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Predictive analytics, operational efficiency, and revenue growth in SMEs in Africa

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Abstract

Predictive analytics (PA) is used for a variety of objectives, including optimisation, planning, strategy development, and resource management, all to improve performance. PA also helps organisations and customers communicate more effectively. Managers may increase customer satisfaction by integrating data on consumer preferences and experiences. Despite increased interest in PA technologies, there is still a considerable study gap in understanding its influence on small and medium-sized enterprises (SMEs) operational efficiency and revenue growth in Sub-Saharan Africa. Hence, the survival of SMEs as key drivers of economic growth and development in Sub-Saharan necessitated this study. The study investigates the influence of predictive analytics on operational efficiency and revenue growth of SMEs in Accra, Ghana, and Lagos, Nigeria. Acknowledging both cities as main commercial centres in their respective nations Using a cross-sectional and survey research approaches, the study sent 150 copies of questionnaire to SMEs in each of the cities using purposive sampling techniques, therefore guaranteeing a focus on key economic centres. Under the guidance of four research assistants in each city monitoring distribution and collection, data were gathered online over two months. The results showed that predictive analytics has positive and significant effect on both operational efficiency and revenues growth of SMEs. The study recommended that SMEs should give training to their staff top priority as well as build the required infrastructure to make the best use of predictive analytics. This entails not just purchasing cutting-edge analytics tools and technology but also making sure staff members have the ability to understand and act upon data-driven insights. Building a solid basis in predictive analytics can help SMEs better use data to maximise operations, foresee trends, and make wise strategic choices, thereby promoting higher efficiency and income development

Keywords: Predictive analytics; Operational efficiency; Revenue growth; Dynamic capabilities theory

1. Introduction

Acting as the backbone of both established and developing economies, small and medium-sized enterprises (SMEs) are absolutely vital for employment creation and global economic progress (Ojeleye et al., 2023). By encouraging innovation, therefore increasing competition, and so improving market variety, they greatly help to propel economic progress (Akujor & Eyisi, 2020). By creating jobs, helping nearby suppliers, and boosting regional businesses, SMEs frequently become rather important in local communities. Their agility and flexibility help them to address particular customer demands, react quickly to changes in the market, and provide individualised services which bigger corporations could not do (George & Mwikya, 2021). Moreover, very important in producing fresh ideas and encouraging entrepreneurship are SMEs, which also help to diversify sectors by promoting technical development (Abdilahi et al., 2017). The dynamism and resilience of SMEs highlight their significance in maintaining economic vitality and advancing equitable development in many different spheres.

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Sadly, many SMEs particularly in Sub-Saharan Africa fail beyond their fifth year mostly because of their difficulty in adapting to fast-changing market circumstances and properly predicting future trends (Esiebugie et al., 2018). Usually resulting from poor resource management and insufficient strategic planning, this difficulty may cause major problems like inventory mismanagement, financial instability, and lost development prospects (Ndayako, 2021). SMEs find themselves unable to make intelligent judgements without the capacity to predict and react to changing customer tastes and competitive pressures, therefore compromising their operational efficiency and market position (Alotaibi & Khan, 2023). The high failure rate of SMEs emphasises how urgently strong analytical tools and improved forecasting methods should be used. Investing in data-driven strategies and strategic planning tools can help SMEs maximise their operations, control uncertainty, and improve their prospects of long-term success and sustainability (Asad et al., 2020). Hence, SMEs that want to survive in a competitive environment and attain steady expansion must be able to predict and adjust.

A plethora studies have thoroughly reported predictive analytics as a major improvement in organisational performance (e.g., Alotaibi & Khan, 2023; Vachkova et al., 2023; Seddaoui et al., 2023; Asad et al., 2020). Defined is an advanced analytical field that uses historical data, statistical methods, and machine learning to estimate future occurrences and trends (Wolniak & Grebski, 2023). Predictive analytics helps organisations forecast future trends, expect market shifts, and make data-driven choices by using historical data and sophisticated statistical techniques (Seddaoui et al., 2023). This capacity enhances operational effectiveness, strategic planning, and financial management among other facets of organisational success (Mafini & Muposhi, 2017). Organisation which use predictive analytics well will maximise resource allocation, save expenses, and improve their capacity to meet consumer requirements and competitive constraints (Wolniak & Grebski, 2023; Vachkova et al., 2023). Better decision-making and more profitability follow from this, as well as general company agility and resilience. Thus, in the data-driven corporate world of today, the extensive use of predictive analytics has become a crucial determinant of performance and the acquisition of a competitive advantage.

Despite the considerable research on predictive analytics and its effects on organisational performance globally, to the best of our knowledge, no study particularly focused on the impact of predictive analytics on SMEs' operational efficiency and revenue growth in Sub-Saharan Africa, especially in Ghana and Nigeria. This disparity in the literature underscores the need of this research, which seeks to investigate how predictive analytics could improve SMEs' competitiveness in these areas. Through an analysis of predictive analytics algorithm usage, the research aims to find if these technologies may raise operational efficiency for African SMEs, increase customer happiness, and stimulate revenue growth. This study is essential to show the worth of predictive analytics in enabling Ghanaian and Nigerian SMEs to better their general performance and meet customer requirements.

1.1. Concept of Operational Efficiency

Recent scholarly definitions of operational efficiency highlight its purpose in raising production while lowering resource use and waste. Barth et al. (2023), for instance, define operational efficiency as the ability of an entity to provide products or services with as minimal resources as possible whilst maintaining high quality. Dildhani et al. (2019), defined it as the degree to which a corporation maximises its activities to save money, time, and effort, therefore improving general performance. Abd-Elmageed et al. (2020), claimed that this is the degree of efficiency with which a company manages its operations to generate the maximum output with the minimum of input. To Kahraman and Rigopoulos (2023), is the capacity of a company to maximise processes and eliminate duplicates, therefore producing faster delivery and reduced prices. Lee and Johnson (2013), described it as the ongoing development of business operations aimed at raising output while controlling expenses and resource allocation by means of continuing improvement of corporate procedures. Therefore, operational efficiency may be described as the ability of a company to maximise its resources and procedures thereby generating the highest potential output while reducing input, cost, and waste. To stay competitive and raise efficiency, it underlines the need of streamlining procedures, cutting duplicates, and always raising performance. Attaining long-term growth and success so depends on operational efficiency.

1.2. Concept of Revenue Growth

Recent scholarly definitions of revenue growth stress its significance as an indicator of the financial situation and market success of an organisation. For instance, Phillips (2021) characterised revenue growth as an indication of a company's potential to expand its market share and customer base that is, as a gain in sales income during a certain period. Revenue growth, according to Johnson et al. (2021), is the speed at which a company's income from main operations increases, therefore indicating its possible expansion and increase of profitability. Olaoye and Olaoye (2022), described it as the acceleration of income from products and services, driven by both strategic efforts like market expansion and natural development. Mwombeki (2023), viewed revenue growth as a company's success in rising revenues from present and

new markets, therefore supporting general business sustainability. Okerekeoti (2021), underlined its importance in generating long-term financial stability and shareholder value by characterising it as the consistent increase of the general revenues of a firm. Revenue growth may therefore be described as the slow increase in a company's sales income brought about by its capability to build market share, increase operational scalability, and effectively implement strategic goals. It is a good gauge of the financial situation of a business as it shows its capacity to keep competitiveness, adapt to changes in the market, and guarantee long-term profitability.

1.3. Concept of Predictive Analytics

Predictive analytics is not a new phenomenon, and many organisations have successfully used it, notably in the financial services and supermarket retail industries (Ogunleye, 2014; Brown et al., 2015). However, its larger benefits and potential have only lately been realised, owing primarily to the emergence of big data. Predictive analytics is an advanced analytical field that uses historical data, statistical methods, and machine learning to estimate future occurrences and trends (Wolniak & Grebski, 2023). It is a subset of advanced analytics, analyses current and historical data using methods from statistics, data mining, machine learning, and artificial intelligence to forecast future occurrences (Kumar & Garg, 2018). Predictive analytics is a type of analytics undergone on big data that deal with extracting information from data and predict the trends and behaviour patterns (Poornima & Pushpalatha, 2018). It enables organisations to identify risks in the past, opportunities, and trends, as well as develop plans for suitable actions and this is only feasible when accurate forecasts are made using organised and unorganised information (Rustagi & Goel, 2022).

1.4. Predictive Analytics and Organisational Output

Recent empirical evidence shows that predictive and big data analytics definitely impact small and medium-sized companies (SMEs). Mafini and Muposhi, (2017), reported that predictive analytics increases supply chain collaboration, risk management, and financial performance by means of improved coordination and risk minimising, thereby improving performance in these domains. Vachkova et al., (2023), underlined the need of predictive analytics in enhancing SMEs by means of a Big Data Analytics Maturity Model with stages of competency development. Alotaibi and Khan (2023), illustrated how well machine learning techniques in large predictive data analytics may optimise operations and enhance decision-making, thereby enhancing operational efficiency and financial outcomes. Using Big Data Analytics with strategic marketing improves operational efficiency and customer interaction, claims Seddaoui et al. (2023). Asad et al. (2020), show via a bibliometric analysis of the literature the growing relevance of data-driven decision-making. These studies taken together reveal that advanced analytics significantly enhance SMEs' performance and provide comprehensive analysis of how best to utilise data for competitive advantage and consistent growth. As a consequence, this study hypothesised that:

- H01: Predictive analytics does not have significant effect on operational efficiency in SMEs in Africa.
- H02: Predictive analytics does not have significant effect on revenue growth in SMEs in Africa.

1.5. Dynamic Capabilities Theory

Dynamic Capabilities Theory holds that an organization's capacity to acquire a competitive advantage and sustain performance in a fast-changing environment is determined by its dynamic capabilities that is, its capacity to combine, develop, and reorganise internal and external competencies to fit evolving market conditions (Samsudin & Ismail, 2019). This concept underlines that companies have to be flexible enough to adapt and innovate in reaction to changes in technology, customer preferences, and competitive problems in addition to fixed resources and skills (Bleady et al., 2018). Dynamic capabilities let companies hedge against risks, reorganise their resource base, and find and seize fresh opportunities thereby ensuring long-term success (Bleady et al., 2018). The focus is on the firm's ability to continuously improve and match its resources and procedures to meet new challenges and capitalise on developing trends, therefore providing a crucial foundation for understanding strategic adaptation and competitive advantage in dynamic and complex business environments.

Dynamic Capabilities Theory provides a helpful framework for understanding how small businesses may utilise predictive analytics to adapt and thrive in the context of the study, which examines how predictive analytics influences operational efficiency and revenue growth. Predictive analytics gives SMEs information on operational processes, resource allocation, and market trends thereby enhancing their dynamic capacity. This ability helps SMEs to make informed strategic decisions, react fast to changing circumstances, and create employing data-driven projections. Predictive analytics may help SMEs better control uncertainty, increase their ability to seize fresh opportunities, and keep a competitive edge in a corporate environment always evolving. Therefore, Dynamic Capabilities Theory stresses

the need of SMEs creating and using contemporary analytical tools to enable constant adaptation and reconfiguration of their long-term growth and success strategies.

2. Methodology

To fully investigate how predictive analytics affected SMEs, the study used survey and cross-sectional research techniques. Cross-sectional studies gather information at one instant in time to provide a window of view on a given event (Sekaran & Bougie, 2016). This study allowed SMEs to assess current policies, issues, and the effectiveness of predictive analytics. This method presents a whole picture of the variables of interest, which facilitates the trend and pattern recognition (Ojeleye et al., 2022). Conversely, survey research is the gathering of data from a sample of participants by means of consistent questionnaires or interviews (Creswell & Creswell, 2018). This approach let the researchers get exact and detailed data from SMEs on their use of predictive analytics, its influence on operational efficiency and income growth, and the issues they run against. Contacting a lot of respondents and gathering quantitative data ready for statistical analysis to identify relationships and influences make surveys valuable tools. Combining these approaches allowed the study to provide both particular findings from individual SMEs and a picture of current predictive analytics utilisation. This method explored further the components influencing predictive analytics outcomes and showed patterns and variations within the sample, therefore providing a complete awareness of how predictive analytics shapes SMEs' operations and growth.

The research focused on SMEs in both Lagos, Nigeria and Accra, Ghana as both cities are major commercial centres in their respective nations and suited for examining the effect of predictive analytics. Data was gathered by sending 150 questionnaires to SMEs in each of both cities using a purposive sampling technique. This strategy guaranteed that the sample was chosen with significant effort to reflect companies in important economic centres. To increase reach and accessibility, the surveys were sent online under four research assistants in each city monitoring the distribution and collecting procedure. Over a two-month period, data were gathered from SMEs to assess the degree of operational efficiency and revenue growth enhancement using predictive analytics. This approach enabled targeted research of SMEs in major cities, therefore offering unique insights on how predictive analytics shapes business operations in these major commercial hubs.

2.1. Measures

In this study, adapted scales from previous research were used to measure key variables. Revenue growth was assessed using four items from the nine-item performance scale developed by Spillan and Parnell (2006), specifically those related to the financial aspect of performance. One example of an item is, "Return on investment goals have been achieved," with a reported Cronbach's alpha of 0.707, indicating acceptable reliability. Operational efficiency was evaluated using a five-item scale from De Weerd-Nederhof, Visscher, Altena and Fisscher (2008), which has a reported Cronbach's alpha of 0.83, demonstrating strong internal consistency. An example of an item from this scale is, "Our development costs are more affordable compared to those of our competitors." Predictive analytics was measured using self-developed 5-item predictive analytics questionnaire with Cronbach's alpha of 0.783. Sample of item is "I am confident in the reliability of the forecasts generated through our predictive analytics models". Three academic experts and two private-sector professionals assessed the content validity. They all confirmed to the accuracy of the instrument.

3. Data Analysis and Presentation

The data were analyzed using Structural Equation Modeling (SEM) with SmartPLS 3.3.8. Before this, preliminary analyses were conducted, including checks for missing values, outliers, common method variance, and normality.

3.1. Analysis of Measurement Model

The measurement model, also known as the inner model, is often used to determine outer loadings, construct validity, reliability, and coefficient of determination (R-squared). The outer loading is often used to determine the amount to which an item in a construct explains the variance or contributes to understanding the overall construct. Hair et al. (2017), advocated keeping outer loadings of 0.7 or higher and removing those below that threshold. They suggested, however, that loadings of 0.4 or more may be kept provided they have no negative impact on construct reliability or average variance extracted. Loadings of 0.5 and higher were preserved in accordance with the guidelines. Hence, OE5 and PA3 were expunged from the dataset owing to loadings below 0.5. In addition, construct validity, which included convergent and discriminant validity, was tested. Fornell and Larcker (1981) advocated using Average Variance Extracted (AVE) to confirm convergent validity. They proposed an AVE value of 0.5 or above to prove convergent validity. Table 1 shows that the value of AVE for the two models is more than 0.5. As a result, convergent validity is

proven. Meanwhile, the instrument's reliability was proven using composite reliability. Dillman et al. (2014), advised a value of 0.7 or above to ensure that the research instrument is consistent and sufficient. Looking at Table 1, all of the composite reliability values are more than 0.7. Thus, the construct's dependability is demonstrated.

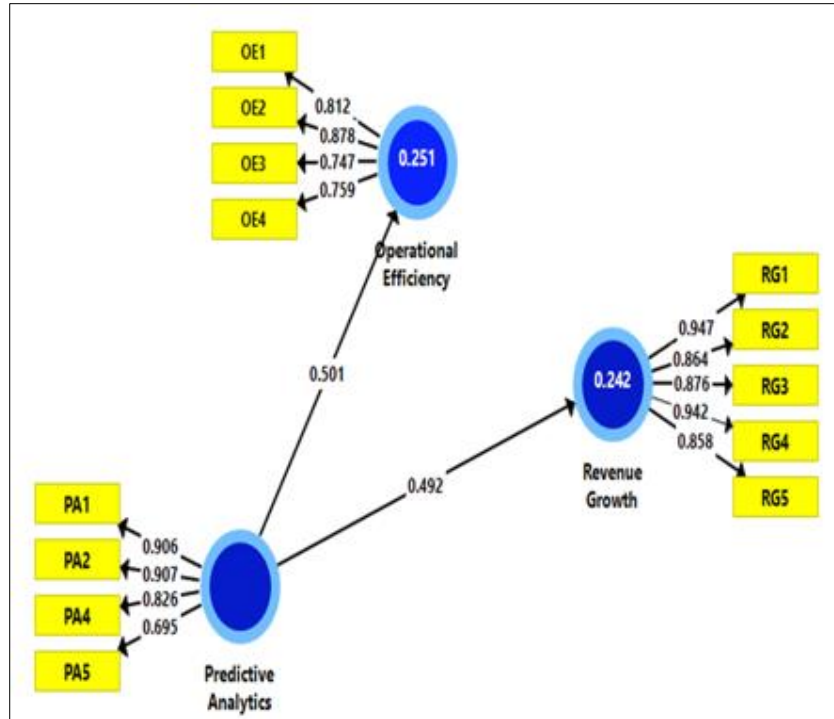


Figure 1 Measurement Model

Table 1 Outer loadings, Reliability and Convergent Validity

Constructs	Indicator	Outer loadings	Composite Reliability	AVE	Decision
Operational Efficiency	OE1	0.812	0.877	0.641	Accepted
	OE2	0.878			
	OE3	0.747			
	OE4	0.759			
	CS5	0.706			
	CS6	0.875			
Predictive Analytics	PA1	0.906	0.903	0.702	Accepted
	PA2	0.907			
	PA4	0.826			
	PA5	0.695			
Revenue Growth	RG1	0.947	0.954	0.807	Accepted
	RG2	0.864			
	RG3	0.876			
	RG4	0.942			
	RG5	0.858			

Source: SEM output (2023)

Additionally, proposed the popular Fornell and Larcker (1981), intercorrelation criteria to verify discriminant validity. They stated that to prove discriminant validity, the square root of the AVE, which represents a construct's intercorrelation, must be bigger than the correlation with other constructs. Table 2 below shows that the square root of AVE (bolded figure) is stronger than the association with other components. Therefore, discriminant validity is proved.

Table 2 Fornell and Larcker Criterion for Discriminant Validity

Constructs	Operational Efficiency	Predictive Analytics	Revenue Growth
Operational Efficiency	0.801		
Predictive Analytics	0.501	0.838	
Revenue Growth	0.680	0.492	0.898

Source: SEM output (2023)

Models 1 and 2 have coefficients of determination (R^2) of 0.251 and 0.242, respectively (refer to Figure 1 and Table 3). Model 1 has a R^2 of 0.251, suggesting that the independent variables explain 25.1% of the variance in the dependent variable, operational efficiency (OE). This indicates a good fit of the model and a moderate to significant correlation. Model 2's R^2 of 0.242 indicates a moderate match of 24.2% of the variance in revenue growth (RG) that is explained by predictive analytics. Model 2 consequently has a slightly better overall fit and predictive ability than Model 1.

Table 3 Coefficient of Determination (R-Square)

Model 1	0.251
Model 2	0.242

Source: SEM output (2023).

3.2. Analysis of Structural Model

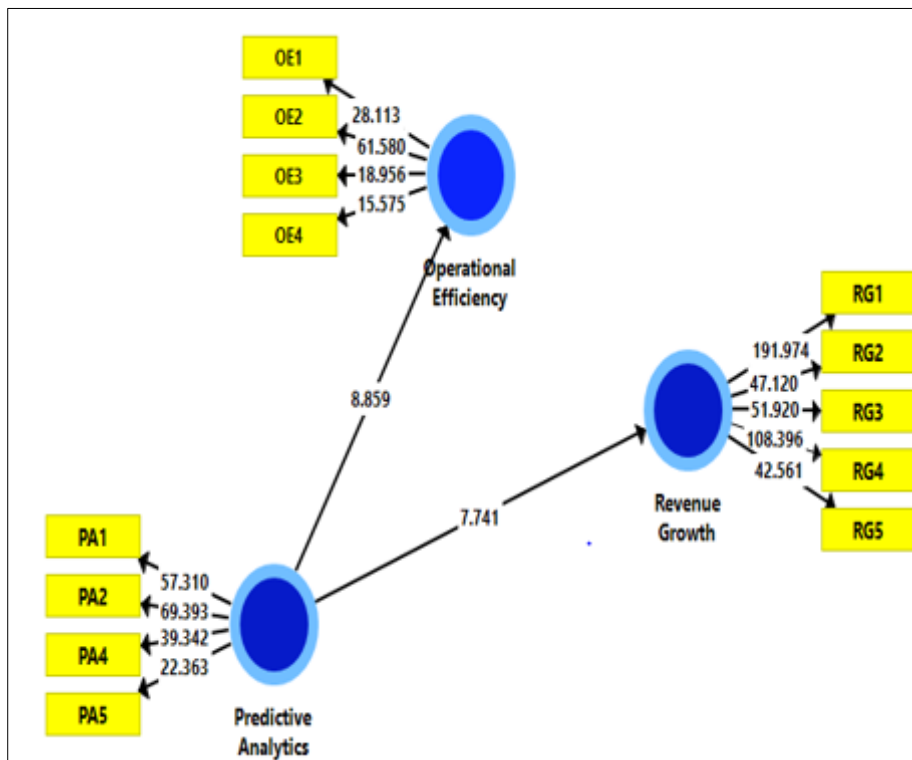


Figure 2 Structural Model

In this, hypothesised relationship between the exogenous and endogenous variables were investigated and confirmed by the structural model also known as the outer model. This model helps evaluate the suggested theoretical framework and grasp the relationships among different aspects (Hair et al., 2019). Analysing the outer model allows researchers to evaluate measurement models, identify the strength and direction of variable interactions, and assess the overall fit of the hypothesised model to empirical data (Hair et al., 2014). This approach enables the identification of relevant paths as well as the validation of theoretical assumptions, therefore strengthening the foundation for making conclusions on the influence and interrelation of the researched components.

Table 4 Hypothesised Relationships

Hypotheses	Relationship	Beta	Standard Deviation	T Statistics (O/STDEV)	P Values	Decision
H01	Predictive Analytics -> Operational Efficiency	0.501	0.057	8.859	0.000	Rejected
H02	Predictive Analytics -> Revenue growth	0.492	0.064	7.741	0.000	Rejected
	Model 1 $Q^2=0.148$			Model 2 $Q^2=0.182$		

Source: SEM output (2023).

The results of the structural equation modelling (SEM) study reveal among SMEs clear advantages of predictive analytics on operational efficiency and revenue growth. The first hypothesis (H01), the relationship between predictive analytics and operational efficiency shows a really strong positive beta value of 0.512. The substantial T-statistic value of 8.859 along with a P-value of 0.000 assist to demonstrate the rejection of the null hypothesis, therefore demonstrating that predictive analytics significantly increases operational efficiency in SMEs. This suggests that SMEs using predictive analytics are likely to operate more efficiently in their operations, thereby optimising resource use and increasing overall output. Comparably, the second hypothesis (H02) generates a beta value of 0.492 and investigates how predictive analytics influences revenue generation. This also demonstrates a rather substantial positive influence with a T-statistic of 7.741 and a P-value of 0.000, which rejects the null hypothesis. This result underlines the importance of predictive analytics in producing revenue growth for SMEs, thereby underlining its role in allowing businesses to better forecast market trends, tailor their strategies, and grasp development possibilities. The clear positive outcomes of both hypotheses highlight the significant contribution predictive analytics makes to increase SMEs' competitiveness and sustainability.

The structural model's Q^2 values provide an idea of its predictive utility for the endogenous variables (Ojeleye et al., 2023; Hair et al., 2017). In particular, Q^2 evaluates the model's ability to forecast the dependent construct values observed. Model 1, which emphasises operational efficiency, has a Q^2 value of 0.148 and Model 2, which explores at revenue growth, has a Q^2 value of 0.182. These Q^2 figures suggest that both models have a moderate predictive relevance, so the exogenous variable; predictive analytics, explains a significant fraction of the variation in operational efficiency and revenue growth. Ultimately, Q^2 values higher than zero show that the model has predictive significance for the corresponding endogenous components, therefore supporting the conclusion that predictive analytics is a valuable predictor of both operational efficiency and revenue growth in SMEs. Model 2's higher Q^2 value 0.182 suggests that predictive analytics has a slightly higher predictive potential for revenue growth than operational efficiency.

4. Discussion

Predictive analytics enables SMEs to make data-driven decisions and optimise resource allocation, allowing them to operate much more efficiently. By analysing previous data and identifying patterns, SMEs may anticipate future trends and customer expectations, resulting in more efficient operations (Vachkova et al., 2023). By ensuring that resources are employed where they are most required, SMEs may decrease waste, improve inventory control by maintaining proper stock levels, and better match production processes with real market demand (Wolniak & Grebski, 2023). By avoiding the costly hazards of overproduction and stockouts, SMEs may help utilise resources and improve financial control. Furthermore, predictive analytics enables SMEs to detect possible hazards and opportunities, allowing them to take preventive measures to improve operational performance (Mafini & Muposhi, 2017). SMEs may decrease downtime and save needless expenditures by projecting supply chain delays or changes in customer behaviour and adapting their strategies accordingly (Seddaoui et al., 2023). Because SMEs are better equipped to adapt quickly to changes in the business environment, this proactive strategy enhances both market competitiveness and efficiency. Higher productivity demonstrates the total impact of these advancements, as more smooth processes and fewer

inefficiencies assist to reduce costs (Alotaibi & Khan, 2023). Furthermore, the capacity to better foresee and address consumer requirements leads to higher customer satisfaction, which is essential for developing long-term relationships and ensuring repeat business (Mafini & Muposhi, 2017). As they achieve these operational improvements, SMEs are better positioned to grow sustainably, with a solid foundation of efficient operations, satisfied customers, and a competitive advantage in the market. Predictive analytics is a great tool for SMEs to improve operational performance, save money, and promote long-term development (Seddaoui et al., 2023).

Predictive analytics is critical for driving revenue development by providing small and medium-sized businesses (SMEs) with data-driven insights that improve strategic planning and decision-making (Alotaibi & Khan, 2023). SMEs can accurately estimate future sales patterns using historical data and advanced algorithms, optimising inventory levels, avoiding stockouts or overstock situations, and ensuring that resources are deployed efficiently to meet projected demand. This accuracy in inventory control not only helps to reduce excess inventory-related expenses, but it also maximises sales opportunities, resulting in fast cash. Predictive analytics also helps SMEs gain a better understanding of client behaviours and preferences through purchase patterns, demographic data, and engagement metrics (Asad et al., 2020). Customised promos and customised marketing efforts enabled by this comprehensive consumer data are more likely to appeal to certain client groups, hence increasing customer acquisition and retention rates (Vachkova et al., 2023). Better targeting leads to improved conversion rates and sales volumes, which result in a significant rise in income (Wolniak & Grebski, 2023). Predictive analytics also assists SMEs in optimising pricing strategies so that they may establish competitive but profitable rates that attract new business while maintaining strong margins by considering market dynamics, competitor pricing, and consumer price sensitivity. Anticipating consumer trends and market movements enables SMEs to create and adjust their product offerings to meet new requirements, ensuring that their product lines stay relevant and appealing, therefore maintaining and extending their market share (Asad et al., 2020). Predictive analytics also enables SMEs to proactively address issues and improve the overall customer experience, hence increasing customer service by predicting consumer wants and potential problems before they arise. Good word-of-mouth and loyalty enable satisfied consumers to become brand advocates and repeat visits, resulting in increased revenue. Predictive analytics assists SMEs in identifying inefficiencies and optimising company operations, allowing them to minimise operating costs and free money that can be directed to projects such as marketing, new market expansion, and product development. Furthermore, by anticipating potential risks and spotting possibilities, SMEs may make sound strategic decisions that reduce financial uncertainty while acquiring successful enterprises, balancing and boosting their income stream (Khan & Alotaibi, 2023). Because data-driven insights encourage experimentation and the adoption of best practices that improve overall company performance, predictive analytics also assists SMEs in developing a culture of constant innovation and development (Poornima & Pushpalatha, 2018). Finally, predictive analytics provides SMEs with the skills and knowledge they need to make proactive, educated decisions that improve customer happiness, streamline processes, strategically position the company for continued income creation, and so increase sales. Thus, SMEs that effectively employ predictive analytics are better able to compete in dynamic markets, increase profitability, and achieve long-term financial success, highlighting the primary and beneficial influence of predictive analytics on revenue growth.

4.1. Implications

Regarding predictive analytics, the findings have practical implications for the operational efficiency and revenue growth of SMEs in Ghana, Nigeria, and Africa in general. These countries' economies mostly revolve around SMEs, so applying predictive analytics might result in substantial expansion and economic development. Predictive analytics can help optimise operations, reduce costs, and increase profitability in Ghana and Nigeria, as such generating more employment, improved business resilience, and more globally and regionally competitive results where SMEs sometimes face challenges including limited resources, market volatility, and supply chain inefficiencies. Wide-ranging predictive analytics used throughout Africa might accelerate digital transformation, therefore promoting innovation and helping SMEs to more effectively satisfy the needs of a growing customer. This might encourage sustainable development, decreased dependence on conventional sectors, and economic diversification. Moreover, predictive analytics may expand export possibilities and draw foreign investment by enhancing SMEs' capacity for size and competitiveness in global marketplaces, thereby strengthening general economic stability and prosperity on the continent. The results highlight the necessity of predictive analytics as a main concern for legislators and business leaders in Ghana, Nigeria, and Africa to boost SMEs development and more general economic growth.

Analysed through the lens of Dynamic Capabilities Theory, the theoretical implication of predictive analytics on SMEs' operational efficiency and revenue growth underscores the need of an organization's ability to evolve, integrate, and adjust internal and external resources to meet changing market demand. This perspective states that by providing insightful information that enables SMEs to more effectively forecast and respond to changes in their environment, predictive analytics increases their dynamic capability. This ability enables SMEs to develop their operational systems,

modify their approach in response to new trends, and innovate in reaction to predicted insights. Using predictive analytics to maximise resource allocation, enhance decision-making, and interact with consumers helps SMEs strengthen their ability to remain competitive and continue development in a constantly changing corporate environment. This theoretical perspective stresses that the integration of predictive analytics is not only a technological enhancement but also a strategic capability that fosters agility and resilience, thereby helping SMEs to navigate uncertainty and grasp prospects with greater effectiveness. Dynamic Capabilities Theory thus highlights how predictive analytics has transformational ability to increase strategic flexibility and long-term performance of SMEs.

5. Conclusion and Recommendations

The study underlines how predictive analytics transforms the operational efficiency and revenue growth of SMEs. Data-driven insights help SMEs maximise operations, enhance inventory control, and adapt marketing efforts to better-fit customer needs. Forecasting market trends and acting early not only helps with resource allocation and cost control but also raises profitability and competitiveness. Widespread use of predictive analytics has a great opportunity for economic development in Ghana, Nigeria, and throughout Africa. By raising SMEs' ability to adapt and thrive in a changing corporate environment, it might encourage digital transformation, innovation, and long-term growth. The results underline the need for legislators and corporate executives to implement predictive analytics as a vital instrument to increase SMEs' performance and general economic development. At last, integrating predictive analytics into corporate processes gives SMEs the strategic tools they need to combat uncertainty, seize possibilities, and accomplish long-term success.

The findings provide two main recommendations for using predictive analytics to improve SMEs' operational efficiency and revenue growth:

- SMEs should give training for their staff top priority as well as build the required infrastructure to make the best use of predictive analytics. This entails not just purchasing cutting-edge analytics tools and technology but also making sure staff members have the ability to understand and act upon data-driven insights. Building a solid basis in predictive analytics can help SMEs better use data to maximise operations, foresee trends, and make wise strategic choices, thereby promoting higher efficiency and income development.

To improve their predictive capacity, SMEs should look at forming alliances with industry experts and data analytics companies. Working with outside specialists may give access to industry best practices, sophisticated analytical tools, and specialised expertise sometimes lacking in-house access. By enabling SMEs to better use predictive analytics, customise solutions to fit their particular requirements, and keep ahead of market trends, these alliances may assist them in retaining their competitive advantage and generating ongoing development.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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