, lecturers as well other relevant agencies to put more emphasis on IT operation by offering and introducing greater and variety apps that will assist the lecturers in benefiting from the huge advantage that IT capability.

The study recommends future researches to considering these IT dimension variables to consider more bigger sample. This study also recommends future studies to employ the use of moderator to as intervening variable to ascertain the relationship between the independent and dependent variable herein.

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