

Innovation Capabilities and Performance of Food Processing Companies in Nigeria

Emmanuel Lubem Asenge¹, Ph.D and Philip Dewua, Ph.D²

^{1&2} *Department of Business Management, Benue State University, Makurdi-Nigeria*

Abstract: Innovation capabilities are key triggers of competitiveness and performance of firms across industries. The research explores the effect of innovation capabilities on the performance of Food Processing Companies in Nigeria. The study employed a cross-sectional survey research design. The target population consists of 406 lower management, middle-level management and top management staff of fifteen (15) food processing companies. A census sampling approach was adopted to sample the entire population. A pilot study was conducted to test the validity and reliability of the survey questionnaire. The primary data collected from the respondents through self-administered questionnaire were processed and analysed with the aid of the Statistical Package for Social Sciences (SPSS) version 25. The Pearson's Product Moment Correlation was performed to ascertain the relationship between the variables while regression analysis was utilized to determine the effect of the predictor variables on the dependent variable. The outcomes of the correlation analysis indicated that positive relationship between the study variables. The results of tested hypotheses revealed that product innovation capability, marketing innovation capability and technological innovation capability had positive and significant effect on the performance of the firms. The study concluded that innovation capabilities implemented by firm help to foster performance of firms. It recommended amongst others that management of the companies should constantly adopt new technologies in the manufacture of new products to meet customer needs and expectations.

Keywords: Innovation Capabilities, Product Innovation Capability, Marketing Innovation Capability, Technological Innovation Capability, Firm Performance

1. INTRODUCTION

The performance of firms in today's turbulent environment is contingent on the capability to innovate new products. With the exponential increase in technological development, consumers' needs and demands are increasingly changing, and to deal with the impulsive changes, organizations are required to constantly develop new products and services (Boon & Edler, 2018). Organizations need to be more competitive by delivering high-quality products in the market because of the technologically volatile environment (Capozza & Divella, 2019).

Organizations that have the ability to absorb the external knowledge, and implement the knowledge into their existing systems are more likely to innovate and remain competitive (Kassa & Getnet-Mirete, 2022). Since 1934 when the concept of innovation was put forward by Schumpeter, innovation has

been widely regarded as the key factor affecting business performance and regarded today as the most fundamental aspect of a firm's capabilities and long-term success (Audretsch & Belitski, 2020; Robinson, 2019).

An innovation capability is the ability of firms to introduce novel ideas in their product strategy to meet market needs, and it is one of the top priorities of a firm's management in enhancing sustainability and promoting superior performance (Singh, Chakraborty & Roy, 2016). The components of innovation capability harnessed by firms to boost performance include product capability, marketing capability and technological capability (Idris, 2016; Jin & Choi, 2019; Ayinaddis, 2023).

Product innovation capability entails the firms' competence in developing and adapting new products to satisfy market needs (Chai, Li, Tangpong & Clauss, 2020). Marketing innovation capability which is one of the core components of the firm's

ability to sustain competitive advantage involves implementing new marketing strategies that are radically different from the marketing methods applied previously by firms (Martin-Rios & Pasamar, 2018). Technological innovation capability is the ability to adapt to unexpected technological change, develop new products and use new technological processes in order to meet current and expected future needs (Bogers, Chesbrough & Moedas, 2018).

Innovation capabilities enable organizations to apply requisite and appropriate technologies to develop new products, meet the market needs, and survive competitions (Rajapathirana & Hui, 2018). The innovation capabilities acquired by companies over a given period influence performance (Ullah & Arshad, 2021). Firm performance is the accomplishment of general firm strategic objectives, usually measured using indices such as profitability, growth, market share and customer satisfaction (Alaskar, 2023). Organizations implement innovative processes in their management systems to improve the management capability to innovate and exploit ways of performing better in the competitive market (Gomezelj, 2016; Martin-Rios & Pasamar, 2018; Tajeddini, Altinay, & Ratten, 2017).

The Food and Beverages Industry contribute essentially to the Nigerian economy regarding the Gross Domestic Product (GDP) and employment generation. Food processing companies assist the nation to maintain a steady supply of food products (Oluwadare, Obembe & Olayungbo, 2016). The food processing sector in Nigeria remains underdeveloped despite considerable market potential and increasing demand for processed foods. Regrettably, the country depends on imports to meet the demands for quality processed foods and most of the companies fail to take advantage of the advent of technologies and new automatic methods to produce more effective and higher quality products in meeting market demands. Prior studies in Nigeria have demonstrated the significant role of innovation on firm performance (Umar, Siti & Noor, 2020; Dahunsi, 2023) with a few domiciled in the manufacturing sector (Ukpabio, Oyebisi & Siyanbola, 2019; Joseph *et al.*, 2023; Onwuzu & Nnamani, 2023) and a scanty literature focusing on food processing companies in Nigeria. To fill the gap in literature the current study is an exploration of innovation capabilities and their effects on performance of food processing companies in Nigeria.

Objectives of the Study

The broad aim of the study is to examine the effect of innovation capabilities on the performance of food processing companies in Nigeria. The specific objectives of the study are to:

- i. Determine the effect of product innovation capability on the on the performance of food processing companies in Nigeria;
- ii. Ascertain the effect of marketing innovation capability on the on the performance of food processing companies in Nigeria;
- iii. Establish the effect of technological innovation capability on the on the performance of food processing companies in Nigeria

2.LITERATURE REVIEW

Innovation Capabilities

Innovative organisations generate or adopt innovation; they innovate to create new products, processes or technologies in order to enter a new market. Innovation refers to the new ideas that could be changed into tangible products or services provided by the company to its consumers (Iddris, 2016). Innovation capability is the ability of firms to transform ideas into something new that carries economic value (Ribau, Moreira & Raposo, 2017). Innovation capability is the ability of organizations to modify knowledge on their processes, systems and products that can spur firm growth (Chai, Li, Tangpong & Clauss, 2020).

The fast-changing environment with constant abrupt changes makes it indispensable for firms to build up their capabilities to innovate. Innovation capabilities help to enlarge the market segment and to improve the performance organizations in developing new products (Sharma *et al.*, 2016). Organizations develop innovation capabilities in through product, marketing and technological capabilities.

Product Innovation Capability

A product innovation capability entails the use of a new product that is also improved in terms of features and use such as having notable improved materials, components, technical specifications, user friendliness, software among others (Gomezelj, 2016). Product innovation capabilities are the sets of operations carried out within the industry to manufacture the quality products to help improve the organization's market position (Afuah, 2020; Chae, Koh & Park, 2018). This implies that such capabilities involve adopting and implementing different ideas, concepts and methods in improving existing products by adding new features to meet consumers' requirements.

Marketing Innovation Capability

Marketing innovation capability performs an important function in satisfying market desires and responding to marketplace opportunities (Kuokkanen, Uusitalo &

Koistinen, 2019). Market innovation capability refers to the use of innovative marketing processes that result to modifications in the product packaging, design, promotion, pricing or placement, with the aim of meeting customer needs, positioning the product in the market or capturing new markets all for increased revenue for the firm (Tajeddini, Altinay & Ratten, 2017; Martin-Rios & Pasamar, 2018). These capabilities support firms in developing superior pricing and promotional strategies to meet customer requirements.

Technological Innovation Capability

Technological innovation capability is a component of innovation capability that involves the introduction of new technologies related to products, services, and processes to reduce production costs by creating a new combination of inputs, thus leading to improvements in existing products or new products or services (Choi, Jeong & Kim, 2015). These capabilities increase the value-added for a company (Zhang, Khan, Lee & Salik, 2019), and applying new technological changes to products and manufacturing processes typically results in considerable organizational change (Yun, Jeong, Lee & Kim, 2018). These capabilities are thus major driving force for improving the competitiveness of companies.

Firm Performance

Organizational performance is a multidimensional concept that is considered one of the most important constructs in management research. It is the attainment of organizational goals by using resources in an efficient and effective manner. Organizational performance as defined in literature is related to how efficiently and effectively firms utilize resource in generating economic outcomes (Barney, 2007). Firm performance, measured using financial and market performance indicators such as operational efficiency, profitability, customer satisfaction and market share (Omar & Zineb, 2019).

Performance measurement assists businesses to evaluate their resource allocation processes in order to determine how the resources can be better managed and distributed to the appropriate channels. Market share and profitability are used in this study as the measures of firm performance. Market share represents the percentage of an industry, or a market's total sales earned by a company over a specified time period (Zhang, Khan, Lee & Salik, 2019). It is calculated by taking the company's sales over the period and dividing it by the total sales of the industry over the same period. Profitability is regarded as a measure of a company's profit relative to its expenses (Andjarwati, 2020). It helps in determining the amount of profit realized by firms over a period of time.

Innovation Capabilities and Firm Performance

Developing innovation capabilities is considered a high priority for most firms (Alaskar, 2023), and one of the most important enterprise applications that impact the creation of new ideas and knowledge and produce insights for businesses (Ukpabio, Oyebisi & Siyanbola, 2019). The authors emphasized the importance of capabilities in the detection of new market opportunities. Mikalef, Boura, Lekakos and Krogstie (2019) reported that innovation capabilities developed by companies enable them to maintain their existing market and expand into new markets, which improve sales performance.

Innovation capabilities enable firms to produce value by using their vital capabilities. Prior studies showed the importance of innovation to get advantages from using information systems (Song, 2015), and increase organizations' performance through the use of IT capabilities in an appropriate way (Muriuki & Kiiru, 2019). A research by Ullah and Arshad (2021) indicated that product innovation and process innovation serve as critical drivers for firm performance in the textile industry of Pakistan. Ayinaddis (2023) reported a significant and positive effect of innovation capabilities on the performance of micro and small manufacturing firms.

Jin and Choi (2019) investigated the effect of innovation capability on business performance with focus on service companies and found that product innovation capability has a positive impact on business performance (revenue and labor productivity) in both large companies and SMEs. Muriuki and Kiiru (2019) investigated the effect of innovation capabilities on firm performance in Kenya and discovered that innovation capabilities (product, organizational, marketing and technological capabilities) are significant predictors of performance. Similarly, Andjarwati (2020) reported a positive impact of innovation capabilities on firm performance in the pharmaceutical industry in Indonesia.

A survey by Alaskar (2023) on innovation capabilities and firm performance established a significant link between the variables. It found a positive and significant effect on product innovation, process innovation and marketing innovation capabilities on firm performance while showed technological innovation capability showed no significant effect on firm performance. Chen, Wang and Huang (2019) assessed the relationship between organizational innovation and technological innovation capabilities on firm performance in China. The researchers found that organizational innovation and technological innovation capabilities were moderately connected with firm performance.

Research Hypotheses

The following hypotheses are formulated in a null form in line with the above literature:

- i. Product innovation capability as no significant effect on the on the performance of food processing companies in Nigeria
- ii. There is no significant effect of marketing innovation capability as no significant effect on the on the performance of food processing companies in Nigeria
- iii. Technological innovation capability as no significant effect on the on the performance of food processing companies in Nigeria

3.METHODOLOGY

The research utilized a descriptive survey design. The choice of this approach helps in studying a sample of elements from the study population. The target population consists of 406 staff (lower management, middle-level management and top management) of fifteen (15) Food Processing Companies namely: Nestle Nigeria Plc, Flour Mills of Nigeria, Coca-Cola Company, Envoy Oil Industries Limited, Dangote Group, Dansa Foods Limited, Cadbury Plc, Unilever Nigeria Plc, Chi Limited, Dufil Prima Foods, Leventis Foods, Honeyland Foods

Limited, United Africa Company (UAC) Foods, Deli Foods and Honeywell Foods. A census sampling technique was adopted for the study and the entire population was used as the sample size. A pilot test was conducted to ascertain validity and reliability of the measurement instrument. The primary data were retrieved from the participants through questionnaire administration. The instrument was designed on a five-point Likert-scale as follows: strongly agree 5, agree 4, undecided 3, disagree 2 and strongly disagree 1. The Pearson's Product Moment Correlation and regression were employed as techniques of data analysis used for data analysis. The data were collected, coded and analyzed using the Computer-Based Statistical Package for Social Sciences (SPSS 25). The formulated hypotheses were tested at 0.05 level of significance.

4.DATA ANALYSIS AND RESULTS

The data analysed were presented using correlation and regression analyses to ascertain association and effect of the variables. Prior to this the reliability of the measurement instrument was tested.

Table 1: Correlation and Reliability Result

Variables	1	2	3	4	Cronbach's Alpha
Product Innovation Capability (1)	1				0.892
Marketing Innovation Capability (2)	.529**	1			0.836
Technological Innovation Capability (3)	.480**	.427**	1		0.865
Firm Performance (4)	.474**	.451**	.482**	1	0.872

** Correlation is significant at the 0.01 level (2-tailed)

Source: Researchers' Computation from SPSS Output, 2022.

The result in Table 1 illustrates the test of association between the factors and a reliability test to guarantee consistency of the variables. The review looked at the connection between components of innovation capability and the dependent variable (firm performance). The outcome shows a positive connection between the factors, and it a positive correlation was found between product innovation capability and firm performance ($r=.474$; $p<.01$). It also found a positive link between marketing

innovation capability and firm performance ($r=.451$; $p<.01$) and a positive association between technological innovation capability and firm performance ($r=.482$; $p<.01$). The test of reliability demonstrates that all the variables were over the 0.70 benchmark as follows: product innovation capability ($\alpha = 0.892$), marketing innovation capability ($\alpha = 0.836$), technological innovation capability ($\alpha = 0.865$) and firm performance ($\alpha = 0.872$).

Table 2: Regression Model Coefficients

Variable	B	T	Sig	Tolerance	VIF
Prd. Innovation Capability	.253	3.092	.001	.867	1.255
Mkt. Innovation Capability	.054	1.084	.279	.825	1.212

Tec. Innovation Capability	.251	3.033	.003	.831	1.204
R- Square	.614				
Adj. R- Square	.607				
F-Statistics	17.171				
Durbin-Waston	1.612				
Sig.	.000				

Source: Researchers' Computation from SPSS Output, 2023.

The regression model demonstrated that the variables (product innovation capability, marketing capability and technological innovation capability) jointly explained 61.4% variation in firm performance ($R^2 = 0.614$), while other factors outside the model contributed 38.6 %. The F-statistics (17.171) and sig value (0.000) shows a significant effect of the predictor variables on the dependent variable. The research reported that the three hypotheses tested showed positive effects on firm performance. The outcome of the first hypothesis indicated that product innovation capability had a positive effect on firm performance ($\beta = 0.253$; $t = 3.092$; $p = 0.001$). The test of hypothesis two reported a positive and but insignificant effect of marketing innovation capability on firm performance ($\beta = 0.054$; $t = 1.084$; $p = 0.000$). The research also revealed that there is a positive and significant effect of technological innovation capability on firm performance ($\beta = 0.251$; $t = 3.033$; $p = 0.000$). The hypotheses were all rejected; since the p-values were lower than 0.05.

Finding

The outcome of the research revealed that product innovation capability significantly affects the performance of Food Processing Firms in Nigeria. The result is supported by Ullah and Arshad (2021) who indicated that product innovation significantly affect firm performance. Jin and Choi (2019) and Ayinaddis (2023) also reported a significant and positive effect of product innovation capability on firm performance. The implication of the result is that product innovation capability acts as a means of improving the quality of products provided by organizations Food Processing firms. It also helps to provide unique value and benefits for consumers and increased market share for the firms.

The research found an insignificant effect of marketing innovation capability on firm performance. The outcome is in disagreement with previous studies by Muriuki and Kiiru (2019), Jin and Choi (2019) and Ayinaddis (2023) who reported a significant effect of marketing innovation on firm performance. The implication of the result is that the companies have not been able to address customer needs and expectations. There is the need for opening up of new markets by the companies in different areas.

The research further discovered that technological innovation capability has a significant effect on firm performance. The finding is corroborated by Alaskar (2023) who affirmed a positive link between the variables. The research by Muriuki and Kiiru (2019) demonstrated an affirmative effect of technological innovation capability on performance of firms surveyed. Chen, Wang and Huang (2019) in their research found a moderate relationship between the variables. The discovery implies that food processing firms in Nigeria keep abreast with changing market dynamics by embracing and implementing new marketing methods.

5.CONCLUSION AND RECOMMENDATIONS

The outcomes of this research demonstrated the extent to which innovation capabilities affect the performance of Food Processing Companies in Nigeria. This clearly implies that innovation capabilities significantly and positively influence business performance. The study concludes that the implementation of product innovation capabilities help food processing firms to improve on products offered to the market in line with the needs of customers. The study also concludes that marketing capabilities have inconsequential effect on the performance of the companies. Lastly, the research alludes that the technological capabilities have helped Food Processing Companies to adopt new inventions that to improve performance in the market. The outcomes of the study suggest the following:

- i. Food Processing Companies in Nigeria should continuously carry out market research to improve its product innovation strategies. This will ensure that the firms only produce products that fulfill market needs.
- ii. Food Processing Companies in Nigeria should renew their marketing innovation capabilities by focusing on capabilities that are aligned with market needs and competition levels.
- iii. Management of Food Processing Companies should constantly adopt new technologies in the manufacture of the products to meet customer needs and expectations. They should harmonize their existing assets and resources to constantly changing

environmental conditions to help improve their performance.

Practical Implications

This study contributes to literature by proposing a conceptual model which demonstrates the effects of product innovation capabilities, marketing innovation capabilities and technological innovation capabilities on firm performance. The research has significant implications for the food and beverages

manufacturing industry in Nigeria. The output of this research will motivate investors to start new businesses in the food processing sector in Nigeria even with small capital through collaboration with other stakeholders. The policymakers in this sector and decision-makers in the Government and food regulatory authorities who are interested in fostering innovation in the industry can update their policies regarding the innovation capabilities that will foster growth of the industry and ensure the manufacture of products in line with market needs.

REFERENCES

1. Adeyeye, A., Jegede, O. O., Oluwadare, J., & Aremu, F. S. (2016). Micro level determinants of small firms' innovation. *Innovation and Development*, 6(1), 25-38
2. Alaskar, T.H. (2023). Innovation capabilities as a mediator between business analytics and firm performance. *Sustainability*, 15, 5522
3. Andjarwati, T. (2020). Impact of innovation capabilities on firm performance of pharmaceutical industry in Indonesia. *Systematic Review Pharmacy*, 11(1), 244-253.
4. Ayinaddis, S.G. (2023). The effect of innovation orientation on firm performance: evidence from micro and small manufacturing firms in selected towns of Awi Zone, Ethiopia. *Journal of Innovation and Entrepreneurship*, 2(4), 12-26.
5. Barney, J. B. (2007). Resource-based theory: Creating and sustaining competitive advantage. *Journal of Public Affairs*, 8(4), 309-313.
6. Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: Research, practices, and policies. *California management review*, 60(2), 5-16.
7. Boon, W., & Edler, J. (2018). Demand, challenges, and innovation. Making sense of new trends in innovation policy. *Science and Public Policy*, 45(4), 435-447.
8. Černe, M., Kaše, R., & Škerlavaj, M. (2016). Non-technological innovation research: Evaluating the intellectual structure and prospects of an emerging field. *Scandinavian Journal of Management*, 32(2), 69-85.
9. Chae, H.C., Koh, C.E. & Park, K.O. (2018). Information technology capability and firm performance: Role of industry. *Information Management*, 55, 525-546.
10. Chai, L., Li, J., Tangpong, C., & Clauss, T. (2020). The interplays of cooperation, conflicts, trust, and efficiency process innovation in vertical B2B relationships. *Industrial Marketing Management*, 85, 269-280.
11. Chen, Q., Wang, C. & Huang, S. (2019). Effects of organizational innovation and technological innovation capabilities on firm performance: evidence from firms in China's Pearl River Delta. *Asia Pacific Business Review*, 26(1), 72-96.
12. Choi, J.Y., Jeong, S. & Kim, K. (2015). A study of diffusion pattern of technology convergence: Patent analysis for Korea. *Sustainability*, 7, 11546-11569.
13. Dahunsi, O.J. (2023). Innovation types and firm performance in Nigeria. *Indo-Asian Journal of Finance and Accountings*, 4(1), 145-159.
14. Gomezelj, D. O. (2016). A systematic review of research on innovation in hospitality and tourism. *International Journal of Contemporary Hospitality Management*, 3(2), 65-78.
15. Iddris, F. (2016). Innovation capability: A systematic review and research agenda. *Interdisciplinary Journal of Information, Knowledge, and Management*, 11, 235-260.
16. Jin, S.H. & Choi, S.O. (2019). The Effect of innovation capability on business performance: a focus on it and business service companies. *Sustainability*, 11(19), 5246-5258.
17. Joseph, T. T., Umogbai, M.E., Kwahar, N. & Adudu, C. A. (2023). Effect of innovation on entrepreneurial success of manufacturing small and medium firms in North-Central Nigeria. *International Academy Journal of Management, Marketing and Entrepreneurial Studies*, 10(1), 84-103.
18. Kassa, E.T., & Getnet Mirete, T. (2022). Exploring factors that determine the innovation of micro and small enterprises: The role of entrepreneurial attitude towards innovation Woldia, Ethiopia. *Journal of Innovation and Entrepreneurship*, 11(1), 1-16.
19. Kuokkanen, A., Uusitalo, V., & Koistinen, K. (2019). A framework of disruptive sustainable innovation: an example of the Finnish food system. *Technology Analysis & Strategic Management*, 31(7), 749-764.
20. Martin-Rios, C. & Pasamar, S. (2018). Service innovation in times of economic crisis: The strategic adaptation activities of the top EU service firms. *R&D Management*, 48(2), 195-209
21. Muriuki, N., & Kiiru, D. (2019). Innovative Strategies and the Performance of Savings and Credit Cooperatives in Nyeri County, Kenya. *International Journal of Current Aspects*, 3(6), 216-234.
22. Oluwadare, A. J., Obembe, O., and Olayungbo, D. O (2016). Competition and technology acquisition among Nigerian firms. *International Journal of Business Forecasting and Marketing Intelligence*, 2(4), 347-358.
23. Onwuzu, K. C., & Nnamani, E. (2023). Effect of green innovation on competitive advantage of manufacturing firms in Enugu State, Nigeria. *Advance Journal of Business and Entrepreneurship Development*, 7(2), 1-21.
24. Pinto, M.M.A., Kovaleski, J.L., Yoshino, R.T. & Pagani, R.N. (2019). Knowledge and technology transfer influencing the process of innovation in green supply chain management: A Multicriteria Model Based on the DEMATEL Method. *Sustainability*, 11, 3485

25. Rajapathirana, R.P.J. & Hui, Y. (2018). Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation & Knowledge*, 3(1), 44–45.
26. Ribau, C.P., Moreira, A.C. & Raposo, M. (2017). SMEs innovation capabilities and export performance: an entrepreneurial orientation view. *Journal of Business Economics and Management*, 18(5), 920–934.
27. Singh, M. P., Chakraborty, A., & Roy, M. (2016). The link among innovation drivers, green innovation and business performance: Empirical evidence from a developing economy. *World Review of Science, Technology and Sustainable Development*, 12(4), 316–334.
28. Song, Z.H. (2015). Organizational learning, absorptive capacity, imitation and innovation: Empirical analyses of 115 firms across China. *China Management Studies*, 9, 97–113.
29. Tajeddini, K., Altinay, L., & Ratten, V. (2017). Service innovativeness and the structuring of organizations: The moderating roles of learning orientation and inter-functional coordination. *International Journal of Hospitality Management*, 65, 100–114.
30. Tajuddin, M. Z. M., Ibrahım, H., & Ismail, N. (2015). Relationship between innovation and organizational performance in the construction industry in Malaysia. *Universal Journal of Industrial and Business Management*, 3(4), 87–99.
31. Taouab, O., & Issor, Z. (2019). Firm performance: Definition and measurement models. *European Scientific Journal*, 15(1), 93–106.
32. Tavana, M., Shabani, A., & Singh, R. (2019). The impact of interwoven integration practices on supply chain value addition and firm performance. *Journal of Industrial Engineering International*, 15(1), 39–51.
33. Ukpabio, M.G., Oyebisi, T.O. and Siyanbola, O.W. (2019). Effects of innovation on performance of manufacturing SMEs in Nigeria: An empirical study. African Institute of Science Policy and Innovation (AISPI), Obafemi Awolowo University, Ile-Ife Osun State, Nigeria.
34. Ullah, Z. & Arshad, H. (2021). Impact of internal innovation on firm performance with moderating role of collaborative innovation. Thesis redits Business Administration Master Programme in Business Administration (MBA): Business Management Master Thesis in Business Administration.
35. Umar G. A., Siti R. H. & Noor A. I. (2020). Effect of marketing innovation on performance of small and medium enterprises in Nigeria. *International Journal of Innovation, Creativity and Change*, 11(12), 34–47.
36. Yun, J.J., Jeong, E., Lee, Y. & Kim, K. (2018). The effect of open innovation on technology value and technology transfer: A comparative analysis of the automotive, robotics, and aviation industries of Korea. *Sustainability*, 10, 2459.
37. Zhang, Y. Khan, U., Lee, S. & Salik, M. (2019). The influence of management innovation and technological innovation on organization performance. A mediating role of sustainability. *Sustainability*, 11, 495.