

# Impacts of Innovation and Business Analytics on the Performance of the Service Sector in Nigeria

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## ABSTRACT

The study investigated the impacts of innovation, including service innovation and business analytics adoption on the performance of the service sector in Nigeria between 2013 and 2022. The proportion of Nigeria's economy attributable to the service sector, the Innovation Efficiency Index, and the Business Analytics usage index were all calculated using secondary data drawn from metrics such as the number of service firms engaging in R&D, the total amount of R&D expenditures, and the share of total service sector revenue received via online channels. As a result of multicollinearity and heteroscedasticity, the study used quantitative analysis, including regression and correlation analyses. The results show that innovation and its impact on service quality, has a large impact on Nigeria's service sector, but that the sector's current adoption level of business analytics is too low to produce far-reaching changes in performance. It was further revealed from the study that the e-participation rate is very vital for driving both the adoption of business analytics and the performance of the service sector. According to the study, the adoption of business analytics should be given more attention in the Nigerian service sector so that its contribution to the performance of the sector is more significant. Finally, the scope of e-participation in the service sector is expanding by the day, and it is recommended that various organizations become more e-service driven to compete in today's market and maintain good performance.

**Keywords:** R&D, Data, Information, e-Participation, e-Commerce, Services

## INTRODUCTION

The non-oil sector in Nigeria has experienced significant growth over the last decade resulting from the growing service sector of the economy. Like many developed economies that have achieved their growth through the service sector, the Nigerian service sector is expected to become a critical component of the economy. Doing this will require the businesses within it to explore innovative ideas and leverage business analytics to drive actionable insights that will improve service quality, bringing up new ideas in various ways to influence the overall performance of the service sector and consequently becoming key drivers of the service sector and economy.

Many organizations in the service sector have recently worked to improve their business analytics capabilities as a vehicle for encouraging innovation of their services, particularly with the increased awareness and adoption of e-transactions. Despite this, the individual contributions of firms to the performance of the service sector and the overall performance of the sector have continued to be below par when compared to other countries that are at the same economic development level as Nigeria.

Despite the widespread popularity of business analytics adoption in helping service companies streamline their operations and achieve improved service quality and growth, Nigeria's service sector does not seem to have taken full advantage of this development. The service sector of Nigeria has evolved over the years with different ups and downs in terms of growth, but the advent of globalization has changed the entire situation, making most of the services and the proliferation in the service sector depend on e-participation. Many services nowadays, especially in the financial and retail sectors, which form the fulcrum of the service sector in Nigeria, are more internet- and ICT-driven and any organization in this setup that fails to adapt to those new trends will find itself on the back foot. The influx of various products in the service sector across the globe and improvement in service quality has been attributed to the growth in innovation and business analytics. For Nigeria, understanding the effect of innovation on the performance of the Nigerian Service sector and whether business analytics have a significant impact on Service sector performance in Nigeria is yet unclear.

## LITERATURE REVIEW

The importance of business performance outcomes as a key indicator in measuring the success and sustainability of a business cannot be overemphasised. Many studies and research projects on business analytics, performance, and innovation have been conducted in Nigeria, but the majority of them focused on individual firms and use primary data, none of the studies available at this time used the entire Nigerian service sector.

Organizations are expected to influence their performance outcomes based on the degree of innovation efforts they include in the business models (Argote & Greve, 2007; Duke et al., 2022). A number of these organisations do not take full advantage of their access to and investment in technology to lead effective adaptability with market dynamics (Rahmasari & Syafitri, 2018; Vitari & Raguseo, 2020). The technology investment by organisation creates a hedge for such organisation among their peers and an impetus for driving innovative outcomes (Abdu & Jibir, 2018; Day & Schoemaker, 2016; Yordanova et al., 2015).

One of the ways that literature has explained innovation is from a service innovation perspective and to describe it as including actionable activities and outcomes for improving business performance, leveraging key performance drivers including technology, business model improvement, market adaptation, and sensing capabilities (Adewole et al., 2013; Adeyeye et al., 2013; Lindblom et al., 2008; Motamarri et al., 2017; Van Ark et al., 2003)

Ekka, 2020 & Singh et al., 2020 define business analytics as data and technology-based methodology with robust capabilities for generating credible and insightful outcomes. An element of investment in technology to achieve innovation considers Business Analytics capabilities (De Luca et al., 2020; Motamarri et al., 2017; Obi et al., 2022; Sohaib et al., 2019). The business analytics embedded technology aids the generation of insights and action-driven decision points (Fosso Wamba et al., 2015; Gao, 2021; Yin & Fernandez, 2020). Studies on business analytics have shown it to be a veritable tool for driving business performance (S. Chatterjee et al., 2021; Fosso Wamba et al., 2020; Rahmah et al., 2020).

Business analytics enhances the responsiveness of businesses to customers' expectations in an efficient manner (Chen & Cheng, 2009; Dubey et al., 2016; Erevelles et al., 2016; Hoang et al., 2021; Ju et al., 2020; Wu et al., 2020). Akter, Motamarri, et al., 2020; Erevelles et al., 2016; & Shan et al., 2019 recommended that businesses, including those in service sectors, should consider the dynamic capability in their business model for seamless adjustments to market changes. The level of analytics integration within the organisation processes significantly determines the degree of innovative outcomes, particularly for companies in the service sector with e-transaction capabilities (Akter et al., 2020; De Luca et al., 2020; Dwivedi et al., 2012; Ghobakhloo et al., 2011; Y. W. Lee et al., 2020; Pollák et al., 2021; Taquesa et al.,

2019).

In a related study, O. O. et al., 2012 investigated the effect that investments in research and development as well as technology had on the output of several different service providers located in Nigeria. Specifically, the research focused on the effect that these investments had on the productivity of the service providers. The vast bulk of the data used was compiled via the use of responses from a survey that was sent to five hundred different service providers in Nigeria. Both inferential and descriptive studies found that R&D spending significantly influences the rate of technological innovation and the output of Nigeria's service industry (Adeyeye et al., 2013; Owusu et al., 2017; Timoshenko & Hauser, 2019).

Ishola & Olusoji, 2020 adopted a new approach to the problem at hand by investigating the impact that Nigeria's manufacturing operations have had on the development of the service industry in the nation. The study suggests a connection between the two that would be beneficial for both parties involved. These conclusions derive from the analysis of secondary data relevant to the performance of industrial and service-oriented firms. The cointegration theory developed by Johansen was used in these various estimating approaches. They seem to be stable enough to make use of Johansen cointegration methods, according to the findings of a unit root test. Although both services and industry were significant contributors to the expansion of the GDP, it was found that some key services segments, including public administration, professional, scientific, and technical services, transport (road, rail, pipeline, air, and water), and utilities (electricity, gas, and water supply, sewage, and waste management) lacked the competencies that were required of them (Adewole et al., 2013; Ishola & Olusoji, 2020). Other fields that lacked these competencies included waste management and sewage treatment. In conclusion, some policy consequences are made to reinforce the sector to maximize potential through the prescription of sector-specific policies. This is done to make the most of the opportunities that exist for the company to grow.

In the same vein, Juliana et al., 2021 examined the entrepreneurial effect of innovation, but this time the focus shifted away from the service sector. They specifically studied the impact of both creativity and innovation on the promotion of entrepreneurship and driving management style (Björk et al., 2010; Juliana et al., 2021; Y. W. Lee et al., 2020). A sample of about 257 entrepreneurs was taken, and questionnaires were administered to them to elicit responses on the subject matter. The collection of data was primary, and it was analyzed using quantitative techniques. Findings from the investigation established a significant relationship between creativity and innovation. In contrast, the study discovered a strong and statistically significant link between entrepreneurial creativity and successful business operations. The second important takeaway from the research was that business owners should place a strong emphasis on creativity and innovation because of their close connection. This view was also held by Capurro et al., 2021; Gault, 2018; Lee et al., 2017; Mikalef et al., 2018; Williams & Olajide, 2020 in their studies.

Duan et al., 2020 investigated the relationship between corporate analytics and innovative approaches to issue resolution. The progression of innovation inside a company was analyzed to see what role business analytics plays in the process. The methodology of the research is evaluated via a questionnaire that was sent to 218 companies in the United Kingdom. According to the findings, the use of business analytics has an immediate impact on the capacity of a company to innovate via the method of ongoing monitoring of the environment outside the firm. Using business analytics and driving data-driven culture has the potential to improve the monitoring of potential dangers. The research also found that business analytics is essential to the efficacy of environmental scanning and that data-driven culture is important in influencing the possibility of its adoption and business management. Both of these findings were uncovered by the study.

Organisations in the services sector continue to rely on their capabilities and investments in analytics capabilities to drive improved service quality and performance of their businesses, customer satisfaction, and adaptiveness of their business models with market dynamics. (Baden-Fuller & Teece, 2020; Barlette & Baillette, 2020; Chaudhuri et al., 2021; Sharma et al., 2019). Studies by other researchers confirm how

service responsiveness improves the relationship between the organization and its customers and establishes customer loyalty (Al-Jahwari et al., 2018; K. Chatterjee et al., 2018; De Luca et al., 2020; Tripathi, 2018)

The results of an investigation conducted by Capurro et al., 2021 to determine whether or not big data may assist businesses in becoming more imaginative were quite similar to the outcomes of the research that was discussed before. The study used a qualitative approach, which consisted of conducting interviews with a selection of big data companies. The results of a qualitative investigation suggest that businesses are making use of big data to get “richer” and “deeper” insights into the points where the virtual and real worlds connect (Capurro et al., 2021). The authors argue that unconventional approaches to the design of new products or services that, initially spot features with differences, sometimes obvious, from the regular customer or user desires, are useful and that it is important to design new products, services, or solutions that first spot these divergent characteristics.

Summing up, there have been numerous studies on the advantages that business analytics and innovation provide, particularly in improving service quality and performance, it is unclear how the services sector has taken full advantage of these benefits. Leveraging technology to drive innovative outcomes will help businesses improve their performance and drive sustainability. It is important to enhance existing literature on the effect of innovation on the performance of the Nigerian Service sector and whether business analytics adoption has a significant impact on Service sector performance in Nigeria.

## AIMS

The objectives of this study are:

1. To examine the impact of innovation on the performance of the service sector in Nigeria
2. To investigate the effect of business analytics adoption on the service sector performance in Nigeria

The following hypothesis has been developed for this study:

**H<sub>01</sub>:** Innovation does not have a significant impact on the performance of the service sector in Nigeria

**H<sub>02</sub>:** Business analytics adoption does not have a significant effect on the performance of the service sector in Nigeria

## METHOD

The study focused on defining an appropriate data selection and measurement approach to identify the variables that are most relevant to the research objectives and for testing the stated hypothesis, and to ensure that the measurements are accurate, reliable, and valid.

The study used the secondary data approach and collected data from sources such as the World Bank and the Global Innovation Index Report, 2022. The study used both inferential and descriptive statistics to look at the information from these sources. For measurement, the study adopted the use of regression and correlation analysis on the variables to test the strength and direction of the relationships between the variables and provide predictions of the dependent variable based on the independent variables as well as quantify the degree of association between the variables.

The study covered the whole country's service sector, hence a secondary data approach from 2013 to date was used, which is about a ten-year series. The data collected was mainly from the Global Innovation Index report and the World Bank 2022 Edition. Data were collected on the following aspects: the service sector's gross expenditure on R&D; the service sector's online activities; the rate of business model development for

businesses; the service sector’s share of Nigeria’s GDP; the country’s innovation efficiency index; the country’s e-participation rate; Results from the first three factors were used to create a business analytics index for the research.

The estimated model was built on a theoretical basis. The theoretical framework of absorptive capacity theory is used to build a research model. The capacity of an organization to evaluate and use externally acquired information for the benefit of its operations is known as its absorptive capability. Furthermore, a model was developed to depict the relationship between service sector performance, innovation, and business analytics, with the work of Ishola & Olusoji, 2020 serving as inspiration.

$$SERV = f(INNO, ePERS, BA) \dots \dots \dots (1)$$

Where SERV is the service sector in Nigeria and performance is measured by the contributions percentage of the service sector to the GDP

e-pers is the e-participation rate in Nigeria, especially in the service sector of the country, INNO is the innovation efficiency index of Nigeria for different years and BA is business analytics which is computed from three variables namely, the new business model developed by businesses based on research, Expenditure on research and Development by businesses in the service sector, and lastly general online participation rate of business enterprises on the service sector.

The model in equation 1 is written in a more explicit regression form as follows;

$$SERV = \beta_0 + \beta_1 INNO + \beta_2 epers + \beta_3 BA + u \dots \dots \dots (2)$$

All variables are as defined above.

During the process of conducting the regression analysis, multicollinearity must be taken into consideration due to the existence of fake variables in the models that are being evaluated as targets. So, both the VIF collinearity diagnostics and the analysis of variance proportions are in the final regression model. The inclusion of these two validations into the regression helps to guarantee that an accurate estimate is produced. Different models will use the produced variable in different ways, which will lead to different signs of multicollinearity.

## RESULTS

The empirical results are presented and analyzed based on the purpose of the research and hypothesis, which is to investigate the effect of innovation and business analytics in the development and performance of Nigeria’s service sector during the last decade. To begin, a correlation analysis is conducted, followed by a regression analysis. The results of this investigation are shown in Table 1.

Table 1. Correlation results

Correlations					
		innovation	Business Analytics	e-participation	Service sector
Innovation	Pearson Correlation	1	.721*	.183	.589
	Sig. (2-tailed)		.019	.614	.073
	N	10	10	10	10
Business Analytics	Pearson Correlation	.721*	1	.757*	.341

	Sig. (2-tailed)	.019		.011	.335
	N	10	10	10	10
e-participation	Pearson Correlation	.183	.757*	1	-.224
	Sig. (2-tailed)	.614	.011		.534
	N	10	10	10	10
Services sector	Pearson Correlation	.689	.341	-.224	1
	Sig. (2-tailed)	.043	.335	.534	
	N	10	10	10	10
*. Correlation is significant at the 0.05 level (2-tailed).					

Source: Author’s computation, 2022

The correlation result as presented in Table 1 explains the degree and levels of association between each of the variables in the model stated under the methodology. Firstly, results show that there is a positive and significant correlation of 0.721 between innovation and business analytics. The implication is that innovation is a very important aspect of business analytics and vice versa, both of them are strongly related. This underscores the findings from existing literature.

The connection between corporate analytics and electronic participation is yet another important one that has been brought up in this discussion. The participation rate of people in Nigeria in e-related activities is used as one of the control variables in the model because one of the primary focuses of this study is the e-commerce sub-sector of the service sector. In addition, one of the other main focuses of this study is the service sector as a whole. The findings of the correlation showed that business analytics had a significant positive association with e-participation. This was determined as a consequence of the correlation. The coefficient is 0.757, and a significance level of 5% is required for it to be considered statistically significant.

Lastly from Table 1, innovation and service sector performance showed a positive and significant correlation coefficient of 0.684. The results imply that an important driver of service sector performance is innovation. The entire service sector in Nigeria is very key and can be promoted if there are more innovations in the sector. The result of the regression analysis showing the impacts of innovation and business analytics on service sector performance is presented in Table 2.

Table 2: Regression result

Variables	Coefficients	Collinearity Diagnostics VIF
(Constant)	88.25 (43.941)	
Business Analytics:	0.298 (0.143)	13.182
e-participation	0.328** (0.131)	6.552

Innovation	0.254** (0.059)	5.822
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Note: (\*\*\*) Statistical Significance at 1%, (\*\*) Statistical Significance at 5%, (\*) Statistical Significance at 10%,

The result shows that innovation is very key to the performance of the service sector in Nigeria. The coefficient of innovation in the regression result in Table 8 is 0.254 and it is statistically significant at 5%, thus showing that innovation has a significant effect on the performance of the service sector. Although this result is not different from many of the past studies that have emphasized the importance of innovation in organizational performance result in Table 8 is 0.254 and it is statistically significant at 5%, thus showing that innovation has a significant effect on the performance of the service sector.

The study has also shown that the participation rate, which is a control variable in this study, has had a significant effect on service sector performance. The coefficient of e-participation is 0.328 and is statistically significant in the model. This implies that e-commerce is an important aspect of the entire service sector in Nigeria.

Despite this, the results from this research indicate that the number of companies that have adopted business analytics is still insufficient to have a meaningful impact on the overall performance of the service industry in Nigeria. According to the estimated model, the coefficient for business analytics is 0.298, which is not significant at 5%. What this means is that business analytics does not have a major influence on the performance of the service sector in Nigeria. Although the coefficient is positive, which suggests that an increased adoption of the use of business analytics would lead to an increase in the performance of the service sector, this rise is not considerable although the coefficient is positive.

Table 3 shows that not a single predictor had an information factor (IF) greater than 10. If the multicollinearity issue is not visible in the generated regression model, then the model is valid. Although more multicollinearity tests were performed, their outcomes are not shown in Table 3.

Table 3 Test for multicollinearity

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	inno	ep	BA
1	1	3.788	1.000	.00	.00	.00	.00
	2	.171	4.706	.00	.00	.00	.06
	3	.040	9.679	.00	.00	.30	.10
	4	.000	93.424	1.00	1.00	.69	.84
a. Dependent Variable: serv							

Source: Author’s computation, 2022

As can be observed in Table 3, the estimated model exhibits no signs of multicollinearity. It should first be noted that the Eigenvalues for all dimensions other than the first are very modest. Further, even for the first dimension, all of the numbers and values of the variance proportions are less than 0.9. The generated regression model now seems to be multicollinearity-free.

Table 4: Measure of Goodness of Fit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.829 a	.687	.531	4.16517
a. Predictors: (Constant), BA, inno, ep				

Source: Author’s computation, 2022

The result as presented in Table 4 explains the proportion of the variance in the dependent variable that can be explained by the independent variable(s) in a regression model.

As can be observed in Table 4, the fitness test presents an R-squared value of 0.687 which means that approximately 68.7% of the variance in the dependent variable can be explained by the independent variable(s) included in the regression model. This indicates a relatively strong relationship between the variables, as more than two-thirds of the variability in the dependent variable can be accounted for by the independent variable(s) being BA, innovation and e-participation.

Table 5: Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	228.674	3	76.225	4.394	.059 <sup>a</sup>
	Residual	104.092	6	17.349		
	Total	332.766	9			
a. Predictors: (Constant), BA, inno, ep						
b. Dependent Variable: serv						

Source: Author’s computation, 2022

Similarly, Table 5 presents the ANOVA results to determine whether the observed differences between groups are due to actual effects or simply random variation.

The F-test has returned a value of 4.394 with a degree of freedom (df) of 3 and a significance level (sig) of .059a. This means that while there may be some differences between the groups, they are not necessarily large enough to be considered practically significant to real impact on outcomes.

### Test of Hypothesis

It would be recalled that two hypotheses were set at the beginning of the study. The decision on the hypothesis based on the results from the analysis are shown in the following table:

Table 6: Hypothesis testing

Hypothesis	Coefficient and P-value	Decision
<b>H<sub>01</sub></b> : Innovation does not have significant impact on the performance of the service sector in Nigeria	0.254** (0.059)	The result shows that the null hypothesis <b>H<sub>01</sub></b> is rejected at 5% significant level. Hence it is concluded that, Innovation does not have significant impact on the performance of the service sector in Nigeria



<p><b>H<sub>02</sub>:</b> Business analytics does not have significant effect on the performance of the service sector in Nigeria</p>	<p>0.298 (0.143)</p>	<p>Results from the analysis indicates that the null hypothesis <b>H<sub>02</sub></b> is accepted at 5% statistical level of significance hence, the conclusion is that, business analytics does not have significant effect on the performance of the service sector in Nigeria</p>
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Source: Author’s computation, 2022

Table 6 describes the decisions based on the hypothesis and it is clear that both business analytics and innovation have different effects on performance of the service sector. Therefore, the implication of this hypothesis is that innovation is more impactful on the performance of the service sector than business analytics. This finding is discussed further under the discussion of results.

## DISCUSSION

This study has established a strong relationship between business analytics adoption and innovation. A firm that will improve the usage of business analytics must be very innovative and in the same vein, for you to drive innovation that can improve the performance of the business, it is important to consider an important process that improves innovative business ideas that will help the business grow. Similar studies in the past have established some reliable and positive results between the two as well, among these studies is that of Duan et al., 2020 where analytics of data on important aspects of business is adjudged to be very crucial to the development of innovative ideas that can improve service quality and move businesses forward. Furthermore, the results from the correlation analysis showed that e-participation and business analytics are strongly and positively correlated. This provides more evidence that the adoption of business analytics is very pertinent to improving the performance and development of e-commerce-connected businesses in Nigeria. Many authors, like Aydiner et al., 2019; and O. D. Faloye & Idowu, 2021 have demonstrated this reasonable result. Results from the correlation also showed innovation, including service innovation, is very key to the performance of the service sector. Many studies that have used a primary data approach and focused on individual segments of the service sector have also corroborated this finding. Among them is the study of Adeyeye et al., 2013; O. O. et al., 2012 where innovative ideas from the staff of an organization are shown to be very key to organizational performance.

The study has fulfilled the purpose of the research and stated hypothesis, considering the results of the regression analysis, it was evident from the analysis that innovation has a significant impact on the service sector performance. Although this result is not different from many of the past studies that have emphasized the importance of innovation in organizational performance (Juliana et al., 2021). The only difference between those studies and this one is that many of them used primary data, while this study relied on secondary data. Consequently, this study has contributed to the body of knowledge from the secondary data perspective that innovation is a key component of organizational performance and is very important to the overall performance of the service sector in Nigeria.

Again, on the impact of business analytics on the performance of the service sector in Nigeria, findings from the study show that business analytics despite having a positive relationship with service sector performance, is not enough to exert a significant impact on the sector’s performance. This is unconnected with the slow adoption rate of business analytics by many businesses in the service sector in Nigeria. This aligns with the study hypothesis and findings of some previous studies, which have shown that business analytics may have a major effect on the performance of a company. The fact that the outcome was different might have something to do with how the case study and method were carried out. In addition, it focuses on a single company rather than the whole service industry, as was done in the previous research, which uses primary data, and distinguishes it from the secondary data used in the current research. The upshot of this is

that the whole of the service sector, which is largely made up of small firms, has not adopted business analytics to the extent that it will substantially affect their performance and that of the service sector as a whole. This finding is also related to the research that Daodu & Bhaumik, 2022a, 2022b, did on how business analytics affects the ability of businesses to adapt to market changes in the e-commerce industry.

The result also showed that the e-participation rate is significant in the service sector performance. This result implies that the service sector in Nigeria is becoming significantly more e-service driven. The rise in the number of people using the internet in the country in recent years is an attestation to this fact. It is not news today that many service organizations in Nigeria have gone digital and are using information and communication systems in their various operations Ishola & Olusoji, 2020. This result has further supported the new trend in the service sector by showing empirically that the rate of e-participation, where e-commerce belongs, is having a significant impact on the performance of the service sector.

Lastly, careful generalization should be made with these results considering its focus on e-participation-based services companies. Future studies will explore the application of the variables to other non-e-participation companies in the services sector.

## CONCLUSION

The purpose of the study was to examine the effect of innovation on the performance of the Nigerian Service sector and establish whether business analytics have a significant impact on Service sector performance in Nigeria.

The findings from this study highlight the value of innovation in Nigeria's service industries, particularly the e-participation businesses. As a consequence, based on the empirical findings collected from this research, it is possible to conclude that innovation is an essential factor contributing to the performance of the service sector in Nigeria. It is impossible to overstate the importance of innovation since it results in more discoveries, which in turn may give rise to new goods and services and will bring in more money and speed up the expansion of the industry. The findings of the study make it abundantly clear, right from the correlation analysis to the regression analysis, that innovation was essential to the performance of the service sector in Nigeria during the year that was under consideration for the study. This conclusion can be drawn from the overwhelming majority of the findings.

On the other hand, one of the things that can be deduced from the findings of the research is that the amount of business analytics that is now being conducted in the service sector is not yet sufficient to have a substantial influence on the way that the sector performs. However, the results of this research have demonstrated that business analytics would improve performance in the service industry if well harnessed. At this point, the extent to which it is capable of doing this is not relevant. This may not be unrelated to the fact that the number of sub-sectors or companies operating within the service sector that make use of business analytics is currently insufficient to meaningfully impact the overall performance of the whole sector.

The study has also shown that the e-participation rate in the service sector is very vital to the performance of the sector. In other words, the study has concluded that the rate of usage of e-platforms, information and communication technology (ICT), and general activities related to e-commerce are having significant impacts on the performance of the service sector. It's a sign that organizations in Nigeria's service sector are becoming more focused on e-participation, and any company that doesn't keep up with the new trend might not be able to survive in the sector.

The study recommends that service sector subsectors, as well as other agencies or organizations in the sector, continue to embrace and prioritize innovation to improve the performance of their organizations. In

addition, the study also recommends that the adoption of business analytics should be given more attention in the Nigerian service sector to make its contribution to the performance of the sectors more significant. Finally, the extent of e-activities in the service sector is increasing by the day, and it is recommended that various organizations become more “e-service driven” to compete in today’s market and maintain good performance.

## AUTHOR CONTRIBUTIONS

Conceptualization: Ladi Daodu

Formal Analysis: Ladi Daodu

Investigation: Ladi Daodu

Methodology: Amiya Bhaumik

Project administration: Ladi Daodu

Supervision: Amiya Bhaumik

Validation: Ladi Daodu, Amiya Bhaumik

Writing – original draft: Ladi Daodu

Writing – review & editing: Ladi Daodu, Amiya Bhaumik

## REFERENCES

1. Abdu, M., & Jibir, A. (2018). Determinants of firms innovation in Nigeria. *Kasetsart Journal of Social Sciences*, 39(3), 448–456. <https://doi.org/10.1016/j.kjss.2017.07.006>
2. Adewole, G. O., Adepoju, A. O., & Adewole, B. Z. (2013). Motivation for innovation: A study of Nigerian services sector. *Journal of Management*, 3(3), 162–168. <https://doi.org/10.5923/j.mm.20130303.04>
3. Adeyeye, A. D., Jegede, O. O., & Akinwale, Y. O. (2013). The impact of technology innovation and R&D on firms’ performance: An empirical analysis of Nigeria’s service sector. *International Journal of Technological Learning, Innovation and Development*, 6(4), 374–395. <https://doi.org/10.1504/IJTLID.2013.060873>
4. Akter, S., Motamarri, S., Hani, U., Shams, R., Fernando, M., Mohiuddin Babu, M., & Ning Shen, K. (2020). Building dynamic service analytics capabilities for the digital marketplace. *Journal of Business Research*, 118(May), 177–188. <https://doi.org/10.1016/j.jbusres.2020.06.016>
5. Al-Jahwari, N. S., Khan, M. F. R., Al Kalbani, G. K., & Al Khansouri, S. S. (2018). Factors influencing customer satisfaction of online shopping in Oman – Youth perspective. *Humanities and Social Sciences Reviews*, 6(2), 64–73. <https://doi.org/10.18510/hssr.2018.628>
6. Argote, L., & Greve, H. R. (2007). A Behavioral Theory of the Firm – 40 years and counting: Introduction and impact. *Organization Science*, 18(3), 337–349. <https://doi.org/10.1287/orsc.1070.0280>
7. Aydiner, A. S., Tatoglu, E., Bayraktar, E., Zaim, S., & Delen, D. (2019). Business analytics and firm performance: The mediating role of business process performance. *Journal of Business Research*, 96 (November 2018), 228–237. <https://doi.org/10.1016/j.jbusres.2018.11.028>
8. Baden-Fuller, C., & Teece, D. J. (2020). Market sensing, dynamic capability, and competitive dynamics. *Industrial Marketing Management*, 89(November), 105–106. <https://doi.org/10.1016/j.indmarman.2019.11.008>

9. Barlette, Y., & Bailleite, P. (2020). Big data analytics in turbulent contexts: towards organizational change for enhanced agility. *Production Planning and Control*, 0(0), 1–18. <https://doi.org/10.1080/09537287.2020.1810755>
10. Björk, J., Boccardelli, P., & Magnusson, M. (2010). Ideation capabilities for continuous innovation. *Creativity and Innovation Management*, 19(4), 385–396.
11. Capurro, R., Fiorentino, R., Garzella, S., & Giudici, A. (2021). Big data analytics in innovation processes: which forms of dynamic capabilities should be developed and how to embrace digitization? *European Journal of Innovation Management*, 25(6), 273–294. <https://doi.org/10.1108/EJIM-05-2021-0256>
12. Chatterjee, K., Adhikary, K., Sen, S., & Kar, S. (2018). Identification and Analysis of Factors Affecting Consumer Behavior in Fast Moving Consumer Goods Sector. *Journal of the Birla Institute of Management Technology*, 17(March), 2–17.
13. Chatterjee, S., Rana, N. P., & Dwivedi, Y. K. (2021). How does business analytics contribute to organisational performance and business value? A resource-based view. *Information Technology and People*, 0–33. <https://doi.org/10.1108/ITP-08-2020-0603>
14. Chaudhuri, R., Chatterjee, S., Vrontis, D., & Thrassou, A. (2021). Adoption of robust business analytics for product innovation and organizational performance: the mediating role of organizational data-driven culture. *Annals of Operations Research*, January 2022. <https://doi.org/10.1007/s10479-021-04407-3>
15. Chen, C. W. D., & Cheng, C. Y. J. (2009). Understanding consumer intention in online shopping: A respecification and validation of the DeLone and McLean model. *Behaviour and Information Technology*, 28(4), 335–345. <https://doi.org/10.1080/01449290701850111>
16. Daodu, L., & Bhaumik, A. (2022a). Effect of Business Analytics on Market Adaptation : Market Sensing and Product Management as Mediating Variables. *International Journal of Applied Research in Management and Economics*, 5, 1–13.
17. Daodu, L., & Bhaumik, A. M. A. (2022b). Business Analytics and Market Adaptation in the E-Commerce Industry in Nigeria. *Future of Business Administration*, 1(1).
18. Day, G. S., & Schoemaker, P. J. H. (2016). Adapting to fast-changing markets and technologies. *California Management Review*, 58(4), 59–77. <https://doi.org/10.1525/cm.2016.58.4.59>
19. De Luca, L. M., Herhausen, D., Troilo, G., & Rossi, A. (2020). How and when do big data investments pay off? The role of marketing affordances and service innovation. *Journal of the Academy of Marketing Science*. <https://doi.org/10.1007/s11747-020-00739-x>
20. Deuter, A., & Imort, S. (2021). *Product Lifecycle Management with the Asset Administration Shell*.
21. Duan, Y., Cao, G., & Edwards, J. S. (2020). Understanding the impact of business analytics on innovation. In *European Journal of Operational Research* (Vol. 281, Issue 3). Elsevier B.V. <https://doi.org/10.1016/j.ejor.2018.06.021>
22. Dubey, R., Gunasekaran, A., Childe, S. J., Wamba, S. F., & Papadopoulos, T. (2016). The impact of big data on world-class sustainable manufacturing. *International Journal of Advanced Manufacturing Technology*, 84(1–4), 631–645. <https://doi.org/10.1007/s00170-015-7674-1>
23. Duke, J., Igwe, V., Tapang, A., & Usang, O. (2022). The innovation interface between knowledge management and firm performance. *Knowledge Management Research and Practice*, 00(00), 1–13. <https://doi.org/10.1080/14778238.2022.2029596>
24. Dwivedi, Y. K., Wade, M. R., & Schneberger, S. L. (2012). *Information Systems Theory: Vol.2*. Springer, 28, 461. <https://doi.org/10.1007/978-1-4419-6108-2>
25. Ekka, S. (2020). *Big Data Analytics Tools and Applications for Modern Business World*. Icesc, 587–592.
26. Erevelles, S., Fukawa, N., & Swayne, L. (2016). Big Data consumer analytics and the transformation of marketing. *Journal of Business Research*, 69(2), 897–904. <https://doi.org/10.1016/j.jbusres.2015.07.001>
27. Faloye, O. D., & Idowu, O. (2021). Business Model Innovation and Micro and Small Enterprises' Performance in Nigeria: Does Entrepreneurial Orientation Mediate? *European Journal of Economics*

- and Business Studies*, 7(1), 88. <https://doi.org/10.26417/541jfi30n>
28. Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How “big data” can make big impact: Findings from a systematic review and a longitudinal case study. *International Journal of Production Economics*, 165, 234–246. <https://doi.org/10.1016/j.ijpe.2014.12.031>
  29. Fosso Wamba, S., Queiroz, M. M., Wu, L., & Sivarajah, U. (2020). Big data analytics-enabled sensing capability and organizational outcomes: assessing the mediating effects of business analytics culture. *Annals of Operations Research*. <https://doi.org/10.1007/s10479-020-03812-4>
  30. Gao, Y. (2021). Big Data Analysis on E-commerce Platform. *Proceedings of the 2021 International Conference on Economic Development and Business Culture (ICEDBC 2021)*, 182(Icedbc), 191–195. <https://doi.org/10.2991/aebmr.k.210712.031>
  31. Gault, F. (2018). Defining and measuring innovation in all sectors of the economy. *Research Policy*, 47(3), 617–622. <https://doi.org/10.1016/j.respol.2018.01.007>
  32. Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. In *Industrial Management and Data Systems* (Vol. 111, Issue 8). <https://doi.org/10.1108/02635571111170785>
  33. Hoang, G. T., Luu, T. T., Nguyen, T. T., Le, L. P., & Pham, N. T. (2021). Entrepreneurial Leadership and Product Innovation in Construction SMEs. *Academy of Management Proceedings*, 2021(1), 10361.
  34. Ishola, O. A., & Olusoji, M. O. (2020). Service sector performance, industry and growth in Nigeria. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, 11(1), 31–45.
  35. Ju, J., Wei, S. J., Savira, F., Suharsono, Y., Aragão, R., Linsi, L., Editor, B., Reeger, U., Sievers, W., Michalopoulou, C., Mimis, A., Editor, B., Ersbøll, E., Groenendijk, K., Waldrauch, H., Waldrauch, H., Bader, E., Lebhart, G., Neustädter, C., ... Saillard, Y. (2020). No 主観的健康感を中心とした在宅高齢者における健康関連指標に関する共分散構造分析Title. *Journal of Chemical Information and Modeling*, 43(1), 7728. [https://online210.psych.wisc.edu/wp-content/uploads/PSY-210\\_Unit\\_Materials/PSY-210\\_Unit01\\_Materials/Frost\\_Blog\\_2020.pdf%0Ahttps://www.economist.com/special-report/2020/02/06/china-is-making-substantial-investment-in-ports-and-pipelines-worldwide%0Ahttp://](https://online210.psych.wisc.edu/wp-content/uploads/PSY-210_Unit_Materials/PSY-210_Unit01_Materials/Frost_Blog_2020.pdf%0Ahttps://www.economist.com/special-report/2020/02/06/china-is-making-substantial-investment-in-ports-and-pipelines-worldwide%0Ahttp://)
  36. Juliana, N. O., Hui, H. J., Clement, M., Solomon, E. N., & Elvis, O. K. (2021). The impact of creativity and innovation on entrepreneurship development: evidence from Nigeria. *Open Journal of Business and Management*, 9(4), 1743–1770.
  37. Lee, H., Kweon, E., Kim, M., & Chai, S. (2017). Does implementation of big data analytics improve firms’ market value? Investors’ reaction in stock market. *Sustainability (Switzerland)*, 9(6), 1–17. <https://doi.org/10.3390/su9060978>
  38. Lee, Y. W., Moon, H. C., & Yin, W. (2020). Innovation process in the business ecosystem: the four cooperations practices in the media platform. *Business Process Management Journal*. <https://doi.org/10.1108/BPMJ-11-2019-0473>
  39. Lindblom, A. T., Olkkonen, R. M., Mitronen, L., & Kajalo, S. (2008). Market-Sensing Capability and Business Performance of Retail Entrepreneurs. *Contemporary Management Research*, 4(3), 219–236. <https://doi.org/10.7903/cmr.1042>
  40. Mikalef, P., Pappas, I., Krogstie, J., & Giannakos, M. (2018). Information Systems and e-Business Management. Big data analytics capabilities: A systematic literature review and research agenda. *Information Systems and E-Business Management*, 16(3), 547–578.
  41. Motamarri, S., Akter, S., & Yanamandram, V. (2017). Does big data analytics influence frontline employees in services marketing? *Business Process Management Journal*, 23(3), 623–644. <https://doi.org/10.1108/BPMJ-12-2015-0182>
  42. O. O., J., M. O., I., J. A., S., B. A., O., & W. O., S. (2012). Factors Influencing Innovation and Competitiveness in the Service Sector in Nigeria: a Sub-Sectoral Approach. *Management*, 2(3), 69–79. <https://doi.org/10.5923/j.mm.20120203.03>
  43. Obi, J. N., Unachukwu, J. C., Ladokun, I. O., & Oyeniyi, K. O. (2022). *Integrated Innovation as a*

- Pathway to Organizational Performance An Empirical Investigation of Nigerian Insurance Industry.* 1–11. <https://doi.org/10.34624/ijbi.v1i1.27586>
44. Owusu, A., Agbemabiese, G. C., Abdurrahman, D. T., & Soladoye, B. A. (2017). Determinants of Business Intelligence Systems Adoption in Developing Countries: an Empirical Analysis From Ghanaian Banks. *Journal of Internet Banking and Commerce*, 22(S8), 1–25. <http://www.icommercecentral.com>
45. Pollák, F., Konečný, M., & Ščulovs, D. (2021). Innovations in the Management of E-Commerce: Analysis of Customer Interactions during the COVID-19 Pandemic. *Sustainability*, 13(14), 7986. <https://doi.org/10.3390/su13147986>
46. Rahmah, M., Ameen, A., Isaac, O., El, A.-E., Abu-Elhassan, S., & Khalifa, G. S. A. (2020). Effect of Organizational Innovation (Product Innovation, Process Innovation, and Administrative Innovation) On Organizational Learning. *TEST Engineering & Management*, 82(2), 12101–12113.
47. Rahmasari, A., & Syafitri, W. (2018). *TRADITIONAL MARKET ADAPTATION STRATEGY IN ADDRESING.* 63–67.
48. Shan, S., Luo, Y., Zhou, Y., & Wei, Y. (2019). Big data analysis adaptation and enterprises' competitive advantages: the perspective of dynamic capability and resource-based theories. *Technology Analysis and Strategic Management*, 31(4), 406–420. <https://doi.org/10.1080/09537325.2018.1516866>
49. Sharma, N., Chakrabarti, A., & Balas, V. E. (2019). Data management, analytics and innovation. *Proceedings of ICDMAI, 1.*
50. Singh, S., Weeber, M., Birke, K. P., & Sauer, A. (2020). Development and Utilization of a Framework for Data-Driven Life Cycle Management of Battery Cells. *Procedia Manufacturing*, 43 (2019), 431–438. <https://doi.org/10.1016/j.promfg.2020.02.191>
51. Sohaib, O., Naderpour, M., Hussain, W., & Martinez, L. (2019). Cloud computing model selection for e-commerce enterprises using a new 2-tuple fuzzy linguistic decision-making method. *Computers and Industrial Engineering*, 132(August 2018), 47–58. <https://doi.org/10.1016/j.cie.2019.04.020>
52. Taquesa, F. H., Lópezb, M. G., Bassoc, L. F., & Areal, N. (2019). Indicators used to measure service innovation and manufacturing innovation. *Suma de Negocios*, 4(1), 32–37. <https://doi.org/10.1016/j.jik.2018.02.001>
53. Timoshenko, A., & Hauser, J. R. (2019). Identifying customer needs from user-generated content. *Marketing Science*, 38(1), 1–20. <https://doi.org/10.1287/mksc.2018.1123>
54. Tripathi, G. (2018). Intentions : Testing the Mediating Effect. *Journal of Services Research*, 17(2), 1–16. [https://d1wqtxts1xzle7.cloudfront.net/59038055/CUSTOMER\\_SATISFACTION\\_AND\\_WORD\\_OF\\_MOUTH20190426-196041d72yhv.pdf?1556280535=&response-content-disposition=inline%3B+filename%3DCUSTOMER\\_SATISFACTION\\_AND\\_WORD\\_OF\\_MOUTH.pdf&Expires=1591980182&Signature=BnczrIH](https://d1wqtxts1xzle7.cloudfront.net/59038055/CUSTOMER_SATISFACTION_AND_WORD_OF_MOUTH20190426-196041d72yhv.pdf?1556280535=&response-content-disposition=inline%3B+filename%3DCUSTOMER_SATISFACTION_AND_WORD_OF_MOUTH.pdf&Expires=1591980182&Signature=BnczrIH)
55. Van Ark, B., Broersma, L., & den Hertog, P. (2003). Services Innovation, Performance and Policy: A Review, Research Series No. 6, Directorate-General for Innovation, Ministry of Economic Affairs. *Dialogic, The Hague.*
56. Vitari, C., & Raguseo, E. (2020). Big data analytics business value and firm performance: linking with environmental context. *International Journal of Production Research*, 58(18), 5456–5476. <https://doi.org/10.1080/00207543.2019.1660822>
57. Williams, O. C., & Olajide, F. (2020). A Technological Approach towards the Measurement of Enterprise Agility. *Iberian Conference on Information Systems and Technologies, CISTI, 2020–June (June)*, 24–27. <https://doi.org/10.23919/CISTI49556.2020.9141142>
58. Wu, L., Liu, H., & Su, K. (2020). Exploring the dual effect of effectuation on new product development speed and quality. *Journal of Business Research*, 106(135), 82–93. <https://doi.org/10.1016/j.jbusres.2019.09.016>
59. Yin, J., & Fernandez, V. (2020). A systematic review on business analytics. *Journal of Industrial Engineering and Management*, 13(2), 283–295. <https://doi.org/10.3926/jiem.3030>

60. Yordanova, Z., Economy, W., Blagoev, D., & Economy, W. (2015). Company Innovative Leadership Model. *Economic Alternatives*, 2, 5–16.