

Effect of Business Analytics on Market Adaptation: Market Sensing and Product Management as Mediating Variables

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ABSTRACT

The study investigated the mediating roles of both market sensing and product management in the impact of business analytics on market adaptation in the eCommerce industry in Nigeria. A sample of 40 firms was selected using both probability and nonprobability sampling techniques. The questionnaire was used to elicit responses from the respondents and quantitative analysis was used to analyze the data collected from the survey. After the application of factors analysis to verify the both reliability and validity of the questionnaire, the result shows that product management has a significant mediating role in the relationship between business analytics and market adaptation while market sensing does not. This study recommends that firms particularly the ones in the eCommerce industry should allow business analytics to dictate changes to be made to their product lines, composition, and structure among others (product management), and by this, they will be able to adapt easily to changes in any market they find themselves.

1. Introduction

Globally, there are dynamics in every aspect of life, and businesses across the globe are not immune to these incessant changes. Marketing particularly remains one of the aspects of business that has had its fair share of dynamism hence the quest for market adaptation. According to Hindle et al., 2020; Schaffner, 2020; Srinivas et al., 2020., and Staegemann et al., 2020, market adaptation is necessary to keep firms in business at all times in the face of an ever-changing world. One of the new attempts to cope with market dynamism is the adoption of business analytics. This process entails the collection, processing, and analyzing of data on relevant variables to the business and applying them to update the marketing activities of the firms. The eCommerce industry remains one of the industries with the required technological resources to engage in business analytics effectively but the reality today is that despite this, many firms in the industry still find it difficult to adapt their marketing to new trends of changes and dynamics in the business environment (Bayighomog Likoum et al., 2020). This challenge has remained very severe considering the rising mortality rate among new firms in the eCommerce industry (Nilsson, 2019).

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Suggestions from the literature have shown that product management and market sensing might likely play some roles in aiding the effectiveness of business analytics (Bayighomog Likoum et al., 2020). However, if the roles of these two can improve the impact of business analytics on market adaptation remains an issue to be unraveled empirically. Exploration of the literature showed that studies have been lopsided to some extent in terms of these four variables namely business analytics, market sensing, product management, and market adaptation. While some studies are concerned about business analytics alone and market adaptation, some are about market sensing and business analytics (Alshanty & Emeagwali, 2019). The closest in the literature is the study of Fosso Wamba et al., 2020 where business analytics and market dynamics capabilities were studied by investigating the mediating role of market sensing.

This study will be contributing more to both literature and knowledge by bringing in the mediating roles of both product management and market sensing in investigating the influence of business analytics on market adaptation. Consequently, the following research question and objective are relevant to the study.

1.1. Research Question

What is the significance of the mediating roles of market sensing and product management in the relationship between business analytics and market adaptation?

1.2. Objective

The study investigates the impact of business analytics on marketing adaption by examining the mediating roles of both market sensing and product management.

1.3. Significance of the Study

Considering the rising trends in globalization and the need to form organization including the eCommerce industry to be dynamic in their marketing strategies to excel among their competitors there is the need to examine avenues where these organizations can improve their maker adaptation. Business analytics which has been suggested as one of the means through which market adaptation can be aided may need some other factors to be able to influence market adaptation significantly. Factors such as product management and market sensing have been suggested in some literature. Consequently, findings from this study will be of great benefit to many entrepreneurs in the eCommerce industry on how to utilize product management and market sensing in aiding the effect of their business analytics efforts on market adaptation.

2. Literature Review

This aspect of the paper is divided into two parts, the empirical and the theoretical literature. Firstly the theoretical review;

2.1. Theoretical Literature

Dynamic capability (DC) theory Dynamic capability (rooted in RBV and KBV) posits that dynamic capability enables firms to modify their resource to adapt rapidly to changing conditions helping them to sustain their competitive advantage over time (Helfat & Peteraf, 2009). Many businesses in recent decades investigate IT business value and competitive advantage using RBV (Côte-Real et al., 2017). The limitations of the RBV encourage the use of other theories like DC and KBV. DC supports the KBV(Newey & Zahra, 2009). Numerous

emerging studies support the DC model and its importance as an enabler for business success (Duan et al., 2020). Dynamic capabilities link technology management with organizational and managerial processes, and specialized assets like technological, human, and institutional resources (Côte-Real et al., 2017). Dynamic capabilities also study the influence of path dependencies such as the impact of previous investments and organizational learning on future actions in technology management (Altay et al., 2018; Kumar Gupta & Gupta, 2019).

2.2. Empirical Review

The empirical perspective investigations have shown that there are some studies around the subject matter of this paper but none is directly similar to the study. It should be noted that four variables are very evident from the study namely; market adaptation, market sensing, product management, and business analytics. The best that was seen in the literature were very few studies that touched on three while the remaining studies the impact of one another. Some of these studies are reviewed as follows;

For instance, Fosso Wamba et al., 2020 examined business data analytics, sensing capabilities, and market dynamic capabilities using some conceptualized models by the authors that focused on big data analytics BDA. After the modeling, both partial least square and structural equation analysis were used to estimate the models and the findings suggested that BDA impacted significantly on the sensing capability of the firms and this has encouraged dynamism in the marketing strategies of the sampled firms. Another effort by Calantone et al., 2004 focused on product management and market adaptation of the wood industry in the US. From the sampled data which was analyzed using structural equation modeling, it was discovered in the study that there is a strong relationship between market adaptation and product management in the wood industry and this has impacted positively on their profitability as well.

In a similar effort, Alshanty & Emeagwali, 2019 concentrated on market sensing and the performance of some SMEs by analyzing the mediating role of product management. A sample of 168 SMEs in the Indonesian furniture industry was included in the study and the data were analyzed using structural equation modeling. The finding shows that market sensing impact positively on SME performance with product management playing a significant mediating role in the process. The attention in Nilsson, 2019 was more on business analytics and adaptation in the eCommerce industry of the Swedish economy. The study developed a business analytics maturity model that can aid market adaptation. The regression model shows that business analytics is an important strategy to aid market adaptation in the eCommerce industry of the Swedish economy. In addition, the study of Bayighomog Likoum et al., 2020 examined market sensing capability, product or brand management, market dynamism, and performance of firms. The study was pure desk research that leverages on theory and past empirical studies. The mediating role of market dynamism and environmental factors was brought into perspective and the findings show that these variables play a significant role in the influence of no market sensing and product management on performance

2.3. Gaps in the Literature

As earlier posited there appears to be no study that combined the four variables namely business analytics, market sensing, product management, and market adaptation in all the existing works of literature. None of the findings of the previous studies can provide enough justification for the mediating roles of both market sensing and product management in the relationship between business analytics and market adaptation which is the main objective of this study. This attests to the importance and justification for this study.

3. Methodology

This aspect of the study discusses the research method used to achieve the objectives of the study.

3.1. Research Design

The study collected primary data from the target respondents using a questionnaire. Quantitative analysis was used to analyze the data and they were interpreted and discussed. This forms the bases of inferences.

3.2. The population of the Study

The study focuses on businesses in the eCommerce industry in Lagos, Nigeria. It is worth noting that there are no available reliable statistics on the number of entrepreneurs that are in the eCommerce industry in Nigeria.

3.3. Sampling and Sampling Techniques

A multistage sampling technique was adopted by the study. This comprised the usage of both probability and nonprobability sampling techniques. The Purposive sampling technique was initially adopted to select 40 businesses that are in the eCommerce industry in the Lagos area of Nigeria Akpa, Victoria O., et al., 2021. The second stage of the sampling technique embraced random sampling techniques which enabled the random representation of the businesses so that all of them will not be on the same line of businesses in that wise, an equal probability was given to the respondents for being selected to partake in the survey. Generally, the 40 respondents were randomly selected from various companies so that their responses will not be lopsided.

3.4. Method of Data Collection

The major approach to the collection of data for the study is through a well-structured questionnaire. The questionnaire is divided into five main parts. Part A contains questions on bio-data and demographic information of the respondents, Part B includes questions on business analytics, and Part C contains questions on market sensing, questions on product management are in Part D while Market adaptation questions are in part E. Apart from the biodata which used categorical responses, other responses on the remaining part of the questionnaire used the five Likert scale.

3.5. Validity and Reliability of the Research Instrument

Both the validity and reliability tests were carried out on the research instrument. The Cronbach Alpha test was used for the reliability test which shows a value of 0.74. The validity test used the KMO Bartlett test which gave a value of 0.64. The two values indicate that the research instrument measure what they are supposed to measure and they also consistently measure them.

3.6. Method of Data Analysis

Following some studies such as Alkatheeri et al., 2020; Fosso Wamba et al., 2020; Lin et al., 2020; Ramli et al., 2018 where relationships among market sensing, product management, market performance, and business analysis were investigated, this study to examine the

mediating roles of both market sensing and product management in business analytics impact on market adaptation came up with some models that are estimated using regression analysis. The estimated models are used to perform SOBEL test which is used to examine the significance of the mediating roles of the two.

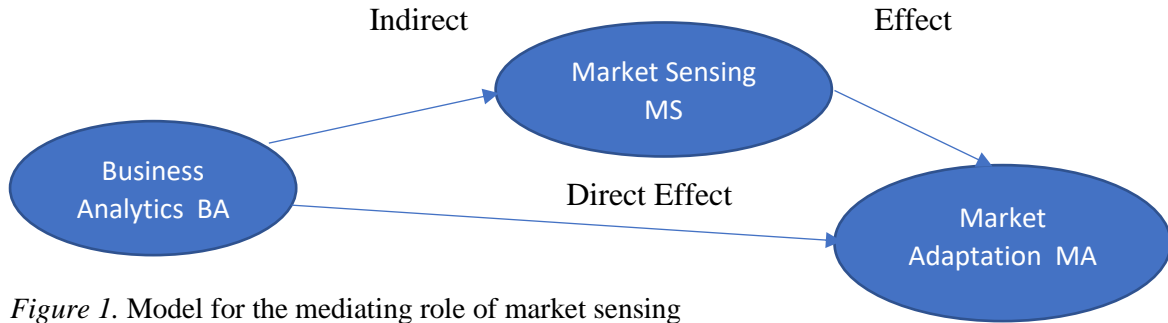


Figure 1. Model for the mediating role of market sensing
Source: Authors Conceptualization, 2022.

The model in Figure 1 will involve the estimation of two different regression equations stated as follows:

$$MS = \alpha + \beta BA + \mu \quad (1)$$

Where BA is business analytics, the independent variable and MS is market sensing, the dependent variable. μ is the error term while α and β are the parameters estimates.

$$MA = \alpha_0 + \alpha_1 MS + \alpha_2 BA + \mu \quad (2)$$

In equation 2, MA is market adaptation and other variables are as defined before. α_i are the parameter estimates.

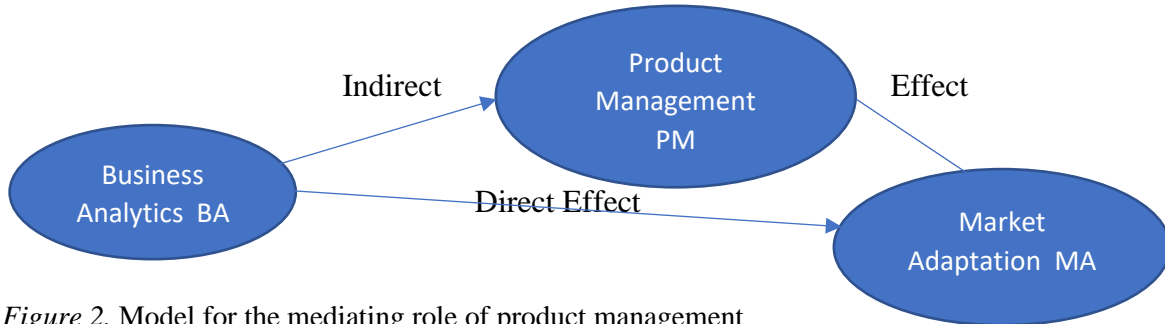


Figure 2. Model for the mediating role of product management
Source: Authors Conceptualization, 2022.

The model in Figure 2 will involve the estimation of two different regression equations stated as follows:

$$PM = \theta + \rho BA + e \quad (3)$$

Where BA is business analytics, the independent variable, and PM is product management, the dependent variable. e is the error term while θ and ρ are the parameters estimates.

$$MA = \theta_0 + \theta_1 PM + \theta_2 BA + \mu \quad (4)$$

In equation 2, MA is market adaptation and other variables are as defined before. θ_i are the parameter estimates.

3.7. Estimation Technique

Quantitative analysis is embraced for the estimation of the equations. Particularly multiple regression approach is applied. Before the application of SOBEL test which is used to analyze the mediating roles of the two variables namely product management and market sensing. The parameter estimates and the standard error of each of the models estimated are generated and inserted in the SOBEL test to generate the SOBEL statistics and the probability that guides which of the variables have the significant mediating effect,

4. Results and Discussion

This aspect of the paper discusses the empirical result. It starts with the descriptive statistics of the bio-data information of the respondents

4.1. Biodata Analysis of Respondents

A total of 40 respondents are included in the survey and the major features of these respondents demographically are analyzed as follows.

Table 1.

Education qualification distribution

Education	Frequency	Percent	Valid Percent	Cumulative Percent
HND	1	2.5	2.5	2.5
Graduate Degree	27	67.5	67.5	70.0
Post-Graduate Degree	12	30.0	30.0	100.0
Total	40	100.0	100.0	

Source: Authors computation, 2022

Results presented in Table 1 shows that the majority of the respondents are highly educated at least about 67.5% of them are university graduate. In addition, nearly 30% also have postgraduate qualifications. The implication of this is that the respondents are well educated to understand the questions in the research instrument and provide the needed answers to them.

Table 2.

Years in service distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1 year	12	30.0	30.0	30.0
1-3 years	17	42.5	42.5	72.5
4-6 years	8	20.0	20.0	92.5
Above 10 years	3	7.5	7.5	100.0
Total	40	100.0	100.0	

Source: Authors computation, 2022

Table 2 indicated that the respondents have relatively long years of experience in their respective organizations. More than 40% of them have spent around 3 years while 20% have spent about 8 years. Some have even spent more than 10 years. The length of experience is important for the questions included in the research instrument.

Table 3.

Gender distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Female	11	27.5	27.5	27.5
Male	29	72.5	72.5	100.0
Total	40	100.0	100.0	

Source: Authors computation, 2022

The percentage of males in the respondents' distribution is more than that of females. It is about 70% of the population. This might not be unconnected to the fact that the online trading business is male dominant profession across the globe (Rodgers & Harris, 2003). The same situation is playing out in this study.

Table 4.
Number of Employees

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 100	28	70.0	70.0	70.0
100-499	4	10.0	10.0	80.0
500-999	1	2.5	2.5	82.5
1,000 -1,999	3	7.5	7.5	90.0
2,000 - 2,999	2	5.0	5.0	95.0
3,000 - 3,999	1	2.5	2.5	97.5
4,000 - 4,999	1	2.5	2.5	100.0
Total	40	100.0	100.0	

Source: Authors computation, 2022

The results in Table 4 show that many organizations with a workforce of less than 100. it shows that the idea that e-commerce business is more capital intensive than labor intensive still holds sway in this study as well. More than 70% have a workforce that is less than 100. Very few of the organizations have employees in thousands.

Table 5.
Nature of Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
100% Homegrown	22	55.0	55.0	55.0
Majorly Homegrown	9	22.5	22.5	77.5
100% Foreign	4	10.0	10.0	87.5
Majorly Foreign	5	12.5	12.5	100.0
Total	40	100.0	100.0	

Source: Authors computation, 2022

The belief that the eCommerce business in a foreign company dominated in Nigeria is refuted going by the result presented in Table 5. Results from the descriptive statistics of the ownership structure of the organizations show that about 55% of the respondents are with 100% homegrown ownership organizations. Notwithstanding, about 23% have co-ownership with foreign investors. Very few of the organizations covered in the study have foreign ownership.

4.2. Other Attributes of the Organizations Involved in the Survey

Utilities and technology dominated the product line of the organization included in the study. Nearly 24% of the organization are into technological base product line notwithstanding both Fintech and utilities are also very common among the product line of the organizations. Office products are also included in the core business occupying about 11.5% of the total population of the organizations covered by the study.

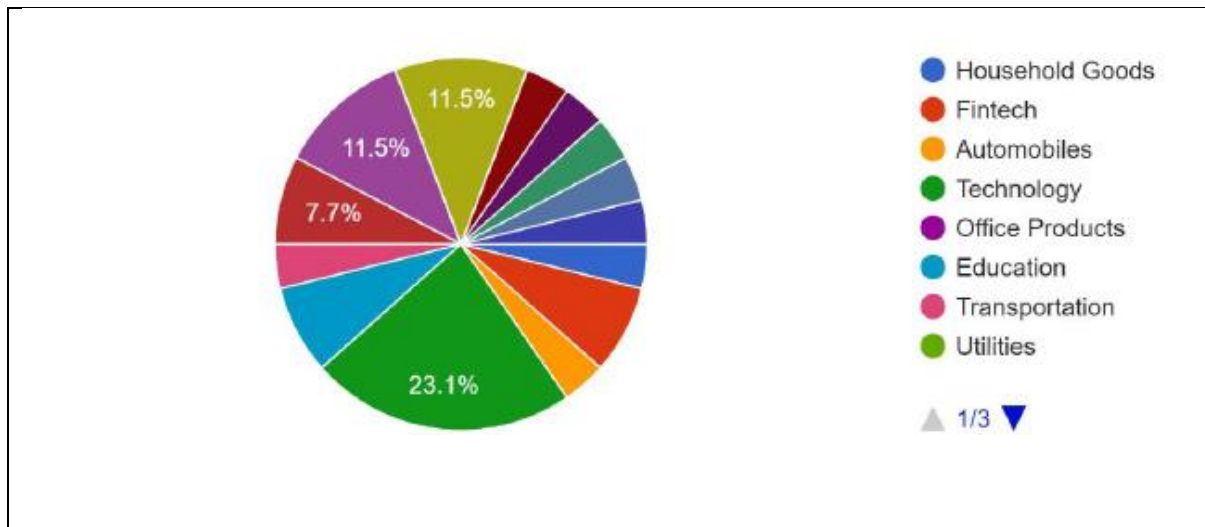


Figure 3. Core Business

Source: Authors computation, 2022

Since the focus of this study is examining the effect of Business analytics on the market adaption of the organizations, the nature of the tool used for carrying out business analytics is investigated and the result is in Figure 4. The result shows that the majority of the organizations about 70% of them use google analytics for their eCommerce business. This further attests to the dominance of google tools in the eCommerce industry across the globe (Gaur et al., 2016).

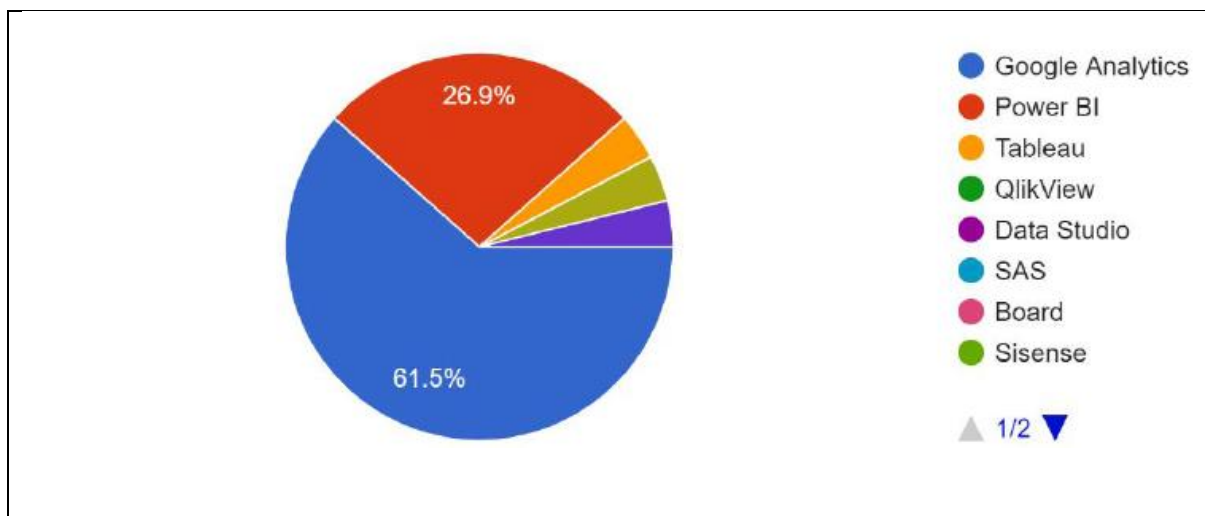


Figure 4. Business Analytics tool used

Source: Authors computation, 2022

4.3. Analysis of the Mediating roles of Market Sensing and Product Management in the Impact of Business Analytics on Market Adaptation

From the methodology of the study, it was made clear that the study utilizes quantitative analysis to achieve this objective. Precisely the study emphasized the usage of linear regression and the SOBEL test to investigate the mediating roles of both market sensing and product management in examining the effect of business analytics on market adaptation in the eCommerce industry in Nigeria. This process is divided into two based on the two variables used as mediating factors

4.4. Meditating Role of Market Sensing

The first regression result presented is that between business analytics and market sensing where market sensing is the dependent variable and business analytics is the independent variable.

Table 6.

Regression result for effect of business analytics on market sensing

Variable	Coefficient
Constant	1.345** (0.467)
Business Analytics	0.713*** (0.117)
R square	0.495
F statistics	37.182***
F. significance	0.000

Dependent variable: Market sensing

(**) Statistical significance at 5%, (***) Statistical significance at 1%

The result presented in Table 6 is an indication that business analytics have a significant impact on market sensing, this is the first step toward investigating its mediating role in the relationship between business analytics and market adaptation. The next step is to present the regression result among the three that is business analytics, market sensing, and market adaptation where market adaptation is the dependent variable.

Table 7.

Regression result for effect of both business analytics and market sensing on market adaptation

Variable	Coefficient
Constant	-0.133 (0.909)
Business Analytics	0.831** (0.290)
Market sensing	0.201 (0.286)
R square	0.381
F statistics	11.385***
F. significance	0.000

Dependent variable: Market adaptation

(**) Statistical significance at 5%, (***) Statistical significance at 1%

Table 7 shows that business analytics maintained its impact significantly on market adaptation but market sensing does not have a significant impact on market adaptation as indicated from the coefficients of market sensing which is 0.201 is not statistically significant at both 1% and 5%. The next step is to compute the SOBEL test.

Table 8.

SOBEL test for mediating role of market sensing

SOBEL Test Statistics	SOBEL Probability
0.69816970	0.48507107

The result in Table 8 is an indication that the mediating role of market sensing is not significant. It is shown that business analytics do have a direct impact on market adaptation and the indirect impact via market sensing is not statistically significant.

4.5. Meditating role of Product Management

The first regression result presented is that between business analytics and product management where product management is the dependent variable and business analytics is the independent variable.

Table 9.

Regression result for effect of business analytics on product management

Variable	Coefficient
Constant	1.054** (0.4)35
Business Analytics	0.769*** (0.109)
R square	0.566
F statistics	49.543***
F. significance	0.000

Dependent variable: Product management

(**) Statistical significance at 5%, (***) Statistical significance at 1%

The result presented in Table 9 is an indication that business analytics have a significant impact on product management, this is because its coefficient from Table 9 is 0.769 and it is statistically significant at 1%. This is the first step toward investigating product management's mediating role in the relationship between business analytics and market adaptation. The next step is to present the regression result among the three that is business analytics, product management, and market adaptation where market adaptation is the dependent variable.

Table 10.

Regression result for effect of both business analytics and product management on market adaptation

Variable	Coefficient
Constant	-0.424 (0.854)
Business Analytics	0.565** (0.303)
Product management	0.533** (0.296)
R square	0.423
F statistics	13.575***
F. significance	0.000

Dependent variable: Market adaptation

(**) Statistical significance at 5%, (***) Statistical significance at 1%

The coefficients of both business analytics and product management in Table 10 are 0.565 and 0.533 respectively. Both of them are also statistically significant at 5% level. The implication is that both of them have significant impacts on market adaptation. The next step is to compute the SOBEL test.

Table 11.

SOBEL test for mediating role of product management

SOBEL Test Statistics	SOBEL Probability
1.74477286	0.04051482

Contrary to what we obtained under market sensing the result shows that the SOBEL test is statistically significant for product management since the test statistics of 1.74477286 is significant statistically at 5%. Therefore, it is confirmed that business analytics apart from

having a significant direct impact on market adaptation, also has a significant indirect impact through product management.

4.6. Discussion of Results

From the analysis of the results, it is clear that business analytics do have a direct impact on market adaptation without any significant role played by market sensing. The result implies that the practice of market sensing is not influenced significantly by business analytics and hence market sensing is not playing any mediating role that is significant between market adaptation and business analytics. These findings appear to be unique as none of the previous studies have investigated this to the best of the knowledge of the researcher. The closest ones are the ones that examined market sensing and market orientation or the effect of market sensing on the performance of firms. All these studies confirmed significant impacts of market sensing notwithstanding, this study has shown that business analytics will directly influence market adaptation positively and significantly even if the organization does not practice market sensing.

Contrary to this result, product management on the other hand has been shown from the result to have a significant mediating role in the relationship between business analytics and market adaptation. Findings from the analysis of results imply that the eCommerce industry will improve the effectiveness of business analytics on market adaptation if they engage in product management. Product management is shown to be very key to the efficiency of business analytics in market adaptation. It should be noted that the result does not undermine the direct effect of business analytics on market adaptation but it has also been made clear from the empirical result of this study that when the eCommerce industry allows its business analytics strategy to influence its product management activities then the effect of business analytics on market adaptation will be more evident. Previous studies have only investigated the effects of product management on performance without investigating the effect on market adaptation (Alshanty & Emeagwali, 2019) From the perspective of Bayighomog Likoum et al., 2020 any policy that fails to influence product which is the end with which customer satisfaction is met might not help marketing much. This assertion seems to have been confirmed by the result of this study. It follows that once business analytics influence product management of the forms, for instance, it leads to changes in product lines and product structures generally hence the firm has demonstrated the ability to adjust and adapt to changes in the market where it exists. All these underscore the importance of product management in the relationship between business analytics and market adaptation.

5. Conclusions and Recommendations

From the findings of the studies, it can be concluded that the mediating role of product management is more significant in the relationship between business analytics and market adaptation than the mediating role of market sensing. Furthermore, it is very evident from the empirical result that the eCommerce industry may improve the effectiveness of their business analytics on market adaptation if they engage in product management very well rather than market sensing. In addition, this study has also shown that business analytics impact product management significantly and this fact remains the main reason why product management plays a major role in reinforcing the effect of business analytics on market adaptation in the eCommerce industry. This study recommends that firms, particularly the ones in the eCommerce industry, should allow business analytics to dictate changes to be made to their product lines, composition, and structures among others (product management) and by this, they will be able to adapt easily to changes in any market they find themselves.

Despite the findings and recommendations from this study, further studies can improve upon this study by expanding the scope to other industries to see if the same findings obtained in this study will be replicated for other industries.

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