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TECHNOLOGICAL INNOVATION AND BUSINESS RESILIENCE AMONG COSMETICS MANUFACTURING FIRMS IN SOUTH-EAST NIGERIA

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ABSTRACT: This article examines the role of technological innovation in enhancing business resilience among cosmetics manufacturers in Southeastern Nigeria. The Nigerian cosmetics industry is experiencing substantial growth, driven by a rising middle class, increasing urbanization, and the impact of social media. To proceed with the study, a sample of 148 senior and management staff from 8 selected cosmetics firms was studied. The study employed a survey research design, with the questionnaire serving as the primary instrument for data collection. The data collected were presented in tables and analyzed using simple percentages, bar charts, mean statistics, and Pearson correlation statistics, all of which were facilitated by SPSS version 21.0. Findings reveal a significant association between technological innovation and operational continuity, with a mean of 3.4; a significant relationship between technological innovation and employee engagement, with a mean of 3.4; and a significant relationship between technological innovation and customer retention, with a mean of 3.1. The study concludes that achieving business resilience depends on the extent of technological innovation implemented. It was recommended that: (1) production firms, especially cosmetics firms, should always involve innovative technology to achieve excellence, especially in today's digital age. (2) Employees should be trained, developed, and engaged on the best ways to operate modern technologies in the company. (3) Modern production equipment should be used to achieve production of quality products, which will enhance customer attraction, patronage, and customer retention. (4) On their own, the Government should provide financial incentives, tax breaks, and grants to encourage manufacturers to invest in technology. Infrastructure development: Investing in improving electricity supply, transportation networks, and internet connectivity in south-east Nigeria.

Keywords: Technological Innovation, Resilience, Cosmetics Companies, Operational Continuity, Employee Engagement.

INTRODUCTION

The cosmetics industry in Nigeria is a dynamic sector with significant potential for economic growth and development. With a large and youthful population, increasing urbanization and a growing focus on personal care, the demand for cosmetic products is on the rise. The rise of social media and e-commerce has further fueled this growth, providing manufacturers with new channels to reach consumers and expand their market. Despite these opportunities, cosmetics manufacturers in Southeast Nigeria face numerous challenges that threaten their business resilience and so need to leverage technological innovation.

Technological innovation involves the creation and application of new or improved technologies, tools, systems, and processes that bring about significant advancement or breakthroughs in various fields. Considering the nature of competition in the manufacturing sector, especially in cosmetics companies, the management of such organizations is committed to sustaining the organization and achieving the business goals. One of the strategies for doing that is through Technological Innovation (TI). According to Mmuo (2021), through technological innovation, organizations introduce new technologies, modify existing technologies, and go for technological transfer so as to increase productivity and produce unique and acceptable products in the market.

Technology has been defined as a transformer, a tool, as knowledge, and as specialized knowledge. Technologies can drive significant structural changes and economic development. Ile (2020) defined technology as a series of techniques that include methods used in marketed and non-marketed activities, the nature and specification of the product produced, and its technique. It encompasses the organization of productive units in terms of scale and ownership, and it extends to services, data gathering systems, manufacturing, and agricultural sectors.

Technological innovation can be perceived in the following four ways:

1. **Radical innovation:** This type of innovation allows companies to reach new markets and create new industries. It involves the development of entirely new technologies or products that disrupt existing markets.
2. **Incremental innovation:** This type of innovation improves existing technical processes and products, making them more efficient and effective.
3. **Disruptive innovation:** This type of innovation creates a new value chain by entering an existing market or creating a completely new market, and
4. **Sustainable innovation:** This innovation aims to improve and grow in current markets by meeting customer needs while reducing environmental impact.

The goal of technological innovation is to achieve business resilience. Kamau (2016) asserted that business resilience refers to the extent to which a business can survive and manage itself effectively during a crisis. Lengnick-Hall, Beck, and Lengnick-Hall (2021) elucidate that corporate resilience is an enterprise's ability to absorb effectively, develop situation-specific responses to, and finally engage in transformative activities to capitalize on disruptive surprises that potentially threaten the organization's survival. To achieve the goals of cosmetics organizations - like Starline Nigeria Ltd, Aba, Abia State; PZ Cussons, Onitsha, Anambra State; Hardis and Dromedis Ltd, Enugu State; Zan Cosmetic Industries Limited, Aba, Abia State; Ziva Beauty, Enugu-Ezike, Enugu State; Udesco Manufacturing Company Ltd, Nkpor, Onitsha, Anambra State; Chilar Manufacturing Services Ltd, Abakiliki, Ebonyi State; and Mila Beauty & Skin Care, Abakiliki, Ebonyi State- there is a need for effective business resilience.

To effectively measure business resilience, this work adopted operational continuity, customer retention, and employee engagement as the major strategies for business resilience. Through operational continuity, an organization strives to minimize waste and maintain its business operations. Customer retention is achieved through improved consideration of customers' needs, which will make them remain in the organization (Oladele, Olowookere, Okolugbo & Adegbola,

2023). Customer retention leads to improved patronage, which is the extent to which customers continue to buy a particular product brand. When the above variables are positive in an organization, it entails a high level of business resilience. Therefore, any cosmetics organization that wants to achieve business resilience in this hard economic condition must always embrace technological innovation (Patrick, Bisi, Chibogu & Ebenezer, 2020). Technological innovation ought to lead to business resilience because Technology is the science that provides the knowledge, that is, it encompasses the total knowledge of how things are done.

It includes inventions, techniques, and a store of organized knowledge about everything. Its main influence is on the ways of doing things, including how we design, produce, distribute, and sell goods as well as services (Koontz, Cyril, & Heinz, 1980; Oladele, Olowookere, Okolugbo, & Adegbola, 2023). In emerging markets, a firm's goal of achieving high profits can be achieved through Technological Innovation (TI) (Li, Zhao, & Liu, 2016). In an uncertain environment, Technological Innovation (TI) enables firms to become leaders in a particular industry and easily seize market profits. On the other hand, having no or limited Technological Innovation (TI) can weaken firms' ability to effectively increase their sales growth (Sirilli & Evangelista, 2014). Based on the benefits of technological innovation to overall resilience in manufacturing firms, many manufacturing companies are introducing new technologies, enhancing their existing ones, and training their employees on the effective use of modern technologies. The goal is to produce more unique products, expand their market, acquire and retain customers, increase sales, and generate greater profit from the products.

These arguments provide a strong foundation for investigating the interplay between technological innovation and business resilience (using operational continuity, employee engagement, and customer retention as indices for business resilience).

Statement of the Problem

The cosmetics industry in South East Nigeria is experiencing rapid changes due to technological advancements and increasing competition. These innovations can significantly impact the operational efficiency and market adaptability of cosmetics manufacturers. However, many of these businesses struggle to integrate new technologies effectively, leading to challenges in maintaining resilience against market fluctuations, economic downturns, and consumer demand shifts.

Despite the growing importance of technological innovation in enhancing business resilience, there is a lack of comprehensive studies examining how these innovations specifically impact cosmetics manufacturers in South East Nigeria. The existing literature often overlooks the unique challenges and opportunities faced by this sector, including cultural influences, local consumer preferences, and the region's specific technological landscape. This gap leaves manufacturers without tailored strategies to harness technology for resilience.

Indeed, Oparaugu and Anosike (2023) researched technological innovation and its impact on increased productivity in selected medium-scale companies in South-Eastern Nigeria. The work examined technological innovation in relation to resilience as the dependent variable, utilizing selected medium-scale companies.

Mol and Birkinshan (2019) researched the sources of management innovation in corporate firms in Zambia. The above work did not consider business resilience and was done outside the Nigerian environment.

Nwokorie (2020) also researched technological innovation and organizational performance. This study was carried out on Dufil Prima Food Plc. Port-Harcourt, River State, and Tummy-Tummy Food Industry Ltd, Nnewi, yet did not cover the company's resilience and cosmetics firms.

Namusonge, Willy, and Olawoye (2016) focused on the role of business resilience on sustainable development in telecom firms in Nigeria. The work was not on technological innovation and only considered telecom firms and not cosmetics firms in the Southeast.

With the above, it can be seen that most existing studies on technological innovation primarily focus on larger industries or different geographical regions, leaving a gap in understanding its implications for local cosmetics manufacturers. This study, therefore, aims to explore the relationship between technological innovation and driving resilience among cosmetics companies in South-Eastern Nigeria, using operational continuity, employee engagement, and customer retention as indices for company resilience.

Objective of the Study

The main objective of this study is to examine the relationship between technological innovation and business resilience among cosmetics manufacturers in South-East Nigeria. The specific objectives are to:

1. examine the association between technological innovation and operational continuity.
2. investigate the relationship between technological innovation and employee engagement.
3. assess the link between technological innovation and customer retention.

Research Questions

Based on the study's objective, the following research questions were posed.

1. What is the association between technological innovation and operational continuity?
2. Is there any relationship between technological innovation and employee engagement?
3. What is the link between technological innovation and customer retention?

Hypotheses for this study (in null form)

Based on the study's objectives and research questions, the following research hypotheses were formulated.

H_{o1}: There is no significant association between technological innovation and operational continuity.

H_{o2}: There is no significant relationship between technological innovation and employee engagement.

H_{o3}: There is no significant link between technological innovation and customer retention.

Scope of the study

The scope of this study is broken down into 3: (1) Content scope, (2) Unit scope, and (3) Geographical scope.

Content Scope: The content scope examines the relationship between technological innovation and organizational resilience. The unit scope encompassed the management and senior staff of the firm under study, while the Geographical scope covered the South-Eastern region of Nigeria, where two cosmetics manufacturing firms were selected, each from Abia, Anambra, Ebonyi, and Enugu. Imo was left out because the researcher found no cosmetics manufacturing firms in Imo.

Conceptual Review

The major concepts discussed in this section are presented in the model below:

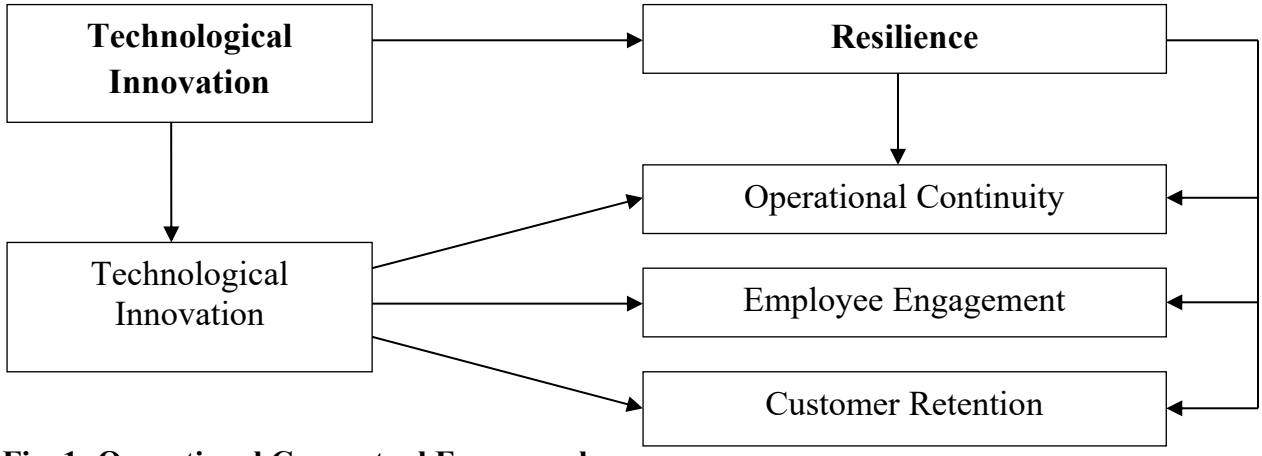

Fig. 1: Operational Conceptual Framework

Source: The Researcher, 2025

The concept for this work is revealed as follows:

Technological innovation

Technological innovation is conceptualized as the creation and application of new or improved technologies, tools, systems, and processes that bring about significant advancement or breakthroughs in various fields.

According to Damanpour and Evan (2015), technological innovation refers to "the implementation of an idea for a new product or a new service or the introduction of new elements in an organization's production process or service operation". However, Singh, Mathiassen, and Mishra (2015) stated in their study that material technologies are applied to technological issues in organizations.

Technological innovation and operational continuity

Technological innovation and operational continuity are two critical aspects of modern business. Technological innovation drives growth, improves efficiency, and enhances competitiveness, while operational continuity ensures that business operations run smoothly and without interruption.

Operational Continuity: Operational continuity refers to an organization's ability to continue operating without interruption, despite disruptions or disasters. Operational continuity is critical to maintaining business reputation, customer trust, and revenue streams. It facilitates business continuity planning, disaster recovery, and risk management.

Relationship between Technological Innovation and Operational Continuity

1. Interdependence: Technological innovation and operational continuity are interdependent, as innovative technologies can enhance operational continuity, and operational continuity can enable the adoption of new technologies.
2. Mutual Reinforcement: Technological innovation can improve operational continuity by enhancing resilience, flexibility, and adaptability, while operational continuity can provide a stable foundation for innovation.

By embracing technological innovation and operational continuity, organizations can drive growth, improve efficiency, and maintain business resilience in an ever-changing environment.

Technological innovation and employee engagement

Technological innovation and employee engagement are closely linked. When employees are empowered with the right technology, they are more likely to be engaged, productive, and motivated. Employee engagement refers to the emotional, cognitive, and behavioral state of being fully involved and committed to one's work. It encompasses:

i. Emotional connection: employees feel a sense of purpose, passion, and enthusiasm for their work.
ii. Cognitive involvement: Employees are focused, motivated, and absorbed in their work.
iii. Behavioral commitment: Employees are willing to exert effort, take initiative, and contribute to organizational success.

Here are some key aspects of their relationship:

i. Increased Efficiency: Technology can automate routine tasks, freeing employees to focus on high-value tasks and improving job satisfaction.
ii. Enhanced Collaboration: Digital tools and platforms facilitate communication, teamwork, and knowledge sharing, promoting a sense of community and engagement.
iii. Improved Work-Life Balance: Flexible technologies, such as remote work tools, can enhance work-life balance, leading to increased job satisfaction and reduced employee turnover.
iv. Upskilling and Reskilling: Technological innovation can provide opportunities for employees to develop new skills, enhancing their engagement and motivation.
v. Employee Empowerment: Technology can empower employees to make decisions, take ownership, and contribute to innovation, leading to increased engagement and motivation.

Technological innovation and customer retention

Technological innovation plays a crucial role in customer retention by enabling businesses to deliver personalized experiences, improve customer service, and build strong relationships. According to Lengnick-Hall, Beck and Lengnick-Hall (2021) Customer retention refers to the ability of a business to keep its existing customers over time, by maintaining a positive relationship and ensuring customer satisfaction. It involves strategies and actions taken to reduce customer chum and increase loyalty, ultimately driving long-term growth and profitability.

Technological innovation plays a significant role in customer retention by enabling businesses to;

1. Personalize experiences: Technology helps businesses collect and analyze customer data, creating personalized experiences and offers.
2. Improve customer service: Technologies like AI-powered chatbots and virtual assistants provide 24/7 support, enhancing customer satisfaction.
3. Enhance engagement: Digital channels and social media enable businesses to engage with customers, build relationships, and foster loyalty.
4. Streamline processes: Technology automates tasks, reducing wait times and improving efficiency, leading to increased customer satisfaction.
5. Provide valuable insights: Data analytics helps businesses understand customer behavior, preferences, and needs, informing retention strategies.

By leveraging technological innovation, businesses can;

1. Increase customer loyalty
2. Reduce churn rates
3. Improve customer satisfaction
4. Drive long-term growth

Business Resilience

According to Umoh and Amah (2013) resilience is the capacity of the organization to absorb shock and develop resistance amid crisis within its environment. Annarelli, Battistella, and Nonino (2020) stated that business resilience involves an organization's ability to face disruptions and unexpected events with strategic awareness and linked operational management of internal and external shocks. An often-overlooked challenge in business resilience planning is the human element, where individuals in chaotic situations must be prepared and educated on how to respond accordingly (Ramezani & Camarinha-Matos, 2020). In view of Annarelli, Battistella and Nonino (2020), business resilience is the corporation's ability to face commotion and unanticipated incidents based on the strategic responsiveness and linked operational management of both internal and external shocks.

Business resilience is the ability of an organization to quickly adapt to disruptions while maintaining continuous business operations and safeguarding its people, assets, and objectives. According to Maguire and Cartwright (2018), resilience is not just about rebuilding well, but also involves revolution, thus requiring both innovation and creativity. Hence, the transformational view of the resilience concept is concerned with concepts of regeneration, renewal, and reorganization. For Lengnick-Hall, Beck, and Lengnick-Hall (2021), business resilience is an enterprise's ability to effectively absorb, develop situation-specific responses to, and finally engage in transformative activities to capitalize on disruptive surprises that potentially threaten the organization's survival. The concept of resilience is applied in various fields of knowledge. It refers to the capacity and aptitude of an element to return to a stable state after an interruption. Business resilience is the ability to effectively participate in crisis management and navigate challenging situations (Beuren, dos Santos, & Theiss, 2021).

Measures of Business Resilience

They are discussed thus:

1. **Operational continuity:** Almazmomi (2018) defined operational continuity as a business strategy that makes business firms strive for sustainability notwithstanding the challenges they face. It implies the need to determine the level of resilience of a firm, its ability to recover after an event, and build a system that resists to external and internal events or can recover after an event without losing its external performance management capability (Ryu, 2016, and Tonkova, Petrov & Hristova, 2019). Operational continuity refers to a business's ability to continue operating despite damage, loss, or critical events. Organizational Continuity is achieved only with specific corporate planning (García-Álvarez, 2015; Gerba & Viswanadham, 2016). Operational continuity means it has maintained its assets, properties, and business in the same manner it started and has made some improvements. According to Al-Qudah (2019), operational continuity refers to an organization's ability to ensure the continuity of its critical operations and core business functions, which should remain completely operational or minimally impacted by a disaster or unplanned incident that takes critical systems offline simultaneously.

2. **Employee engagement:** According to Kajogbola (2014), employee engagement refers to the level of commitment, passion and enthusiasm that employees have towards their work and their organization. Employee engagement is a set of positive emotions that brings congruence and focus on goal alignment, resulting in the reduction of organizational nonconformity. Basically, engaged employees are more productive, innovative, and loyal to their employers. The extent of organizational goal achievement depends on the level to which workers are engaged on their job (Adeola, 2020 and Degenova, 2019). Employee engagement is defined by (Kajogbola, 2014) as "a positive attitude held by the employee towards their organization and its values. Here, an engaged employee is aware of the business context, and works with colleagues to improve performance within the job for the benefit of the organization. The organization must work to develop and nurture engagement, which requires a two-way relationship between employer and employee.
3. **Customer retention:** Customer retention starts with the first contact an organization has with a customer and continues throughout the entire lifetime of a relationship and successful retention efforts take this entire lifecycle into account (Beuren, dos Santos & Theiss, 2021). A company's ability to attract and retain new customers is related not only to its product or services, but also to the way it services its existing customers, the value the customers actually generate as a result of utilizing the solutions and the reputation it creates within and across the marketplace. For Lengnick-Hall, Beck and Lengnick-Hall (2021) successful customer retention involves more than giving the customer what they expect. Generating loyal advocates of the brand might mean exceeding customer expectations. Customers are the engine of any business. This is because the extent to which a firm has customers and retains their customers determines in the extent of resilience of such business. Lengnick-Hall, Beck and Lengnick-Hall (2021) customer retention refers to the ability of a company or product to retain its customers over some specified period. It is the activity that a selling organization undertakes in order to reduce customer defections.

Theoretical Review

The researcher adopted Resource Based Theory (RBT).

Resource Based Theory (RBT)

This theory was developed by Zikizi in 1977. The theory argued that organizations should look inside the company to find the sources of competitive advantage instead of looking at competitive environment for it. Resources refer to all components made available by an organization to perform innovative work tasks. It has been averred that employees need access to sufficient resources to be creative. These resources may include access to funds, materials, facilities, knowledge, information, sufficient time to produce novel work in the domain, and training opportunities. The work was further improved by Wernerfelt (1984), who presented a resource-based view of the Firm, significantly contributing to understanding how technological innovation can impact companies by introducing the Resource-Based View (RBV) of the firm. His key contributions relevant to technological innovation and companies:

1. **Focus on Resources and Capabilities**
   Wernerfelt emphasized that a firm's resources and capabilities are critical for achieving a competitive advantage. This perspective highlights the importance of technological innovations as valuable resources that can differentiate companies in the marketplace.
2. **Competitive Advantage**
   The RBV suggests that firms can gain a sustainable competitive advantage by leveraging unique resources, including proprietary technologies, patents, and advanced R&D capabilities. This framework helps explain how technological innovation can enhance a company's position.
3. **Innovation as a Strategic Resource**
   Wernerfelt argued that technological innovation should be viewed as a strategic resource. Companies that innovate effectively can not only improve operational efficiency but also respond better to market changes and consumer demands.
4. **Barriers to Imitation**
   The paper discusses how unique resources are less likely to be easily replicated by competitors. Innovations that are difficult to imitate can provide companies with a lasting edge, reinforcing the value of investing in technology.
5. **Linking Resources to Performance**
   Wernerfelt's framework establishes a connection between a firm's resources, including technological capabilities, and its overall performance. This relationship underscores the role of innovation in driving business success and resilience.
6. **Strategic Resource Allocation**
   The RBV encourages firms to strategically allocate resources toward innovation and technology development, recognizing that these investments are crucial for long-term growth and adaptability.

In all, Wernerfelt's work laid the groundwork for understanding how technological innovation can serve as a key resource for companies, driving competitive advantage and enhancing resilience in a dynamic business environment. His insights continue to influence strategic management and innovation studies today.

The researcher chose this theory because it brings another angle of innovation which examines how resources can drive competitive advantage through customized strategies, which will drive growth over time. The resources and capabilities of an organization are the primary considerations in the formulation of its strategy; they are the main concept upon which an organization can establish its identity and build its strategy, and are the primary sources of an organization’s profitability.

This work is anchored on Resource Based Theory (RBT). The reason is that the extent of technological innovation implementation in business organizations depends on the availability of resources. Here, a cosmetic firm with a high financial and human resource base is likely to effectively implement technological innovation and enhance organizational goals. This requires designing strategies that allow for maximum exhibition of the organization’s unique characteristics. A competitive advantage is a strategy that is based on resources that are valuable. Despite the advantages offered by the RBV to practitioners and scholars alike, the theory has been under attack by opponents claiming that there is an over enthusiasm for what the theory can deliver, especially

concerning a lack of criteria for generalizability and definitional ailments. The Resource Based Theory (RBT) may be self-verifying, but this reason is circular and invalid operationally.

Empirical Review

Bienose, Egwakhe, Adefulu, and Akande (2022) analyzed business resilience dimensions and revenue generation as an option for family business sustainability in Ogun State. The data collected through the primary sources (questionnaire) were analyzed using inferential statistics employing multiple regression analysis. Findings revealed that business resilience measures have no significant effect on revenue generation and family business sustainability in South-Western Nigeria (Adj. $R^2 = 0.001$; $F(6, 461) = 1.056$, $p > 0.05$).

Ekeh (2021) examined the impact of market innovation and customer patronage in Dangote Cement, Benue State, Nigeria (2010 – 2015). The study employed an ex post facto method using secondary data. The data collected were presented in a table, and the data were analyzed using regression statistics. The findings revealed a significant market segmentation that can lead to improved sales and organizational growth. +

Yinka (2021) focused on the effect of technology innovation on the performance of HITY manufacturing firm in South Africa. In line with the above, four research objectives, four research questions and two hypotheses guided the study. The researcher employed a survey research design, hence the questionnaire served as the instrument of data collection, where 34 management staff of the firm were studied. The data collected were presented in tables and analyzed using simple percentages, and hypotheses were tested using the Pearson Correlation Coefficient. The findings revealed that there is a significant impact of technology innovation and customer patronage.

Nwokorie Peterson (2020) examined Technological Innovation and organizational performance using Dufil Prima Food Plc. Port-Hacourt, Rivers state, and Tummy Tummy Foods Industry Ltd, Nnewi, Anambra state, as the case study. He employed a descriptive survey design, and the questionnaire served as the primary instrument for data collection. The study population consists of the permanent staff of the above-mentioned firms. The data collected were presented in tables and analyzed using simple percentages and analysis of variance (ANOVA). It was discovered that technological innovation has a significant effect on productivity. Consequently, technological innovation significantly affects patronage, and a significant relationship exists between technological innovation and customer acquisition.

Ogu (2019) researched the effect of technological innovation on productivity (a study of Nigeria Bottling Company Plc, Rivers State). In line with the statement of the problem, five objectives, five research questions, and two hypotheses guided the study. Survey research design was adopted, the questionnaire served as the instrument of data collection, the data collected (from the employees of the Nigeria Bottling Company, Rivers State) were presented in a table, and analyzed using simple percentage and analysis of variance (ANOVA). The result indicated that technological innovation leads to improved profit and customer acquisition.

Adeola (2017) determined the effect of technological innovation on Nigerian consumers. The knowledge derived from relevant literature was used to draft out organized questionnaires to be filled by respondents residing in Yola and Jimeta towns, Adamawa State, Nigeria. A total of 270 copies of questionnaires were distributed to respondents, but only 222 were duly completed and returned. The data collected were analyzed using SPSS 21.0 and Microsoft Excel software. On the SPSS package, correlation and significance (2-tailed) were used as statistical tools. It found that innovation enhances patronage of Nigerian consumers.

Obinwa (2016) carried out research on the effects of business planning on the business resilience of Nigerian firms using the Nigeria Bottling Company as the focal point. Based on the above four research objectives, four research questions, and two hypotheses guided the study. The researcher employed a descriptive survey research design, and the questionnaire was used as the instrument of data collection. The staff of the Nigeria Bottling Company served as the study population, from which a sample of eighty (80) individuals was selected using a simple random sampling technique. Though out of the 80 questionnaires distributed, only 60 were properly filled out, returned, and used. The data collected were presented in tables and analyzed using simple percentages, and hypotheses were tested using analysis of variance (ANOVA). The findings revealed that there is a positive effect of business ethics on business resilience.

Gap in Literature

In line with the empirical studies, it could be seen that many related works have been done on this subject matter. However, the exact subject matter was not covered. We are grouping the gap in many categories, thus:

a. **Gap on topic:** As we can see from the related empirical work, none of the past studies covered the exact topic of this work. Only related works were covered, as no work covered both dependent and independent variables studied in this work at the same time.
b. **Gap in the area of the study:** This work covered only selected cosmetics companies in South-East Nigeria. Some of the past studies did not use Nigeria organizations. Some that used Nigerian organizations were not done within the southeast, but used other parts of Nigeria. Still, few works done within the south east studied a single firm and did not used cosmetics companies.
c. **Gap on the variables/indices:** The variables in our objectives of study were not exactly covered by past research. Past work did not exactly use the indices which include technological innovation for the independent variable, and operational continuity, customer retention, and employee engagement for the dependent variable. For that, this work is focus on filling the gap on technological innovation and resilience in cosmetics companies in South-East Nigeria.

METHODOLOGY

Research Design

For this work, a cross-sectional survey design was applied. The study employed questionnaires, observation, and interviews. This design is used because it enables the easy collection of data from a group of people (a population or a sample) at a single point in time.

Population of the Study

The population of this study consisted of 300 senior and management staff from the cosmetics companies under study. The cosmetics manufacturing firms in South-Eastern Nigeria are approximately 12 in number, with Enugu State having 4, Anambra and Abia having 3 each, and Ebonyi State having 2. For convenient and equal representation, two firms were then selected from each of these four, excluding Imo State. To select these 2 firms, a stratified random sampling method was adapted. Here, the names of all 4 firms in Enugu, 3 firms in Abia, and 3 firms in Anambra were written on a piece of paper, folded, and dropped into a small black bag, one state per bag. Then a young man was invited to pick 2 from each bag without replacement. This resulted in the 8 firms that serve as the population of this study (as can be seen in the table below):

Table 1: Study population

Manufacturing companies	**Population**
Starline Nigeria Ltd, Aba, Abia State	39
PZ Cussons Onitsha, Anambra State	43
Hardis and Dromedis Ltd, Enugu State	39
Zan Cosmetic Industries Limited, Aba, Abia State	35
Udesco Manufacturing Company Ltd, Nkpor, Onitsha, Anambra State	30
Chilar Manufacturing Services Ltd, Abakiliki, Ebonyi State	43
Mila Beauty & Skin Care Abakiliki, Ebonyi State	37
Ziva Beauty Enugu-Ezike, Enugu State	34
Total	**300**

Source: *Personnel Unit of the Cosmetics Companies under study, 2025.*

To determine the sample size, the formula of Taro Yamane was used. The formula is given as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where

n = the sample size

N = population. An estimated population of 300 is used.

e^2 = square of maximum allowance for sampling error at 5% level of significance.

$$n = \frac{300}{1+(300)\ (0.05)^2}$$

$$n = \frac{300}{1+(300)\ (0.0025)}$$

n = **171.428 = 171**

Data collection

For this work, the questionnaire is the major instrument for data collection. The questionnaire was framed in a Likert format, with options ranging from "strongly agree" to "strongly disagree," and was distributed to the senior and management staff of the firms. The management and senior staff of the firms were chosen because they are the individuals who possess the necessary information and understanding of the variables under study. They set the goals and record the resultant effects on the variables from within and outside the organization. A total of 171 copies of the questionnaire were distributed, and only 148 were duly completed and returned, as shown in the table below.

Table2: Questionnaire Distribution

Cosmetics companies	**Copies allotted**	**Copies returned**
Starline Nigeria Ltd Aba, Abia State	22	19
PZ Cussons Onitsha, Anambra State	24	20
Hardis and Dromedis Ltd, Enugu State	22	18
Zan Cosmetic Industries Limited Aba, Abia State	21	21
Udesco Manufacturing Company Ltd Nkpor, Onitsha, Anambra State	17	15
Chilar Manufacturing Services Ltd, Abakiliki, Ebonyi State	24	17
Mila Beauty & Skin Care Abakiliki, Ebonyi State	21	18
Ziva Beauty Enugu-Ezike, Enugu State	20	20
Total	**171**	**148**

Method of data analysis

The data collected in this study were analyzed using simple percentages, bar charts, mean statistics, and Pearson Product-Moment Correlation Coefficient (r) at a 0.05 level of significance, through Statistical Package for Social Sciences (SPSS version 21.0).

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

Data presentation

Table 3: Constructs for Technological Innovation.

S/N	Questionnaire Items	SA (4)	A (3)	D (2)	SD (1)	N	EX	X	Dec
1	Technological innovation enhances the operational continuity of the business	147	1	-	-	148	591	4.0	Positive
2	The issue of technical design and product innovation encourages firm output maximization	76	29	23	20	148	457	3.1	Positive
3	Introduction and use of new technology leads to business sustainability	83	39	13	13	148	488	3.3	Positive
4	Technological innovation contributes to organizational improvement in product acceptance	93	41	6	8	148	404	2.7	Positive
5	Technological innovation leads to organizational goal achievements	86	33	9	20	148	481	3.3	Positive
	Grand mean							**3.3**	

As shown in Table 3, all items are positive. This is because item 1 has a mean of 4.0, item 2 has a mean of 3.1, item 3 has a mean of 3.3, item 4 has a mean of 2.7, and item 5 has a mean of 3.3; hence, all the items have mean scores of 2.5 or above.

Table 4: Construct for operational continuity.

S/N	Questionnaire Items	SA (4)	A (3)	D (2)	SD (1)	N	EX	X	Dec
1	Operational continuity will be achieved through improved and innovative products	56	71	15	6	148	473	3.2	Positive
2	Employment of qualified staff will lead to operational continuity	111	29	6	2	148	545	3.7	Positive
3	Use of modern technologies will enhance operational continuity	66	69	8	5	148	492	3.3	Positive
4	Regular staff development activities for the use of modern production	75	38	20	15	148	499	3.4	Positive

	equipment will lead to operational continuity								
5	Understanding the nature of customers and producing acceptable quality products will lead to the firm's operational continuity	100	33	8	7	148	522	3.5	Positive
	Grand mean							**3.4**	

As shown in Table 4, all items are positive. This is because item 1 has a mean of 3.2, item 2 has a mean of 3.7, item 3 has a mean of 3.3, item 4 has a mean of 3.4, and item 5 has a mean of 3.5; hence, all the items have mean scores of 2.5 or above.

Table 5: Construct for employee engagement.

S/N	Questionnaire Items	SA (4)	A (3)	D (2)	SD (1)	N	EX	X	Dec
1	Engagement of workers will lead to innovation in the business	130	15	-	3	148	565	3.8	Positive
2	Organizational resilience will be achieved when the employees are properly engaged	49	71	20	8	148	457	3.1	Positive
3	There is neglect of employee engagement which has affected firm resilience in the system	21	28	60	39	148	327	2.2	Negative
4	Given more responsibilities and training to workers will enhance their innovative engagement in the organization	115	27	6	-	148	553	3.7	Positive
5	Engaging employees on different corporate innovation will lead to goal achievement and business resilience	139	6	2	1	148	579	4.0	Positive
	Grand mean							**3.4**	

As shown in Table 5, not all items are positive. This is because item 1 has a mean of 3.8, item 2 has a mean of 3.1, item 3 has a mean of 2.2, item 4 has a mean of 3.7, and item 5 has a mean of 4.0; hence, not all the items have mean scores of 2.5 or above.

Table 6: Construct on customer retention.

S/N	Questionnaire Items	SA (4)	A (3)	D (2)	SD (1)	N	EX	X	Dec
1	Employee retention will regularly lead to goal achievement in the business	27	15	50	56	148	309	2.1	Negative
2	Some organization customer may staff patronizing other companies if staff retention is neglected	107	37	1	3	148	544	3.7	Positive
3	Retaining qualified staff will lead to innovation in the organization	41	69	19	19	148	428	2.9	Positive
4	Most of the qualified employees in the organization normally seek jobs in other companies because of a lack of retention packages	31	7	60	50	148	315	2.1	Negative
5	Employee retention will lead to organisational resilience and effectiveness at all times	109	30	5	4	148	540	3.6	Positive
	Grand mean							**2.9**	

Table 6 indicates that not all items yield positive results. Specifically, item 1 has a mean score of 2.1, item 2 has a mean of 3.7, item 3 has a mean of 2.9, item 4 also has a mean of 2.1, and item 5 has a mean of 3.6. Notably, despite the variation, all items have mean scores exceeding the threshold of 2.5.

Testing of Hypotheses

Ho1: There is no significant association between technological innovation and operational continuity.

To test Hypothesis 1, data from Tables 1 and 2 were used.

Table 7: Association between technological innovation and operational continuity.

H_i1	There is a significant relationship between technological innovation and operational continuity.	Pearson Correlation = 0.87 Sig = 0.05 N = 148 Grand mean for Table .1 = 3.3	**VALID**

		Grand mean for table 2 = 3.4 Mean of mean = 3.35 Approximately 3.4	

Table 7 above reveals that the mean of the means is 3.4, which yields a Pearson product-moment correlation of 0.87, indicating a value greater than 0.05. This suggests a significant relationship between technological innovation and operational continuity. Hence, the null hypothesis is thus rejected.

Ho2: There is no significant relationship between technological innovation and employee engagement.

To test Hypothesis 2, data from Tables 1 and 3 were used.

Table 8: Relationship between technological innovation and employee engagement.

H_i2	There is a significant relationship between technological innovation and employee engagement.	Pearson Correlation = 0.87 Sig = 0.05 N = 148 Grand mean for table 1 = 3.3 Grand mean for table 3 = 3.4 Mean of mean = 3.3 + 3.4 = 6.7÷ 2 = 3.3.5, approximately 3.4	**VALID**

Table 8 above reveals that the mean of the means is 3.4, which also yields a Pearson product-moment correlation of 0.87, still greater than 0.05. It also reveals that there is a significant relationship between technological innovation and employee engagement. Hence, the null hypothesis is rejected.

Ho3: There is no significant link between technological innovation and customer retention.

To test Hypothesis 3, data from Tables 1 and 4 were used.

Table 9: Link between technological innovation and customer retention.

H_i3	There is a significant link between technological innovation and customer retention.	Pearson Correlation = 0.81 Sig = 0.05 N = 148 Grand mean for table 1 = 3.3 Grand mean for table 4 = 2.9 Mean of mean = 3.3 + 2.9 = 6.2, 6.2 ÷2 = 3.1 = 3.1	**VALID**

Table 9 above reveals that the mean of the means is 3.1, which yields a Pearson product-moment correlation of 0.81, also exceeding 0.05. This suggests a significant relationship between technological innovation and customer retention. Hence, the null hypothesis is rejected.

Table 10: Summary table for the test of the hypothesis.

S/N	Hypotheses	Statistical Tools Applied (Software Results)	Result
H_i1	There is a significant relationship between technological innovation and operational continuity.	Pearson Correlation = 0.87 Sig = 0.05 N = 148 Grand mean for table 1 = 3.3 Grand mean for table 2 = 3.4 General mean = 3.4	**VALID**
H_i2	There is a significant relationship between technological innovation and employee engagement.	Pearson Correlation = 0.87 Sig = 0.05 N = 148 Grand mean for table 1 = 3.3 Grand mean for table 3 = 3.4 General mean = 3.4	**VALID**

H_i3	There is a significant link between technological innovation and customer retention.	Pearson Correlation = 0.81 Sig = 0.05 N = 148 Grand mean for table 1 = 3.3 Grand mean for table 4 = 2.9 General mean = 3.1	**VALID**

DISCUSSION OF FINDINGS

The major findings of this study are:

1. There is a significant association between technological innovation and operational continuity. A strong relationship between technological innovation and operational continuity enhances organizational resilience by:

Automating critical processes reduces human error and ensures business operations can continue even during disruptions.

Introducing flexible digital systems (e.g., cloud computing, data backup, AI monitoring) that allow the organization to maintain productivity despite crises like power failures, pandemics, or cyber-attacks.

Improving adaptability: through predictive analytics and real-time monitoring, which help anticipate and mitigate risks before they escalate. In turn, this results in the organization becoming agile and self-sustaining, capable of maintaining smooth operations under pressure. This is in agreement with Michael (2022), who views technology as the basic instrument for achieving business viability and development. For Jhingan (2013), business patronage and customer increase are possible through the effective use of modern technology.

Ekeoma (2019) asserted that high-tech applications for product manufacturing in organizations can be used to achieve business growth. In this direction, Kamau (2016) noted that improved technology could be used to achieve viable productivity.

2. There is a significant relationship between technological innovation and employee engagement. A good relationship between technological innovation and employee engagement strengthens resilience because;

Digital tools (like collaboration platforms and AI assistants empower employees to work efficiently, even remotely.

Innovative technologies (like learning platforms or automation) support continuous skill development, increasing employees' confidence and adaptability.

Inclusive innovation culture: encourages employees to contribute ideas, promoting ownership and creativity in problem-solving.

Hence, employees become motivated, adaptable, and proactive, forming a workforce that can absorb shocks and sustain performance during change. This aligns with Khalil (2022), who views technology as the result of human knowledge and acquired technical skills, enabling individuals to perform tasks effectively. Based on the above, technology innovation is the application of ideas related to applied science to make changes to production processes.

3. There is a significant link between technological innovation and customer retention.

When technological innovation supports customer retention, it boosts organizational resilience by:

Enhancing customer experience: through personalized services, AI chatbots, and faster response times.

Using data analytics to understand and anticipate customer needs, fostering trust and loyalty even during disruptions.

Building strong digital relationships: via online platforms, ensuring continuity of engagement when physical channels are unavailable.

Therefore, the organization maintains a stable and loyal customer base, providing steady revenue and feedback loops that help it recover quickly from crises.

This is in agreement with the findings of Mmuo (2021), who found that modern technology (eg, the Internet of Things by cloud computing) could be used to reach numerous customers and achieve patronage and retention from customers. (Seng, Yusof & Abidin, 2021). believe that a better strategy for the organization is to focus more on customer satisfaction and market segmentation than on its products or processes.

The findings of this work disagree with those of Bienose, Egwakhe, Adefulu, and Adande (2022), who found that business resilience measures have no significant effect on revenue generation and family business sustainability in the South-West, Nigeria.

In all, this is in line with Wernerfelt's RBV theory as contained in Wernerfelt's 1984 framework, which established a connection between a firm's resources, including technological capabilities, and its overall performance.

Generally, this work laid the groundwork for understanding how technological innovation can serve as a key resource for companies, driving competitive advantage and enhancing resilience in a

dynamic business environment. His insights continue to influence strategic management and innovation studies today.

Conclusion

One of the strategies for achieving an organization's business goals is through technological innovation. For that reason, the contributions of technological innovation to organizational goals cannot be overstated. That is why many organizations, especially those in the production sector, pay attention to effective technological innovation in order to achieve resilience and overall improved market performance. The findings of this work demonstrate a strong relationship between technological innovation and key organizational dimensions, including operational continuity, employee engagement, and customer retention, which significantly enhances organizational resilience. Technological innovation supports operational continuity by automating critical processes, minimizing human error, and enabling flexible digital systems that sustain productivity during disruptions. Through innovations such as cloud computing, artificial intelligence, and predictive analytics, organizations can anticipate risks and maintain consistent performance in the face of uncertainty. Furthermore, the integration of technological innovation with employee engagement fosters resilience by empowering staff with efficient digital tools, promoting continuous learning, and encouraging a culture of creativity and problem-solving. Engaged employees are more adaptable and motivated to respond effectively to change. Similarly, the connection between technological innovation and customer retention strengthens resilience by improving service delivery, personalizing customer experiences through data analytics, and maintaining strong digital relationships that ensure customer loyalty even during crises. Collectively, these interactions enhance an organization’s adaptive capacity, stabilize essential resources, and enable it to recover swiftly and thrive amid environmental and market uncertainties.

In this direction, technological innovation is the essential key to a firm obtaining a dominant position and gaining sustainability and performance. This work concludes that the achievement of business resilience depends on the extent of technological innovation that is implemented.

Recommendations

Based on the findings, it was recommended that:

1. Manufacturing firms, especially cosmetics firms, should adapt technological innovation so as to achieve operational continuity.
2. Employees should be trained, developed, and engaged on the best ways to operate modern technologies in the company.
3. Modern production equipment should be used to achieve production of quality products, which will enhance customer attraction, patronage, and customer retention.

On their own, the Government should provide financial incentives, tax breaks, and grants to encourage manufacturers to invest in technology.

Infrastructure development: Investing in improving electricity supply, transportation networks, and internet connectivity in south-east Nigeria.

Suggestion for further studies

The researcher recommends that further studies be conducted to explore:

1. The transformative effects of technology and innovation on Nigeria's business environment.
2. The influence of technological innovation on the profitability of small and medium-sized enterprises (SMEs) in Nigeria.

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