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Abstract

This study examined the relationship between reverse logistics and organizational resilience of packaged water firms in Rivers State. The study adopted a survey research design. The study was conceptualized using reverse logistics as a predictor to organizational resilience proxied by strategic flexibility, management of keystone vulnerabilities and adaptive capacity. The population of the study comprised 10 packaged water firms operating in Rivers State as listed by Finelib.com, Nigeria Directory and Search Engine. The entire population was surveyed. 4 copies of questionnaire were administered to each of the 10 package water firms, thereby giving us a total of 40 respondents which included procurement, marketing, sales and production managers. Pearson's Product Moment Correlation (PPMC) was used to test 3 hypotheses, with the help of the Statistical Packages for Social Sciences Version 23.0. The study found the existence of positive and statistically significant relationship between reverse logistics and organizational resilience of packaged water firms in Rivers State. Thus, the study concludes that reverse logistics significantly relates to organizational resilience of packaged water firms in Rivers State. The study recommends that management of packaged water firms should imbibe environmental friendly orientation such as recycling, reuse, and re-design in their innovation process, as this can enable them remain resilient in the face of disruptions.

Keywords: Adaptive capacity, management of key stone vulnerabilities, organizational resilience, reverse logistics, strategic flexibility

Introduction

Environmental concerns, effects of climate change, scarcity of raw materials and technological advancements have increased attention and focus on reverse logistics. According to Banihashemi et al. (2019), environmental concerns presently have led manufacturing firms to redesign their processes in order to have environmentally friendly manufacturing and logistics systems.

As a result, logistics service providers, manufacturers and consumers alike, are required to dismantle used products into their constituent parts for reuse, recycling or safe disposal (Sheth et al., 2011). Adopting green strategies such as reuse, recycle and remanufacture helps in "greening" the physical environment and contributes to organizational resilience (Sorkun & Onay, 2018).

Although companies globally are increasingly recognizing the importance of conserving the environment, implementation of reverse logistics strategies aimed at reducing environmental effect has been slow (Meherishi et al., 2019). This is because manufacturing firms have information systems tailored to optimize forward logistics but similar systems for implementing reverse logistics have persisted at the planning stage. Similarly, the development of asset value recovery systems is also at its infancy (Dekker et al., 2013).

The implementation of reverse logistics among packaged water companies in Rivers State is not as proactive as it should be and that has limited the identity and reputation of most packaged water companies and their brands. Customers of packaged water have continued to decry companies' inability to meet reverse logistics tasks required to mitigate environmental impact of their products and production processes (Sorkun & Onay, 2018).

This ineptitude may be due to lack of researches that provide proper understanding of the role of reverse logistics practices in achieving organizational resilience. Thus, this study is an attempt to examine the relationship between reverse logistics and organizational resilience of packaged water firms in Rivers State.

Theoretical Foundation: Dynamic Capabilities Theory

Dynamic capabilities theory (DCT) emerged in the early 21st century as an extension of Resource-Based View (RBV). It was first proposed by Teece, Pisano and Shuen (1997) and later expanded Teece (2007). DCT emphasizes organizations' ability to sense and respond to change in the environment by developing and deploying dynamic capabilities that enable them adapt, innovate and reconfigure resources in pursuit of competitive advantage.

This way, DCT builds upon RBV, and emphasizes the importance of organizational capabilities in achieving competitive advantage (Teece et al., 1997). It asserts that static resources alone are insufficient for sustained success; instead, firms must develop dynamic capabilities to adapt, innovate, and reconfigure their resource base in response to environmental shifts (Teece, 2007).

In the context of supply chain strategies, dynamic capabilities play a crucial role in facilitating the adoption and implementation of sustainable practices throughout the supply chain. Firms with strong dynamic capabilities are more adept at sensing changes in market demands, regulatory requirements, and stakeholder expectations related to sustainability concerns (Helfat & Peteraf, 2015). Again, firms with dynamic capabilities are inherently more resilient because they possess the agility and flexibility to respond effectively to environmental challenges and uncertainties.

Concept of Reverse Logistics Practices

Reverse logistics simply is the opposite activity of forward logistics. It relates to a sequence of activities required to collect used products or return products from customers for the purpose of reusing, remanufacturing, recycling or proper disposal (Bai & Sarkis, 2013). Reverse logistics involves the process of planning, implementing and controlling the efficient flow of raw materials, in-process inventory, finished goods and related information from points of consumption to points of origin for the purpose of recapturing value (Mahmoudi et al., 2019).

Reverse logistics is concerned with moving "end of useful life" goods from consumers to manufacturers so as to recapture value or ensure eco-friendly disposal (Vahabzadeh et al., 2015). Reverse logistics has received increased attention due to the confluence of several situations. On the one hand, there is a verifiable concern about environmental matters and sustainable development (Meherishi et al., 2019).

Also, economic reasons have had their contribution in this increasing importance of reverse logistics. By means of recycled products, companies stand the possibility of recovering either constituent materials that no longer need to be purchased in the same quantities, or added-value (Sorkun & Onay, 2018).

According to Banihashemi et al. (2019), reverse logistics entails logistics activities relates to recycling and disposal of waste and hazardous materials. It involves cost effective planning, implementation and control of movement of raw materials, semi-finished and finished products, and associated information from their usage locale back to their origin either to reclaim value or for proper disposal (Asees Awan & Ali, 2019).

Organizational Resilience

Organizational resilience implies an organization's ability to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper. Ortiz-de-Mandojana and Bansal (2016) describe organizational resilience as the capacity of a business to

continuously change and adapt in response to emerging risks and uncertainties, thereby ensuring long-term sustainability.

According to Duchek (2020), organizational resilience refers to an organization's ability to systematically manage resource configurations through bundling and leveraging processes in the face of turbulent environments. Resilience is a critical attribute that enable organizations navigate crises and emerge stronger, or at least intact in a rapidly changing world marked by economic, technological, and social volatility.

Resilient organizations possess the ability to adapt, cope, survive and prosper in the face of abrupt and sometimes hostile variations in the business-scape (Ateke & Nadube, 2017); learning from their own experiences and also from the experiences of others (Harcourt & Ateke, 2018). Zhang and Liu (2012) argue that resilient firms easily cope with change, overcome adversity and function adaptively.

Organisational resilience is a multidimensional construct consisting resilience ethos, situation awareness, management of keystone vulnerabilities, and adaptive capacity (Zhang & Liu, 2012). In this study however, we adopt strategic flexibility, management of keystone vulnerabilities and adaptive capacity to represent organisational resilience.

Strategic flexibility

Strategic flexibility is a competence that allow businesses adapt quickly to change and uncertainty in the environments. It encompass ability to swiftly reconfigure resources, operations and strategies in response to external pressures or opportunities. Wang et al. (2023) describe strategic flexibility as a capability that allow organizations to recover from disruptions and continue operations by shifting strategic focus as needed. This definition underscores the importance of resilience in ensuring that strategic flexibility not only addresses immediate adaptive needs but also support sustained recovery and operational continuity.

Wang and Ahmed (2014) characterize strategic flexibility as the capacity of an organization to effectively manage core competencies and resources to respond to environmental change. This means that strategic flexibility involves structural and behavioral adjustments within the firm, making it possible to capitalize on new opportunities while mitigating risks. This approach underscores a dual focus: exploiting existing assets, and exploring new possibilities as essential requirements for resilience.

Management of key stone vulnerabilities:

Management of keystone vulnerability represent operational and managerial aspects of the firm affects it negatively in instantaneous or insidious crisis situations (Ahiauzu & Jaja, 2015). It core focus is identifying and proactively managing and treating vulnerabilities that if manifested, could threaten the firm's ability to survive (Ateke & Nwulu, 2018; Stephenson et al., 2010). A thorough understanding of the firm's vulnerabilities and current sources of resilience, as well as the astute management of these for optimal results (Ilmola et al., 2013) is key to developing of resilience capacity.

In Whittaker et al. (2014), management of key stone vulnerabilities is describes as a set of practices aimed at protecting the firm's weaknesses from being exploited by rivals. Managers must have precise understanding of links between components within its system, and be able to manage the vulnerabilities that may arise from them. Such vulnerabilities according to Ahiauzu and Jaja (2015) include "specific components such as buildings, structures and critical supplies; computers, services and specialized equipment; individual managers, decision makers and subject matter experts."

Adaptive capacity

Adaptive capacity in the context of organizational resilience refers to the ability of an organization to anticipate, prepare for, respond to, and recover from disturbances, adapting in a way that allows it to maintain critical operations and even thrive in the face of change (Lengnick-Hall et al., 2011). This capacity involves both proactive and reactive elements, emphasizing the strategic importance of flexibility and learning in organizational practices.

According to Seuring and Müller (2018), adaptive capacity in green supply chains involves the ability of a company to integrate environmental considerations into its supply chain management, thereby responding to regulatory, economic, and social pressures. These definitions emphasize the importance of developing internal competencies and engaging with suppliers who are equally committed to sustainability practices.

Reverse Logistics and Organizational Resilience

A substantial number of studies have linked reverse logistics to different aspects of performance outcomes of firms. Okumu and Juma (2019) established that reverse logistics practices influence customer perception of motor vehicle dealers. Particularly, Okumu and Juma (2019) identify product return and product remanufacture as reverse logistics practices that influence customer perception among motor vehicle dealers.

Similarly, Li and Goh (2018) reported that remanufacturing as a reverse logistics practice has significant influence on competitiveness of manufacturing firms in Kenya. The report implies that increase in companies' effort to remanufacture will lead to increase in their competitiveness. Also, Wambaya et al. (2018) demonstrated that reverse logistics has strong impact on procurement performance among state corporations in Kenya.

Relatedly, Guta (2016) and Serut (2013) confirmed that reverse logistics practices leads to improved organizational performance; while Muthemba (2016) found reverse logistics practices like remanufacturing, re-working, re-cycling and eco-friendly disposal strongly influence operational performance. Also, in a study on performance of government owned manufacturing firms in Kenya, Nyarega (2015) reports that more than 50% of manufacturing firms that practice reverse logistics experience reduced costs and material and energy consumption

In addition, Muttimos (2014) and Wainaina (2014) established that reverse logistics practices relates to organizational performance of manufacturing firms. The study showed that remanufacturing and recycling as reverse logistics practices impact increased customer satisfaction and profits, hence, financial performance. The study implies that an improvement in financial performance of manufacturing firms would most probably result from increased adoption of remanufacture and recycling as reverse logistics practices.

Furthermore, Waithaka (2012) studied reverse logistics practices in medical supplies by looking at the case study of Kenya Medical Supply Agency. The study showed that reverse logistics has positive relationship with operational performance; while Ongombe (2012) examined the relationship between reverse logistics and competitive advantage of bottling companies and found that a strong relationship exists between reverse logistics and competitive advantage that manifests in increased profit margins due to reduction in production costs and increased sales.

H01: There is no significant relationship between reverse logistics and strategic flexibility of Packaged Water Firms in Rivers State.

H02: There is no significant relationship between reverse logistics and management of key stone vulnerabilities of Packaged Water Firms in Rivers State.

H03: There is no significant relationship between reverse logistics and adaptive capacity of Packaged Water Firms in Rivers State.

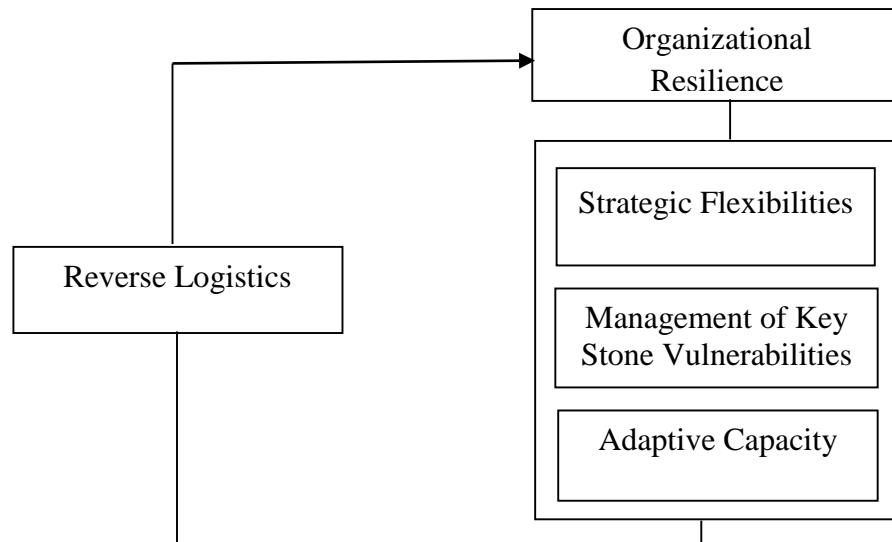


Fig. 1: Conceptual framework of relationship between reverse logistics and organizational resilience of packaged water firms in Rivers State.

Source: Banihashemi, T. A., Fei, J., & Chen, P. S. L. (2019). Exploring the relationship between reverse logistics and sustainability performance: A literature review. *Modern Supply Chain Research and Applications*, 1(1), 2-27.

Methodology

This study adopted a sectional research design with a correlational investigation type. The population of the study comprised 10 packaged water firms operating in Rivers State as listed by Finelib.com, Nigeria Directory and Search Engine. The entire population was adopted as the sample size of the study. 4 copies of instrument were given to each of the 10 package water firms under survey, thereby giving us a total of 40 respondents which included procurement, marketing, sales and production managers. With the help of Statistical Packages for the Social Sciences (SPSS) version 23.0, Pearson's Product Moment Correlation (PPMC) was used to test the hypotheses to figure out the direction and strength of relationship between reverse logistics and organizational resilience.

Table 1: Reliability test - Cronbach's alpha analysis

| S/N | Variables | Number of Items | Cronbach's Alpha Coefficients |
|-----|---|-----------------|-------------------------------|
| 1 | Reverse Logistics | 3 | 0.918 |
| 2 | Strategic Flexibility | 3 | 0.825 |
| 3 | Management of Key Stone Vulnerabilities | 3 | 0.878 |
| 4 | Adaptive Capacity | 3 | 0.850 |

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

As shown in Table 1, the results of the Cronbach's alpha test revealed that all the variables in the study produced high Cronbach's Alpha coefficients indicating that, there is inter-item consistency among the variables in the study. This means that, if this study is conducted again in similar condition, the results would be similar to the results of our study.

Table 2: Descriptive statistics of reverse logistics

| | N | Sum | Mean | Std. Dev. | Variance |
|---|----|-----|------|-----------|----------|
| Do you think goods returned to manufacturers in your organizations follow due environmental laws? | 37 | 141 | 3.81 | 1.431 | 2.047 |
| Do you think your organization takes into consideration environmental issues, when disposing waste plastic returned by customers? | 37 | 166 | 4.49 | 1.121 | 1.257 |
| Do you think the process applied by your organization in recycling returned packaged water reduces waste and cost? | 37 | 163 | 4.41 | .865 | .748 |
| Do you think the proportion of returned products that are successfully reused in our organization is very high? | 37 | 165 | 4.46 | 1.016 | 1.033 |
| Valid N (listwise) | 37 | | | | |

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 2 reveals that most responses with respect to reverse logistics are on the higher side of the Likert scale which ranges from 1 to 5. As a result of the high concentration of responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, question 2 which sought to ascertain the extent to which packaged water firms in think their organizations take into consideration environmental issues, when disposing waste plastic returned by customers, has the highest sum of 166 and therefore the highest mean score of 4.49. This also indicates that this item has the strongest influence on the variable. Also, question 1 has the highest standard deviation of 1.431 and variance of 2.047, indicating that, responses spread most in question 1 compared to other questions.

Table 3: Descriptive statistics of strategic flexibility

| | N | Sum | Mean | Std. Dev. | Variance |
|---|----|-----|------|-----------|----------|
| Do you think your organization has the flexibility to adapt to environmental changes? | 37 | 152 | 4.11 | 1.220 | 1.488 |
| Do you think your organization is quick to respond to external environmental changes? | 37 | 180 | 4.86 | .585 | .342 |
| Do you think your organization has adapted to new environmental policies and regulation made by the government? | 37 | 171 | 4.62 | .639 | .408 |
| Do you think your organization have a robust comprehensive response plans for various potential incidents? | 37 | 184 | 4.97 | .164 | .027 |
| Valid N (listwise) | 37 | | | | |

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Results of the analysis from the SPSS output in Table 3 reveals that most of the responses with respect to strategic flexibility are on the higher side of the Likert scale which ranges from 1 to 5. As a result of the high concentration of the responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, in the result, question 4 which sought to ascertain the extent to which packaged water firms in Rivers State think their organizations have robust comprehensive response plans for various potential incidents, has the highest sum of 184 and therefore the highest mean score of 4.97. This also indicates that this item has the strongest influence on the variable. Also, question 1 has the highest standard deviation of 1.220 and variance of 1.488, indicating that, responses spread most in question 1 compared to other questions.

Table 4: Descriptive statistics of management of keystone vulnerabilities

| | N | Sum | Mean | Std. Dev. | Variance |
|---|----|-----|------|-----------|----------|
| Do you think your organization frequently carries out assessment on key vulnerable operations area to mitigate production risk? | 37 | 147 | 3.97 | 1.190 | 1.416 |
| Do you think your organization usually identifies and eliminates factors that may cause operational disruptions? | 37 | 170 | 4.59 | .762 | .581 |
| Do you think your organization is very effective in implementing strategies that will enhance adaptability and product quality? | 37 | 159 | 4.30 | .939 | .881 |
| Do you think your organization have a robust comprehensive response plans for various potential incidents? | 37 | 157 | 4.24 | 1.116 | 1.245 |
| Valid N (listwise) | 37 | | | | |

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 4 reveals that most of the responses with respect to management of key stone vulnerabilities are on the higher side of the Likert scale which ranges from 1 to 5. As a result of the high concentration of the responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, in the result, question 2 which sought to ascertain the extent to which packaged water firms in Rivers State think their organizations usually identify and eliminate factors that may cause operational disruptions, has the highest sum of 170 and therefore the highest mean score of 4.59. This also indicates that this item has the strongest influence on the variable. Also, question 1 has the highest standard deviation of 1.190 and variance of 1.416, indicating that, responses spread most in question 1 compared to other questions.

Table 5: Descriptive statistics of adaptive capacity

| | N | Sum | Mean | Std. Dev. | Variance |
|---|----|-----|------|-----------|----------|
| Do you think your organization frequently embarks on training programs aimed at enhancing adaptability? | 37 | 157 | 4.24 | 1.256 | 1.578 |
| Do you think the speed and frequency of adopting new technologies or practices in our organization is high? | 37 | 183 | 4.95 | .229 | .053 |
| Do you think your organization encourages and facilitates continuous learning to overcome challenges? | 37 | 175 | 4.73 | .450 | .203 |
| Do you think your organization has adaptive culture to respond and withstand environmental threat? | 37 | 179 | 4.84 | .688 | .473 |
| Valid N (listwise) | 37 | | | | |

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 5 reveals that most of the responses to items on adaptive capacity are on the higher side of the Likert scale which ranges from 1 to 5. As a result of the high concentration of the responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, in the result, question 2 which sought to ascertain the extent to which the speed and frequency of adopting new technologies or practices are high among packaged water firms in Rivers State, has the highest sum of 183 and therefore the highest mean score of 4.95. This also indicates that this item has the strongest influence on the variable. Also, question 1 has the highest standard deviation of 1.256 and variance of 1.578, indicating that, responses spread most in question 1 compared to other questions.

Table 6: Correlations between reverse logistics and strategic flexibility

| | | Reverse Logistics | Strategic Flexibility |
|-----------------------|---------------------|-------------------|-----------------------|
| Reverse Logistics | Pearson Correlation | 1 | .641** |
| | Sig. (2-tailed) | | .000 |
| | N | 37 | 37 |
| Strategic Flexibility | Pearson Correlation | .641** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 37 | 37 |

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

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 6 reveals a correlation coefficient of 0.641** between reverse logistics and strategic flexibility, indicating a strong positive relationship between the variables. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a statistically significant relationship between reverse logistics and strategic flexibility. This implies that reverse logistics can be used to achieve strategic flexibility among packaged water firms in Rivers State. Based on this, we reject the null hypothesis that there is no significant relationship between reverse logistics and strategic flexibility of packaged water firms in Rivers State.

Table 7: Correlations between reverse logistics and management of keystone vulnerabilities

| | | Reverse Logistics | Management of Keystone Vulnerabilities |
|---|---------------------|-------------------|--|
| Reverse Logistics | Pearson Correlation | 1 | .693** |
| | Sig. (2-tailed) | | .000 |
| | N | 37 | 37 |
| Management of Key Store Vulnerabilities | Pearson Correlation | .693** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 37 | 37 |

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

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 7 reveals a correlation coefficient of 0.693** between reverse logistics and management of keystone vulnerabilities, indicating a strong positive relationship between reverse logistics and management of key stone vulnerabilities. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a strong significant relationship between reverse logistics and management of key stone vulnerabilities. This further implies that reverse logistics can be used by packaged water firms in Rivers State to achieve management of keystone vulnerabilities. Thus, we reject the null hypothesis that there is no significant relationship between reverse logistics and management of keystone vulnerabilities of packaged water firms in Rivers State.

Table 8: Correlations between reverse logistics and adaptive capacity

| | | Reverse Logistics | Adaptive Capacity |
|-------------------|---------------------|-------------------|-------------------|
| Reverse Logistics | Pearson Correlation | 1 | .514** |
| | Sig. (2-tailed) | | .001 |
| | N | 37 | 37 |
| Adaptive Capacity | Pearson Correlation | .514** | 1 |
| | Sig. (2-tailed) | .001 | |
| | N | 37 | 37 |

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

Source: SPSS Output of data analyses on reverse logistics and organizational resilience (2024).

Table 8 reveals a correlation coefficient of 0.514** between reverse logistics and adaptive capacity. The P(r) coefficient indicates a moderate positive relationship between reverse logistics and adaptive capacity. The probability value (0.000) is less than the critical value (0.05), this shows that there is a moderate significant relationship between reverse logistics and adaptive capacity. This further implies that reverse logistics can be used to achieve adaptive capacity among packaged water firms in Rivers State. Therefore, we reject the null hypothesis that there is no significant relationship between reverse logistics and adaptive capacity of packaged water firms in Rivers State.

Discussion of Findings

This study was designed to determine the correlation between reverse logistics and organizational resilience of packaged water firms in Rivers State. The results of the empirical analyses conducted in the study showed that reverse logistics has a strong positive relationship with flexibility; a strong positive relationship with management of keystone vulnerabilities; and a moderate positive relationship with adaptive capacity. More so, all the relationships posted statistical significance.

These findings are in line with the findings of Okumu and Juma (2019) that product return and product remanufacture as reserve logistics practices, significantly influence customer perception among motor vehicle dealers in Kisumu County; and that of Li et al. (2018) remanufacturing has great economic and environmental potential.

The findings also align with that of Mbovu and Mburu (2018) that remanufacturing practice has a significant influence on competitiveness of the manufacturing firms in Kenya; and that of Wambaya et al. (2018) that a significant relationship exists between third party logistics, lean agile manufacturing and procurement performance. Similarly, the current findings support that view that reverse logistics practices relates to organizational performance (Guta, 2016; Serut, 2013); operational performance (Muthemba, 2016) and performance of government owned firms (Nyarega, 2015).

Additionally, our findings corroborate the findings that reverse logistics practices effect competitiveness of food manufacturing firms (Mwaura et al., 2015), financial performance of manufacturing firms (Muttimos, 2014); operational performance of medical supply agencies (Waithaka, 2012) and competitive advantage in water bottling companies (Ongombe, 2012).

Conclusion and Recommendations

The study investigated the relationship between reverse logistics and organizational resilience of packaged water firms in Rivers State. As observed from the results of data analyses, reverse logistics has positive relationship with organizational resilience (strategic flexibility, management of keystone vulnerabilities and adaptive capacity). This results corroborate the findings of previous studies carried out in other sectors and regions. Consequently, the study concludes that reverse logistics significantly relates to organizational resilience of packaged water firms in Rivers State.

Drawing from the conclusion, this study recommends that:

- a) Management of packaged water firms should imbibe environmental friendly orientation such as recycling, reuse, re-design in their innovation process, this will help them remain resilient in the face of disruptions.
- b) Management of packaged water firms should capitalize on the strategic role of reverse logistics in their pursuit of strategic flexibility. Reverse logistics will cater for the environmental friendliness needs of the customers, host community and operating organization.

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