

# Technological Innovation And The Performance Of Food And Beverage Manufacturing Companies

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**Abstract-** *Innovation is a strategy that leads to gaining competitive advantage in the marketplace. It makes business organisations sustainable and enables them to be in positions to adequately meet the needs of their customers in the face of changing tastes and fashion. So, organisations that have poor attitudes towards innovation that consequently result in low ability to create products and services that satisfy their customers decrease their chances of growth and survival in the marketplace. The objective of this study was to investigate the effect of technological innovation on the performance of food and beverage manufacturing companies in Osun state, Nigeria. Specifically, the effect of product and process innovations on company performance was investigated.*

*This study was conducted based on survey research design. Data collected for the study on a five-point Likert scale ranging for Strongly Agree 5 to Strongly Disagree 1 were analysed based on descriptive and inferential statistics. Multiple regression analysis provide measures for the effect of the constructs on company performance.*

*The results of multiple regression analysis indicated statistical significance for the hypotheses of the study. Technological innovation had positive effect on performance. Technological innovation explained 68.59 percent variation in company performance. The two components of technological innovation, product innovation and process innovation that were tested for statistical significance indicated positive effects on performance.*

*Having ascertained positive effect of technological innovation on company performance, the study emphasized the need for the companies to place greater reliance on it to increase the chances of explaining more variation in performance and improving their competitive positions in the marketplace.*

**Index Terms-** *Company performance, innovation, process innovation, product innovation, technological innovation.*

## I. INTRODUCTION

The conduct of business requires creating value for customers.

Among the factors for gaining competitive advantage that subsequently lead to profitability is the value customers place on the company's product i.e. the satisfaction they derive from consuming the product. (Jones & Hill, 2013). Customers' tastes and fashion change from time to time. It is when organisations are able to initiate change and keep pace with change that they increase their chances of survival and prosperity in the business environment. It is when organisations do device new ways of doing things and constantly make efforts that, from time to time, result in the introduction of new products in the market that they increase the chances of increasing their market shares, sales volume, and profits and also build upon their goodwill.

Businesses thrive and grow when goods and services are capable of satisfying customers' needs. For this reason, managers of business organisations need to use technology to create new products and improve production processes. Innovation is an important determinant of business success both for domestic and global businesses. Innovation is of strategic importance in the conduct of business. It is a means of expanding market share, increasing sales revenue and profits of a firm. It increases the ability of a firm to survive or excel in a difficult market. A study by Baden Fuller and Stopford (1992) indicates that creative firms can achieve success in a hostile industry and even transform the industry.

Technological innovation consists of activities that, among others, represent the application of new technology and methods (Olomu, Akinwale, & Adepoju, 2015). Two aspects of technological innovation - product innovation and process innovation, play significant role in creating opportunities for organisations in the business environment. Product innovation relates to producing an entirely new product or making changes

that improve product infrastructure or the quality of existing products. Process innovation, on the other hand, refers to new technology or improvements in an existing technology for creating products. Both innovation types have the potential to improve the competitive positions of business organisations.

Innovation is important for increasing the competitiveness of firms in the marketplace because it enables them to create new products that better fulfil the needs of their customers. However, it seems that significant contributions are not being made by product and process innovations to the market performance of food and beverage manufacturing companies in Osun State, Nigeria. A situation where innovation efforts do not yield anticipated gains for companies can have adverse effects on their competitive positions in the marketplace.

### Research Questions

The research questions of this study are:

1. What is the effect of product innovation on the performance of food and beverage manufacturing companies in Osun State, Nigeria?
2. What is the effect of process innovation on the performance of food and beverage manufacturing companies in Osun State, Nigeria?

### Hypotheses of the Study

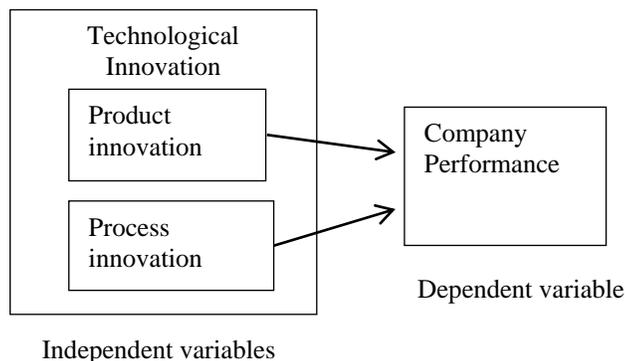
H<sub>01</sub>: Product innovation has no significant effect on the performance of food and beverage manufacturing companies in Osun State, Nigeria.

H<sub>02</sub>: Process innovation has no significant on the performance of food and beverage manufacturing companies in Osun State, Nigeria.

### Objectives of the Study

The broad objective of this study is to ascertain the effect of technological innovation on the performance of food and beverage manufacturing companies in Osun State, Nigeria.. The specific objectives are to:

1. Determine the effect of product innovation on the performance of food and beverage manufacturing companies in Osun State, Nigeria.
2. Determine the effect of process innovation on the performance of food and beverage manufacturing companies in Osun State, Nigeria.



**Figure 1: Conceptual Framework of technological innovation and company performance**

Source: Author, 2022

## II. LITERATURE REVIEW

### Innovation

Innovation gives rise to new products that come to the market or new technology and processes that are associated with their production. Newness of a product or technology refers to a novel product or technology or a change conceptualised to improve an existing one. Companies rely on innovation as a means of improving their competitiveness in the marketplace. Walker (2011) defines innovation as the introduction of a new product, service, or process to the external market or the introduction of a new device, system, program, or practice in one or more units of an organisation. Innovation refers to the process that aims at creation, development, and generation of new ideas to develop new products, services or any other new activities (Dibrell, Davis, & Craig, 2008). Innovation has also been defined as the process that creates new and useful things; such as introduction of new techniques, practices and process or producing new products and service (Mckeown, 2008). OECD (2007) states that innovation implies the conversion of ideas into products, processes or services that are successful in the market. Zimmerer and Scarborough (2011) define innovation as the ability to apply creative solution to problems and opportunities to enhance or to enrich people’s lives. It follows that solving problems through innovation is the consequence of value creation that enables companies to take advantage of opportunities in the business environment. Value creation brings about need-satisfying goods and services and promotes the welfare of customers and the competitiveness of business. The essence of innovation is to use novel ideas, products, processes, or any other thing to achieve a more efficient and effective operation, improve the present state of affairs and people’s welfare.

A large company with substantial financial resources and established research and development unit that introduces a new product into the market or uses new technology to produce an improved version of a product has a chance of reaping more benefits from the market than other competitors that follow suit in adopting the new technology. The early- or first-mover advantage theory emphasizes the importance of innovation for firm competitiveness and growth, and argues that innovation activities create awareness of latest developments for companies, enables them to gain new knowledge, and increases their likelihood of benefiting from the innovation over time (Bierly & Damanpour, 2009). So, when a company introduces change in an industry via innovation, other competitors that adapt to it subsequently benefit from it.

### Technological Innovation

The pursuit of technological innovation as a means of achieving increased employee productivity and organisational performance is a core business strategy that anticipates gains for organisations, financial or otherwise. Anticipated gains such as higher returns on investment and sales revenue or improved market position

and customer satisfaction provide impetus for embarking on technology-driven strategy such as product innovation and process innovation. Technological innovation, in this study, is conceptualised as product and process innovations. This classification of technological innovation agrees with that of Damanpour (2010) and OSLO (2005).

**Product innovation** is a necessity for organisations that desire to continue to provide satisfaction to their customers in the face of their changing needs and tastes. Product innovation has been defined as the introduction of new products or services designed to meet the needs of external users (Damanpour, 2010; Schilling, 2013). Product innovation refers to producing new products or services or making significant improvement on existing ones (Polder, Leeuwen, Mohnen, & Raymond, 2010). Product innovation has also been defined as the introduction of goods and services that are new or significantly improved in their characteristics or intended uses, or improvement in technical specification, component and material, incorporated software, user friendliness, or other functional characteristics (OECD Oslo Manual, 2005). Kanagal (2015) states that firms need product innovation to enable them cope with competitive pressures, changing tastes and preferences, short product life cycles, technological obsolescence, varying demand patterns, and specialized requirements of customers.

Since an innovation project is embarked upon to boost company competitiveness and market position, it is important to ascertain if desired results are being achieved. Thus, the success of a product-innovation project can be determined by some measures of efficiency and effectiveness. Measures of efficiency include ascertaining: the average time spent on a product-innovation project, the average cost of the project to know if cost reduction is achieved, the degree of public satisfaction that results from the project (Alegre, Lapedra & Chiva; 2006). Measures of effectiveness include ascertaining if the project produces a product that: replaced another product, results in an increase in the company's market share, is environmentally friendly, targets a new group within a domestic economy, and opens new markets abroad (Alegre, *et al.*, 2006). When a new product replaces another product that is no longer in vogue in the market, the innovating firm's effectiveness is enhanced if the new product contributes to enlarging the firm's market share and increases sales volume.

**Process innovation** refers to new elements introduced into a firm's production or service operation to produce a product or render a service (Damanpour, 2010; Schilling, 2013). Process innovation is an aspect of technological innovation that relates to introducing new processes in firms for the purpose of producing new goods or providing new services that yield satisfaction to their users and improve the competitiveness of firms that introduce them. Parida, Patel, Frishammar and Wincent (2016) define process innovation as the creation and implementation of new concepts and methods in manufacturing companies while Frishammar, Lichtenthaler and Richtner (2013) state that process innovation is a type of process development of a firm's manufacturing processes. Essentially, it involves introducing new

activities to a firm's manufacturing processes in order to produce a new product or service or to upgrade an existing one.

Like product innovation, companies are motivated to embark on process-innovation projects by the need to differentiate their products from similar products of other competitors in order to improve their competitive positions. Product differentiation resulting from process innovation enables companies to reap substantial benefits from innovation before market competition levels them up. Four benefits of effective process development efforts indicated by Wheelwright (2010) are: it improves a company's market position by affording the company the ability to set a standard for the industry; it enables a company to overcome past weaknesses and enhances the chances of realizing its full potential; it is associated with creativity and positive outcomes in the whole organisation; it gives a company competitive advantage by speeding up time to market or by taking time to acquire information that produces goods and services that meet the expectations and needs of customers.

Product or service quality is a factor in meeting the expectations of customers. What a company achieves from innovation has relationship with the emphasis the company places on quality. Hung, Lien, Yang, Wu and Kuo (2011) suggest that quality has significant and positive effects on organisational learning, and that both quality and organisational learning have significant as well as positive effects on innovation performance (Hung, 2006).

### **Company Performance**

Performance plays an important role in the operations of organisations and ability to attain performance goals is what keeps them in business. Companies set performance goals for themselves that require ascertaining if the goals are being attained or not. Performance goals include attaining defined returns on investment, sales figure, market share, customer satisfaction, corporate image and so on. Darwish, Potočnik and Singh (2016) state that company performance may be defined in terms of financial ratios such as return on assets (ROA) and return on equity (ROE) or in terms of market outcomes such as market share, stock price and growth or in human relations-related outcomes such as job satisfaction, job commitment and others or in organisational outcomes such as productivity, service quality, new product development and others. Furthermore, Hannachi (2015) reports that a study conducted by Storey and Easingwood (1999) on consumer financial services sector in the UK identified three distinct dimensions of performance: sales performance, profitability and enhanced opportunities.

### **Technological Innovation and Company Performance**

Empirical studies on effects of product and process innovations on company performance have, to a large extent, indicated positive effects between dependent and independent variables. Tuan, Nhan, Giang, and Ngok (2016) studied the effect of innovation on innovation performance and how innovation performance affected the performance (marketing, production, and financial) of four firms: mechanics, electronics, motorbike and automobile in Vietnam. The results of the study indicated positive effects of process, marketing, and organizational innovations on firm performance. Therefore, process, marketing,

and organizational innovations rather than product innovation were recommended for improving performance. Another study by Cahn, Liem, Thu, and Khuong (2019) that investigated the impact of innovation on firm performance and corporate social responsibility of Vietnamese manufacturing firms reported that product and process innovations were beneficial to firm performance in terms of market share but not return on total assets. It was stated that the implication of the findings was that investment in innovative activities required time to make positive changes in profitability, but it might help in winning customer loyalty. A study that used multiple regression to analyse data collected from small and medium enterprises (SMEs) in Nigeria found that technological (product and process), and non-technological (marketing) innovations as well as firm size significantly impacted on the turnover of the studied SME firms while organisational innovation had no significant impact (Olomu, Akinwale & Adepaju, 2015). The study concluded that

technological and non-technological innovations as well as size of the firm were vital for SMEs in Nigeria to grow and achieve profitability. A study that used correlation analysis to determine the relationship between dependent variable - organisational performance, and independent variables - innovation, inter-organisational systems, and quality, of 272 randomly selected managers of a South African government department reported strong positive relationships between organisational performance and independent variables (Mafini, 2015). Based on the results of regression analysis, it was also reported that innovation, inter-organisational systems, and quality predicted organisational performance.

### III. METHODOLOGY

#### Research Design

The study was conducted based on the survey method that involved descriptive and inferential statistics. The qualitative responses obtained were converted to quantitative data via a five-point Likert scale having scores ranging from Strongly Agree, 5, to Strongly Disagree, 1. Quantitative data became the basis for hypotheses testing and results analyses. Performance was measured by perceived market shares of companies.

#### Population of the Study

The population of the study consisted of 1,600 employees of four randomly selected manufacturing companies in the food and beverage industry in Osun State. The employees were middle-level managers and junior members of staff.

#### Sample Size Calculation

The sample size for the study was calculated based on Taro Yamane formula:  $n = N/(1+Ne^2)$  where n represents the desired sample size, N represents the population of study, and e is the desired margin of error. With 5 percent error margin and a population of 1,600, the sample size for the study is given by:  $n = 1,600/[1+1,600(0.05)^2] = 320$  respondents. However, statistical analysis was based on 73.5 percent response rate.

### IV. RESULTS

The mean and standard deviation values in table 1 describe how technological innovation relates to company performance.

**Table 1:** Technological innovation and company performance

Technological innovation	Mean	Standard deviation
Product innovation	4.112	0.634
Process innovation	3.947	0.912

Source: Researcher, 2022

Higher mean value in table 1 indicates higher value for the measured construct.

**Table 2:** ANOVA

Model	Sum of squares	Df	Mean square	F	Sig
1 Regression	70.4136	2	35.2068	250.0119	0.002
Residual	32.2479	229	0.1408		
Total	102.6615	231			

a. Predictor: (Constant), Product innovation, process innovation  
b. Dependent variable: Company performance  
Source: Researcher, 2022

The results in table 2 indicate statistical significance for the predictor variables on company performance [(F(2,229)df = 250.0119, p < 0.05)]. This implies that product and process innovations have significant and positive effect on company performance.

**Table 3:** Coefficients

Model	Unstandardized coefficients		Standardized coefficients	t	Sig
	B	Std Error	Beta		
1 (Constant)	6.632	0.617		10.749	0.000
PRODI	0.454	0.129	0.410	3.519	0.001
PROCI	0.654	0.201	0.602	3.254	0.012

PRODI = Product innovation, PROCI = Process innovation  
Source: Researcher, 2022

Table 3 indicates the relative contribution of independent variables to the prediction of company performance. It is shown in table 3 that an improvement in product innovation by 1 unit improves company performance by 45.4 percent (t = 3.519, p < 0.05) while an improvement in process innovation by 1 unit improves company performance by 65.4 percent (t = 3.254, p < 0.05).

will increase the chances of technological innovation explaining more variation in performance.

Table 4: Model summary of predictors of performance

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.8282	0.6859	0.6831	0.3753

a. Predictor: (Constant), Product innovation, process innovation  
b. Dependent variable: Company performance  
Source: Researcher, 2022

The results in table 4 indicate the ability of technological innovation to explain variation in company performance. Multiple coefficient of determination has the ability to explain 68.59 percent variation in company performance.

## V. DISCUSSION

Innovation is a means of enhancing the competitive positions of companies in the business environment. Technological innovation, defined by product and process innovations, makes enormous contribution in this regard. The findings of this study indicated positive contribution of technological innovation to company performance. The results of multiple regression analysis revealed that both product and process innovations had positive effect on company performance. Their combined effect was that technological innovation explained 68.59 percent variation in company performance. Therefore, the null hypotheses that: 1. product innovation has no significant effect on performance and 2. process innovation has no significant effect on performance were rejected.

The results of this study are similar to the results obtained by Olomu *et al.* (2015) that used qualitative and ordinary least squares techniques to study the impact of technological and non-technological innovations on the profitability of 365 small and medium enterprises (SMEs) in Nigeria. Olomu *et al.* (2015) reported that both product innovation and process innovation contributed significantly to the sales performance of the SMEs. Another study by Nataya and Sutanto (2018) that used partial least squares to study how product innovation and service innovation affected the performance of plastic-producing firms in Subaraya, Indonesia stated that companies that combined product and service innovation would gain greater revenue growth and profitability.

## VI. CONCLUSION

The objective of this study was to ascertain the effect of technological innovation on the performance of food and beverage manufacturing companies in Osun state, Nigeria. The results indicated statistical significance for both product and process innovations. This implies that these innovation types, that constitute technological innovation, served as a means of attaining the performance goals of food and beverage manufacturing companies in Osun. However, these companies need to place greater reliance on using technological innovation to further their goals and improve their competitiveness. This

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