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# Product Innovation and Organizational Resilience in Public Universities in South-South Nigeria

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**Abstract**

This study empirically investigates the association between product innovation and organizational resilience. Primary data is generated from the selected Public Universities located in south-south Nigeria while analysis examined the association between product innovation and three dimensions of organizational resilience namely – situation awareness, keystone vulnerability and adaptive capacity. A total of three null hypotheses are tested using the Spearman rank order correlation. The results showed a significant association between product innovation and organizational resilience. Based on the foregoing findings, it was revealed that product innovation significantly influenced the awareness, vulnerability and adaptive capacity of the institutions and thus it was therefore recommended that for organizations to remain resilient, the adoption and implementation of innovation through products and services was a primary requirement.

**Keywords:** Product innovation, organizational resilience, keystone vulnerability, situation awareness, adaptive capacity.

## 1.1 Introduction

A recent conceptualization of innovation is that of Kustoff (2008), who conceived that innovation means different techniques work, in the organization can be structured, in other to be accomplished in organizations to encourage competitive advantage. It includes how organizations and people manage the work in a way of association; employee competence, retention, and knowledge management are optimized. A recent knowledge in the organization does not attract desirable change, in the processes, product nature, or growth in revenue and customers, then such an advantage fails in its translation into organizational innovation and can be described as a means in which new knowledge is transferred to the organization, institutions, and employees as well as the application of such knowledge. Knowledge and unique methods of thinking serve as another way of inspiration plus innovativeness in organizations recent knowledge in the organization does not does not attract desirable change, in the processes, product nature, or growth in revenue and customers, then such an advantage fails in its translation into organizational innovation and can be described as a means in which new knowledge is transferred to the organization, institutions, and employees as well as the application of such knowledge. Knowledge and unique methods of thinking serve as a stepping stone to creativity and innovativeness in organizations.

Empirical research (e.g., von Hippel, 1988; Lundvall, 1992) has suggested that sources of innovation in the university often lie outside the university. External partnership and resources propels a network of relationships, as well as using new personnel to graft new knowledge onto the existing learning systems. Concepts such as 'cellular forms' (Miles et al., 1997); modular forms (Galunic & Eisenhardt, 2001) and 'project-based networks' (DeFillippi, 2002) reflect the growth of flexible and adaptive forms of university management with a strategic focus on entrepreneurship and radical innovation in knowledge-intensive sectors of the economy. These studies highlight the different ways in which Public Universities seek to use in creating effective learning environment capable of continuous problem solving and innovation. Societal structures create constraints on and possibilities for Public Universities to develop different types of innovative competences, giving rise to distinctive national innovative trajectories (Ololube, 2006). Several studies have dealt on the association between organizational resilience and various organizational outcomes (McManus et al., 2008; Anyamele, 2006; Chamberlin, 2003 & Seville, 2006); however, despite these commendable efforts, something still remains lacking. Almost all of these studies have been conceptualized in the western world (e.g., McManus et al., 2008; Lam, 2000, 2002). For the findings of this study to be relevant for Nigerian organizations, they must be based on studies using Nigerian organizations. Secondly, there has been no known study that examined the association between innovation and organizational resilience from the internal point of view of the university within the Nigerian work environment. To fill this gap in literature, this research focused on organizational resilience through the product innovating

 

capabilities from the internal point of views of the Public Universities. It is on this note that the researcher intends to do a study on this theme to determine whether product innovation will led to resilience in public Universities.

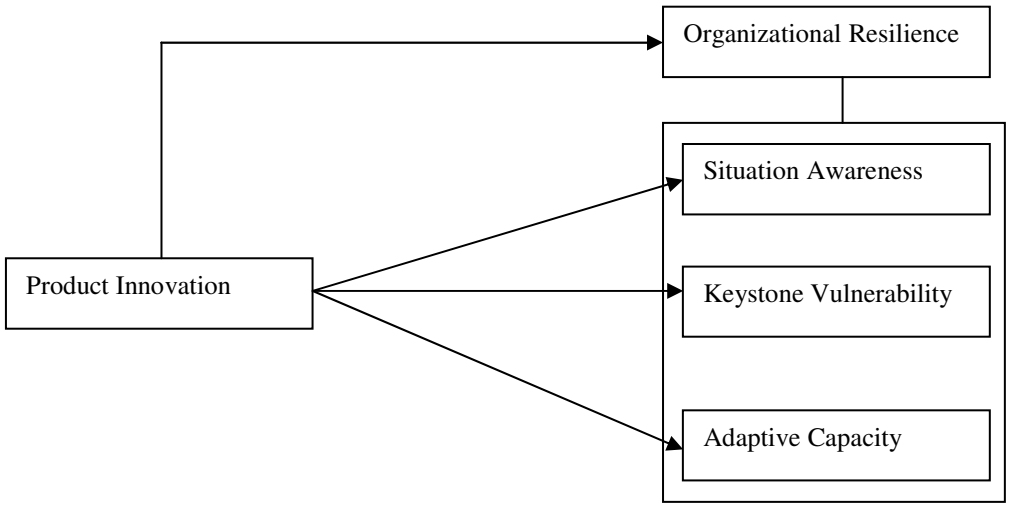


Figure 1: Framework showing the association between Process Innovation and Resilience

## 2. Literature Review

Product innovation is the development and marketing, and or the introduction of a new idea, turning out of (students) in this paradigm, redesigned or substantially improved goods or services. For example, product innovation might include new product invention, technical specification and or quality improvement Education, or product and services. It comprises human resource, an inclusion of new components, materials or desirable functions into an existing product or services (Dougherty, 2013). The product-process life cycle theory (Utterback & Abernathy, 1975) provides a useful model that is helpful towards understanding the pattern of innovation stages and processes. This model succeeded in encompassing the mutual relationships between the stages of a product´s life cycle, the related production process, stages of development and competitive strategy.

By identifying, separating, and processing product innovations, the innovation pattern could be related to three different stages of the innovation process, vis-à-vis the uncoordinated, the segmental and the systemic stage and or process. Utterback and Abernathy (1975), notice that the rate of product or process innovation depends on the present stage of the product´s life cycle. Product innovations requires radical changes in the production processes, however, the rise in the product innovation rate diminishes over time. Nonetheless, highly integrated technological solutions are implemented in organizations, which further standardize production systems while cost minimization becomes an important goal. Product and process changes are highly interdependent which must be taken into consideration by management**.** Technology, services, distribution or logistics, and any combination of these that is unfamiliar to the organization.

An organization must adapt on a more continuous basis to changes in markets, technologies, and competition, however, occasional new products may not be enough to remain viable. Sustained product innovation posses' major organizational challenges that are not addressed by most organizations; this means that the organization must provide resources to, monitor, and staff a variety of different projects at different stages of development all at once (including routine and mature products); develop procedures so that all projects both use well-established steps for effective innovation project management and adjust these steps to their unique situation; enable all these projects to build on the firm's core competencies; enable the core competencies to build on the new knowledge and insight created through specific innovations; finally manage the firm's resources such as manufacturing, R&D, selling, and distribution systems so that they both accommodate the new products readily and run as efficiently as Research and development (R&D) are associated with the creation of new products. There are many studies on innovation which revealed that increased R&D activities lead to innovative products

 

which enable organizations to achieve competitive advantages and to gain market shares (see for e.g., Freeman & Soete, 1997). This is at the core of university activity as they engage in teaching and learning to allow this to happen. The last decades, witnessed a radical revolution in organizational policy, planning and management.

As public Universities in Europe, the USA and Japan have been searching more thoroughly for accompanying measures to flank their R&D-based strategy by pursuing innovation activities in additional fields. Although studies have shown the importance of organization innovations for performance, defining and measuring organization product innovation still lags behind in the public Universities in sub-Saharan Africa. Organizational research and development (R&D) spans the whole process from seeking improvements or innovations experimentally to bringing an idea to the stage of production in the university system. Most public Universities development work predominates within R&D. Almost any idea for a new or improved product will have to go through a process of development in order to make it into something which can be produced and sold. It seems obvious that the amount of effort and resources put into R&D will strongly influence product innovation, but just how important is this? And in what way are resources and effort organized and brought to bear? (Naylor, 1999).

Situation Awareness is the ability to identify product, process, and administrative capabilities and follow serious features of evidence around the happenings to the organization (university) with regards to its vision and mission. Understanding what is happening Witten the organization (university) is very important and it is seen as a strong leadership quality. When organization loses its situational awareness it increases the potential for human error and mishaps (Seville, 2013). The same applies to University. According to Naylor (1999), effective organization situation awareness depends on the composition of its members developing accurate expectations for organizational performance by drawing on a common knowledge base. This process involves anticipate the needs of organization members; predict the needs of organizational members; and adaptation to efficient demand of organizational task. To ensure effective situation awareness, organizational members must share their knowledge relative to organization task and goals (vision and mission); their individual tasks; and organizational members' roles and responsibilities. To provide a solid base for building team situation awareness, organizational members need to have information that will help them develop relevant expectations about the entire organizational task. When organizations lose focus, it puts them in a gray area where no one may be able to predict outcomes with any certainty thereby making process, product and administrative capability most difficult. During organization evolution, they set certain goals or targets to meet, such as speed of advance, waypoints, and soundings. When they are not met, organizations must question why and systematically begin to evaluate its present situation to determine what went wrong (Smit & Wandel, 2006).

For organizations to maintain situation awareness for effective process, product and administrative actions, it must occur through effective communications and a combination of the following actions, vis-à-vis, recognize and make others aware when the organization deviates from standard procedures; monitor the performance of organizational members; provide information in advance; identify potential or existing problems; demonstrate awareness of task performance; communicate a course of action to follow as needed; demonstrate ongoing awareness of mission status; continually assess and reassess the situation in relation to the mission goal(s); and clarifying expectations of all organizational members eliminates doubt situation awareness is dynamic, solid to retain, and very cool to lose. Knowing what is going on all the time is very difficult for any organization, especially during complex high stress operations. Therefore it is important that organizations know what behaviour is effective in keeping employees situational aware of its product, process and administrative capacity and capabilities. It is important that organizations retain and maintain effective regain situation awareness (Becker, 2003; Smit et al., 2000).It is therefore consequent on this thinking that we are poised to hypothesize that:

**$Ho_1$**: There is no significant association between product innovation and situation awareness
**$Ho_2$**: There is no significant association between product innovation and keystone vulnerability
**$Ho_3$**: There is no significant association between product innovation and adaptive capacity

## 3. Methodology

3.1 Population and sampling procedure

The population of this study comprised management staff of ten public universities in the south-south geo-political zone of Nigeria. The unit of analysis is at the organizational level, which consists of Administrative/management staff of the ten public universities located in the South-south Region of Nigeria. The respondents comprise of Vice Chancellors, Deans of Faculties, Directors, Registrars, and Deputy Registrars.

 

Because of the heterogeneous nature of the population under study, the Taro Yemen's formula suggested by Baridam, (2001) was used to determine a sample size of 313 participants.

3.2 Instrumentation

The researcher designed a comprehensive questionnaire. The questionnaires were guided by the characteristics of a good questionnaire as developed by Dillman, Smyth and Christian (2008), Fink (2008) and Fowler (2008). In order to decipher the relevant information, the questionnaire were designed along 5 Likert type scale (1) strongly Disagree, SD, (2) Disagree, D; (3) Undecided, U; (4) Agree, A; (5) Strongly Agree, SA. The questionnaires were divided into two sections: section 'A' deals with issues of respondents' personal data (Rank, department, gender, age, qualification, and faculty). Section 'B' was designed to elicit information on variables related to product innovation and resilience.

3.3 Reliability

The respondents (n = 313) for this study responded to a 54 item five-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). The research instrument was quantitatively analysed based on group elements. (See table 1.).

Table 1. Cronbach alpha coefficient and number of items in group component reliability

| | **Group components** | **Cronbach's Alpha** | **No. of items** |
|---|---|---|---|
| Product Innovation | Product Innovation:-Development and marketing and or the introduction of new redesigned or substantial improved goods or quality services in the university. | .906 | 3 |
| Organizational Resilience | Situation Awareness-an understanding of the multiple parties that make up the University and how they relate to each other | .893 | 6 |
| | Keystone Vulnerability management- able to control components in which by their loss or impairment have the potential to cause exceptional effects in the system | .916 | 4 |
| | Adaptive Capacity-ability to alter strategy, operations, management systems, governance structure and decision support –capabilities | .859 | 4 |

Source: Research data, 2015

## 4. Results and discussion

4.1 Demographic Data

The first analysis conducted was a descriptive illustration of the characteristics of the demographic features of the sample (see table 2).

 

Table 2. Demographic Information of Respondents

| Independent Variables | | Frequency (N) | Percentages (%) |
|---|---|---|---|
| **Gender** | Male | 207 | 66 |
| | Female | 106 | 34 |
| **Age** | 25-39 years | 23 | 7 |
| | 40-54 years | 235 | 75 |
| | 55-69 years | 43 | 14 |
| | 70 and above years | 12 | 4 |
| **Marital Status** | Single | 36 | 11 |
| | Married | 256 | 82 |
| | Divorce | 21 | 7 |
| **Education** | Doctorate degree | 287 | 92 |
| | Master's degree | 26 | 8 |
| **Job Title** | HODs/SL/PROF. | 225 | 72 |
| | Deans | 35 | 11 |
| | Registrar | 9 | 3 |
| | Deputy registrar | 22 | 7 |
| | Directors | 22 | 7 |
| **Length of Service** | 10-20 years | 35 | 11 |
| | 21-30 years | 261 | 83 |
| | 31-above | 17 | 5 |

Source: Research Data, 2015

 

Gender

From table 2. demographic data reveals that the majority of respondents, 207 (66.1%), were male while 106 (33.9%) were female. Implying most of the organizations had a predominantly male occupied workplace as compared to their female counterparts.

Age

Table 2. reveals that twenty-three (7.3%) of the respondents were 25-39 years old, 235 (75.1%) were 40-54 years, 55-69 (13.7%) and 12 (3.8%) were 70 years and over. This implies a higher percentage of the workers fall within 40 to 60 years, possibly as a result of the targeted cadre of respondents with emphasis on senior level staff of the target institutions.

Marital Status

For marital status, table 2. shows that thirty-sixty (11.5%) of respondents were single, 256 (81.8%) were married, while 21 (6.7%) were divorced; implying a higher percentage of married workers which could also be as a result of the targeted cadre of audience which constituted mostly senior staff of the institutions studied.

Educational Status

Based on their educational levels, table 2. reveals that, 287 (91.76%) of the respondents hold Doctorate Degree, while 26 (8.3%) hold Master's Degree.

Job status

Based on the analysis on table 2. the analysis on respondents job title showed that 225 (71.9%) were HODs, Senior lecturers and Professors, 35 (11.2%) were Deans, 9 (2.9%) were Registrars and 22 (7.0%) were Deputy Registrars, while 22 (7.0%) were Directors.

Length of Service

The calculation on Length of Service as shown on table 2. depicts that respondents who have served for 10-20 years were 35 (11.2%), 21-30 years 261 (83.4%), while those who have served 31-years above were 17 (5.4%).

Univariate Analysis

In this section, the analysis for each variable is presented. Data analysis in this section entailed the use of various descriptive analytical tools illustrated using contingency tables. Data is herein described through the examination of central tendency (mean) and dispersion (standard deviation) while distribution is evaluated through data kurtosis and skewness coefficients portrayed on contingency tables.

Based on the nature of the scale adopted (5 –point Likert) and the structure of indicators which were stated in the positive; a base mean of x>3.0 with a relative standard deviation of s<2.0 served as benchmark for observations of affirmative tendencies while x<3.0 with a relative standard deviation of s<2.0 served as benchmark for observations of negation tendencies.

Table 3. Descriptive statistics for process innovation

| | Mean | Std.Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Product | 4.0937 | .84800 | -2.081 | .138 | 3.587 | .275 |

Source: Research data, 2015

Table 3. Above illustrates the summary of the descriptive analysis for the predictor variable; Product innovation; which assesses the organizations innovative measures towards products and services has a mean score of x = 4.0937 and a standard deviation of s = 0.84800. The criterion variable for the study; organizational resilience; is operationally defined using three variables namely – situation awareness, keystone vulnerability and adaptive capacity.

 

Table 4. Descriptive summary on measures of organizational resilience

| | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Awareness | 4.1001 | .79142 | -1.867 | .138 | 3.206 | .275 |
| Keystone | 4.1230 | .81333 | -2.112 | .138 | 4.500 | .275 |
| Adaptive | 4.1246 | .75509 | -2.204 | .138 | 5.293 | .275 |

Source: Research data, 2015

Table 4. Above illustrates the summary of the descriptive analysis for measures of the criterion variable; organizational resilience (situation awareness, keystone vulnerability and adaptive capacity). Situation awareness; which assesses the organizations knowledge accessibility and dissemination as regards market changes and competition has a mean score of x = 4.1001 and a standard deviation of s = 0.79142. Keystone vulnerability which assesses the organizations competitive stance and advantages relative to external pressures and risk has a mean score of x = 4.1230 and a standard deviation of s = 0.81333 while adaptive capacity which assesses the organizations capacity for structural, cultural and technological flexibility in order to stay ahead of competition and to survive change carries a mean score of x = 4.1246 and a standard deviation of 0.75509. The findings show a tendency for affirmation based on the adopted x>3.0 benchmark and a relative standard deviation of s<2.0 coefficient.

All three empirical referents indicate negatively (left) skewed data with $G_1$<-1.0 coefficients showing a high level of data skewness in all three instances. Also for kurtosis ($G_2$) two instances (keystone vulnerability and adaptive capacity) reveal leptokurtic tendencies with $G_2$>3.0 coefficients while situation awareness is symmetrical at a $G_2$ = 3.coefficient.

Table 5. Product innovation and organizational resilience

| | | Spearman's rho | | |
|---|---|---|---|---|
| | | Correlation Coefficient | Sig. (2-tailed) | N |
| Product | Product | 1.000 | . | 313 |
| | Awareness | .379** | .000 | 313 |
| | Keystone | .449** | .000 | 313 |
| | Adaptive | .622** | .000 | 313 |

Source: Research data, 2015

Table 5. Illustrates the association between product innovation and the measures of organizational resilience namely - situation awareness, keystone vulnerability and adaptive capacity.

Hypotheses one: There is no significant association between product innovation and situation awareness

The table 5. shows a significant association between product innovation and situation awareness with a rho value of 0.379 and a high significance of 0.000. Indicating significance at a 0.01 (**) level and at a 99% confidence interval. The null hypothesis of no significant association is therefore rejected on the basis of a p<0.05 criterion as the findings reveal a strong (**) and significant association between product innovation and situation awareness. Therefore we restate that: There is a significant association between product innovation and situation awareness

Hypotheses two: There is no significant association between product innovation and keystone vulnerability

The table 5. Shows a significant association between product innovation and keystone vulnerability with a rho value of 0.449 and a high significance of 0.000; indicating significance at a 0.01 (**) level and at a 99% confidence interval. The null hypothesis of no significant association is therefore rejected on the basis of a p<0.05 criterion as the findings reveal a strong (**) and significant association between product innovation and

 

keystone vulnerability. Therefore we restate that: There is a significant association between product innovation and keystone vulnerability

Hypotheses three: There is no significant association between product innovation and adaptive capacity

The table 5. shows a significant association between product innovation and adaptive capacity with a rho value of 0.622 and a high significance of 0.000. Indicating significance at a 0.01 (**) level and at a 99% confidence interval. The null hypothesis of no significant association is therefore rejected on the basis of a $p<0.05$ criterion as the findings reveal a strong (**) and significant association between product innovation and adaptive capacity.

Therefore we restate that: There is a significant association between product innovation and adaptive capacity

**4. Discussion of findings**

The findings drawn from the interpretation of our results is that product innovation associate with organizational resilience. This finding was revealed from the interpretation of the results of the Univariate analyses on the product innovation, which is one of the major (predictor) variables in our study. The analytical attention on product innovation owes its necessity to establish the extent to which product innovation associates with organizational resilience practiced in the organizations (public Universities) under study. It was found that public Universities product innovation associate largely with situation awareness, keystone vulnerability, and adaptive capacity. The high extent of existence of organizational innovation in the management of organization(public Universities) tend to agree with Kustoff(2008),who contend that organizational innovation refers to new ways work can be organized, and accomplished within an organization to encourage and promote competitive advantage, he further argue that if innovation is about change, new ideas, and looking outside of oneself to understand ones environment, then continuous learning is a requirement of organizational innovation success.

A trend that emerged from our findings reveals a strong and positive association between product innovation and situation awareness, keystone vulnerability, and adaptive capacity. So considering this obvious trend and the extent to which innovation and organizational resilience is practiced in the organization, (public Universities) we categorically state as our finding that there is the existence of innovation on organizational resilience practiced in the public Universities. Considering this, it is logical to conclude that: although, there is the existence of appreciable innovation and organizational practice in the public Universities, there is still room to do more.

## 5. Recommendations

In view of the above findings, we recommend that:

i. Organizations (public Universities) should adopt more innovative ideas in their research teaching and learning in other to improve the quality of our university education system; in doing this they should give equal attention to process innovative ideas.
ii. Public Universities should more specifically seek to understand their environment, by been aware of the situation, taking cognizance of the keystone vulnerabilities, and also be ready to adapt to innovative ideas or technologies.
iii. To achieve a successful educational institution, innovation in research teaching and learning has to be an integral part of all processes in higher education institutions.

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