

## **DISRUPTIVE TECHNOLOGY AND EMPLOYEE PRODUCTIVITY OF AGRICULTURAL PRODUCING FIRMS IN RIVERS STATE**

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### **ABSTRACT**

*The purpose of this research was to empirically investigate the effect of disruptive technology on employee productivity of agricultural producing firms in Rivers State. The study adopted cross-sectional survey design in accessing its sample elements. While the study's population comprises of owners/managers or agricultural merchants, a total of 203 merchants were conveniently administered copies of questionnaire. Information retrieved through this means was analyzed with Spearman's Rank Correlation Coefficient and results revealed that disruptive technology has a positive and significant relationship with operational efficiency and profitability. The study therefore concludes that disruptive technology is a valuable strategic tool that can help agric merchants in improving organizational productivity. Based on the findings and conclusion, the study recommends that agricultural merchants that want to enhance their productivity should endeavour to engage in continuous researching on new and innovative processes that deliver superior value for customers' as this will eventually lead to enhanced operational efficiency and profitability of the organization.*

***Keyword: Disruptive Technology, Innovation, Organizational Productivity, Agricultural Merchants.***

### **INTRODUCTION**

The growth and development of Nigeria has to a large extent due to our agricultural cultivation prowess coupled with her natural endowment (Bakaro, 2013). Nigeria is a vast agricultural country with 68 million hectares of arable land fresh water resources covering about 12.6 million hectares, 960km of coastline and an ecological diversity which enables the country to produce a wide variety of crops, livestock, forestry, and fishery products (World Bank, 2014). Nigeria has a highly diversified agro-ecological condition, which account for the enormous contribution to the economy and a major source of basic food supply in feeding her teeming population.

Though the practice of agriculture in this part of the world has been largely subsistence in nature; however, due to competition, government intervention/support, and increasing demand for food; has continued to change the narrative and has put pressure for a more mechanized and business-based system of agriculture. In this sense, the practice of agriculture is highly technological and the industry has started competing in this direction as a way of achieving sustainable competitive advantage (Ehui & Tsigas, 2015). Again, because digital agricultural has the potential to drive economic benefit, increased productivity, cost efficiency, market opportunities, and organizational success, therefore it is crucial for agricultural merchants to strategically key into disruptive technology innovations. According to Momeni and Rost (2016) an agricultural technologic change is either disruptive or sustaining. The authors argued that agricultural disruptive innovations entails new technologies that result to shift in the technological paradigm and business processes; that create new products that replaces existing products within the agricultural value chain. On the other hand, sustainable innovations reinforce the technological paradigm but do not lead to the creation of new products rather the development of existing ones (Momeni & Rost, 2016). More so, the interesting aspect of disruptive technology is that it helps new firms that are highly technologically innovative in displacing established and less technological firms. Disruptive technology creates an opportunity for new and innovative firms to occupy emerging market niches.

Similarly, Christopher (2017) stated that over time firms with technological innovative ideas improves in productivity and build technological competence that provides a competitive edge that enable them occupy a larger share of the market; thus driving established firms out of business. A good number of studies have been carried out in the area of disruptive technology and various organizational performance outcomes. Hudson and Thomas (2017) examined organizational adaptability to disruptive technologies among Kenyan commercial bank; adopted resource reconfiguration, organizational learning, and knowledge management capability as moderators of the relationship between disruptive technologies and organizational performance. Dominic and Wilhelmina (2012) analyzed the impact of disruptive technology on the success of small and medium enterprises (SMEs) in South Africa. The authors measured success with sales growth and market share. Leipziger and Dodev (2016) investigated disruptive technologies and their implications for economic policy among Asian economies. In view of the above and other related studies, this research deviated from extant literature by addressing contemporary issues in the agricultural industry in Rivers State; as it relates to outdated agricultural processes and technologies that have resulted to poor productivity and business failures. In solving this problem, this research examines whether disruptive technology can lead to enhanced employee productivity.

**Model Specification and Research Hypotheses**

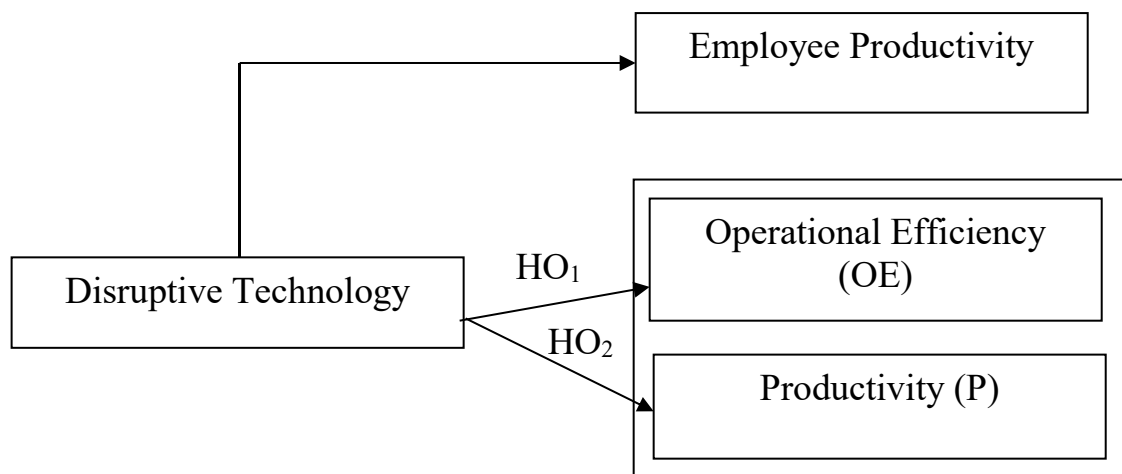
This study is on disruptive technology and employee productivity of agricultural merchants in Rivers State. The independent variable is disruptive technology and the dependent variable is employee productivity, which is measured with operational efficiency and profitability. Below is the model specification of this research.

EP = f(DT)	-	-	-	-	Model 1
EP = DP, P	-	-	-	-	Model 2
(OP,P) = f(DT)	-	-	-	-	Model 3

Where:

- EP = Employee Productivity
- DT = Disruptive Technology
- OP = Operational Efficiency
- P = Profitability

Below is the operational framework of the study



**Fig. 1.1:** Operational Framework of the study

**Source:** Researchers Conceptualization from Reviewed Literature

Based on the operational framework, the following hypothetical statements were subjected to statistically test:

**Ho<sub>1</sub>:** Disruptive technology has no significant effect on operational efficiency of agricultural merchants in Rivers State.

**Ho<sub>2</sub>:** Disruptive technology has no significant effect on profitability of agricultural merchants in Rivers State.

## **LITERATURE REVIEW**

### **Theoretical Foundation**

The theory upon which this research was anchored is the diffusion of innovation theory propounded by Evereth Rogers (2003). The theory seeks to explain how, why and at what rate new ideas and technology spread. Rogers (2003) argued that diffusion is the process by which an innovation is communicated over time among the participation of a social system. The author further opined that the diffusion process of innovation has four components which include; innovation, communication channels, time, and social system. However, these four components largely depend on the human capital. The innovation component, according to Rogers (2003) described innovation as an idea, practice, or project that is perceived to be new by individuals or other units of adoption. This implies that an innovation may have been in existence for some time, perhaps those that have not come across such idea may consider the existing idea as new.

More so, communication channels, according to Rogers (2003) are the process in which participants create and share information with one another in order to reach a mutual understanding. The author argued that the diffusion is a specific kind of communication with channels such as mass media and interpersonal communication. In addition, Rogers (2003) talked about the time component of the diffusion process. Time here explains the period within which a new innovation spread in a social system. It measure the period upon which people are aware and learn about the new technology. The social system is the fourth components of the diffusion process. Rogers (2003) defined a social system as a set of interrelated units engage in problems solving to accomplish a common goal. He argued that since diffusion process occurs in the social system, therefore, the rate at which information is passed to others is largely influence by the social structure of the social system. Finally, Rogers (2003) argued that the rate of adoption of a new innovation is dependent on four benefits such as relative advantage, compatibility, complexity, and triability. Those four benefits determine the speed at which the new technology spreads across the social system. He further categorized adopters (i.e. the people expected to use the new idea) as innovators, early adopters, early majority, late majority, and laggards.

### **Conceptualizing Disruptive Technology**

The concept of disruptive technology is multi-dimensional and scholars have yet to come to terms with its definition. However, a few scholars have attempted to give varying definitions of the concept. Danneels (2004) defined disruptive technology as a technology that changes the bases of competition by changing the performance metrics along which organization compete. According to the author; such technology can lead to changes in business models and even the basis of competition. Therefore it is crucial for firms to adopt in a manner that enables them to continue competing favourably and build competencies. Lytinen and Rose (2003), defined disruptive technology as a necessary but not sufficient architectural innovation originating in the information technology base that radically and pervasively impact system development process and services. More so, Christophe (2014) argued that disruptive technology describe a process whereby a firm introduces an innovation idea that threatens and/or changes the way or processes that were hitherto considered the best, of which users now perceive outdated due to the new innovation. He further argued that as this new innovation spreads within the social system, the innovator tend to eat into the market share of well established firms thereby providing a strategic opportunity to improve sales growth, productivity, and sustainable profitability. Further, Sood and Tellis (2011) stated that disruptive technology occurs when a new technology exceeds the performance of the dominant technology on the priming dimension of performance. Linton (2002) maintained that disruptive innovations are based on a different, but unique technology that alters current business models and creates more value for stakeholders in the industry. A typical example of current

disruptive technologies are; cloud technology, advanced robotics, mobile internet, automation of knowledge work energy storage, 3D printing, averaged materials renewable energy, etc (Stephen et al., 2017).

### **Employee Productivity**

Employee performance largely depends on several factors; however, can be measured with productivity. Employees', who pose unique skills, competencies, and experience, have the ability to deliver high productivity (Wright, 2004). It has been argued that improving employee productivity has been among the many goals of several organizations. This is in line with several efforts by management to enhance employee productivity as this will lead to organizational profitability (Sharma & Sharma, 2014). The authors were also of the view that higher productivity tends to maximize organizational competitive advantage through cost reduction and improvement in quality of output.

Agnes (2009), posits that productivity is the quantity of work that is achieved within a period of time by means of the factors of production. Baatti (2007) mentioned that organizational productivity is a measure of performance that encompasses both efficiency and effectiveness. It is the correlation that exists between the quantity of inputs and outputs from a clearly defined process. Qureshi (2007), opined that organizational productivity is an indication of how efficient essential resources are utilized to attain specific goals in terms of quantity and quality within a given time frame.

Many researchers have explored the meaning of productivity and its effect on organizations survival; however, a good number of them have not come to terms on its definition. According to Gummesson (2000), productivity is an assessment of the efficiency of workers and one of the key components which directly affects the profit of the organization. Sele et al., (2006) posited that productivity may be evaluated in terms of the output of an employee or group of employees in a specific period of time. The scholar further posited that productivity can be assessed according to the quantity of unit of product or service that an employee handles in a defined time frame. As the success of an organization largely depends on the productivity of employees; therefore, any means or strategy that may result to higher employee productivity should be one of the priorities of organization if they must achieve improved performance (Sharma & Sharma, 2014).

In addition, Cato & Gordon (2009) also expressed that the alignment of a strategic vision to organizational productivity is crucial to the performance of the organization. They further expressed that the effective alignment of vision and productivity will motivate and improve employees to be more creative, and this can in-turn improve their performance effectiveness to attain organizational predetermine goals and objectives. Perhaps, higher productivity tends to increase the competitive advantage through reduction in cost and improvement in quality output.

### **Operational Efficiency**

Operational efficiency is the backbone of every industry or organization (Dhillon & Vachhrajani, 2012). In the various departments or units of the organization, operational efficiency must be assessed for the overall benefit of the organization. According to Agnes (2009), every unit in the department has a duty to evaluate related costs and/or expenses and the quantity of productivity from each worker, as this will help assess whether the unit is operating in an efficient manner. The author argued that the long rang survival of the organization is basically dependent on how management utilizes resources at their disposal.

The concept to operational efficiency signifies the quality of employee competence and the degree of achievement in the management and performance of various activities in the organization. Harngren defined operational efficiency as the profitable, efficient and judicious use of resources available to an organization in relation to sound financial policies on operations. Since business is a dyad and dynamic process; therefore, operational efficiency is the result achieved as a result of inter-departmental collaboration and the quality of performance in a given persist of operation.

Operational efficiency involves adopting a mixture of strategies or tactics which are used to attain greater delivering of quality goods and services to customers in the most cost effective and timely way (Parkar, 2009).

According to Dhillon and Vachhrajani (2010) management in organizations manages its revenues and uses them to generate profits. The authors further explained that operational efficiency is the ability of an organization to offer goods to its customers at low cost, but with the highest quality of goods. This can be achieved by reorganizing the organization's processes in such a manner that is more effective in responding to continually changing market forces in a cost effective way. It is an organizations ability to utilize the existing resources to generate and maximize output (Dhihion & Vachhrajani, 2012).

### **Profitability**

Maximizing profit is one of the major objectives of many organization and key to sustainable survival. According to Gitman and Zutter (2012), profitability is a fundamental pre-requisite for long-term survival and success of a firm while it is a key pre-condition for achievement of financial goals of a business enterprise. Profitability is a core indication of the success of an organization. It shows a firm ability to generate sales by commanding patronage and customer satisfaction (Margaretha & Supartika, 2016). They argued that profitable companies create value, for customers which results to repeat purchase and loyalty.

It is important to distinguish between profit and profitability because more often than not, the both terms are erroneously conceived as the same. While profit is an absolute term, profitability is a relative concept. They are related and mutually independent. According to Aburime (2006) profit refers to the total income earned by an organization within a specific period of time whereas profitability refers to the capacity of an organization to operate efficiently and earn income. Profitability is the ability of a firm to make profit from business activities, which is measured, with how resources are utilize to achieve a level of outputs. The ability of a firm to remain sustainably viable is anchored on how efficient the management of the firm carries out business activities and how effective its employees are in terms of productivity (Al-Jafari & Al-Samman, 2015).

### **Disruptive Technology and Employee Productivity**

The nexus between disruptive technology and employee productivity has been researched by plethora of scholars in divers industries or markets. Christophe (2017) who examined the effects of disruptive innovation on productivity, revealed two distinct effects on total factor productivity (TFP). First, disruptive technology has a positive impact on productivity measures. Second, the direction and impact of disruptive technology on productivity measures vary considerably across time and countries. More so, Dominic and Wilhelmina (2012) analyzed the impact of disruptive technology on the success of SMEs. While the authors, obtained data from 101 owners or managers of SMEs in South Africa, however, they found out that disruptive technology has a positive and significant effect on SMEs success.

In addition, Leipziger and Doder (2016) who studied disruptive technology and their implication for economic policy, found that though, the effect of disruptive technologies vary from country to country especially in Asian nations; however they have a positive and significant effect in most of the countries considered. Lastly, Stephen, Bensemman, Eweje and Jennifer (2017) investigated disruptive technology in the agro-food sector; with emphasis on current and future influence on sustainability, bio-security and business effectiveness. The authors found out that technological change has a positive impact on the agro-food industry at an unprecedented rate, thereby significantly changing current business practices and models. Ehui and Tsigas (2015) mentioned that 21<sup>st</sup> century organization that want to build sustainable competitive advantage in-terms of high productivity and operational efficiency must do this with a smart energetic and innovative

workforce that understand and appreciate the importance of innovative technologies. They further revealed that disruptive innovativeness reduces substantial cost in the long-run and enhance organization profitability. In view of the above postulate; we therefore proposed the following hypotheses:

- Ho<sub>1</sub>:** Disruptive technology has not significant effect on operational efficiency of agricultural merchants in Rivers State.
- Ho<sub>2</sub>:** Disruptive technology has no significant effect on profitability of agricultural merchants in Rivers State.

## **MATERIALS AND METHODS**

Due to the nature of the study as to the need for questionnaire administrated for primary data collection; the researcher's philosophical stand-point is objectivism. This entails the use of nomothetic methodology. In view of the above, this paper adopted cross-sectional survey design due to its focus on studying groups of individuals located in a geographical area, at a particular point in time. More so, the population of this research comprised agricultural merchants in Rivers State. According to the Rivers State Yellow Pages Report (2014-2015 Edition), there are a total of four hundred and fourteen (414) agriculture producing firms in Rivers State. Based on the population size of 414, Taro Yamen formula was used to determine a sample size of 203. With respect to the above, the research conveniently administered 203 copies of questionnaire to accessible agricultural producing firm in Rivers State.

In addition, data for the study were obtained from both primary and secondary sources. While the primary source of data were obtained with the help of questionnaire, the secondary source were gotten from journal articles, internal publication, government directories, textbooks, etc. Lastly, Spearman Rank Correlation Coefficient was used in testing the two proposed hypotheses; while tables, charts, percentages, and averages (mean) were used at the primary level of analysis. However, all analyses were carried out with SPSS (version, 20.0).

## **DATA PRESENTATION AND ANALYSIS**

The researcher relied on data from questionnaires distributed to respondents. This section was devoted for data presentation and testing of hypotheses.

**Table 4.1 Questionnaire Distribution and Retrieval**

<b>Questionnaire</b>	<b>Frequency</b>	<b>Percent (%)</b>
Distributed	203	100
Retrieved	180	88.7
Not retrieved	11	5.4
Retrieved usable	175	86.2

**Source:** field survey data, 2024.

Table 4.1 above shows that a total of two hundred and three (203) copies of the questionnaires were distributed to agricultural merchants in Rivers State. A total of one hundred and eighty (180) copies out of the two hundred and three (203) copies of the questionnaire distributed were retrieved, but one hundred and seventy five (175) was usable i.e. completely filled.

## **Result of Test of Reliability**

<b>Variables</b>	<b>Cronbach's Alpha</b>
Disruptive Technology	0.842
Operational Efficiency	0.801
Profitability	0.874

**Source:** SPSS Output, 2024

The table above shows the results of the reliability test. As can be noticed that since the various test results are more than 0.700 (70%) which happens to be the criterion for acceptance of the instrument. Hence, the research instrument is reliable.

### Testing of Hypotheses

#### Decision rules

Accept the null hypotheses (Ho) and reject the alternate hypotheses (Ha) if and only if the significant probability value (PV) >0.01, i.e., no significant correlation exist. Reject the null hypotheses (Ho) and accept the alternate hypotheses (Ha) if and only if the significant probability value (PV) <0.01 i.e. a significant correlation exists. The strength of the relationship is thus; -0.1 to -0.4 have a weak negative relationship, -0.5 to -0.7 have a moderate negative relationship, -0.8 to -0.9 have a strong negative relationship, -1 has a perfect negative relationship, 0.1 to 0.4 have a weak positive relationship, 0.5 to 0.7 have a moderate positive relationship, 0.8 to 0.9 have a strong positive relationship, 1 has a perfect positive relationship.

#### Test of Hypothesis One

**Ho<sub>1</sub>:** Disruptive technology has no significant effect on operational efficiency of agricultural merchants in Rivers State.

**Table 4.3 Correlation Analysis between Disruptive Technology and Operational Efficiency**

			Correlations	
			Disruptive Technology	Operational Efficiency
Spearman's rho	Disruptive Technology	Correlation Coefficient	1.000	.811**
		Sig. (2-tailed)	.	.001
		N	175	175
	Operational Efficiency	Correlation Coefficient	.811**	1.000
		Sig. (2-tailed)	.001	.
		N	175	175

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

**Source:** Field Survey Data, 2024, SPSS Output.

**Decision:** The above table shows a Spearman Rank Correlation Coefficient of 0.811 and probability value of 0.001. Since the PV which is 0.001 <0.01 we reject the null hypothesis and accept the alternate hypothesis. This result indicates that there is positive and significant relationship between disruptive technology and operational efficiency of agricultural merchants in Rivers State.

#### Test of Hypothesis Two

**Ho<sub>2</sub>:** Disruptive technology has no significant effect on profitability of agricultural merchants in Rivers State.

**Table 4.4 Correlation Analysis between Disruptive Technology and Profitability**

			Correlations	
			Disruptive Technology	Profitability
Spearman's rho	Disruptive Technology	Correlation Coefficient	1.000	.829**
		Sig. (2-tailed)	.	.001
		N	175	175

	<b>Profitability</b>	Correlation Coefficient	.829**	1.000
		Sig. (2-tailed)	.001	.
		N	175	175

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

**Source:** Field Survey Data, 2024, SPSS Output.

**Decision:** The above table shows a Spearman Rank Correlation Coefficient of 0.829 and probability value of 0.001. Since the PV which is 0.001 < 0.01 we reject the null hypothesis and accept the alternate hypothesis. This result indicates that there is positive and significant relationship between disruptive technology and profitability of agricultural merchants in Rivers State.

### Discussion of Findings

This section sought to discuss various findings as regards to data analysis and results.

Hypothesis one (H<sub>01</sub>) aimed to examine the relationship between disruptive technology and operational efficiency of agricultural merchants in Rivers State. The hypothesis was tested using Spearman Rank Correlation and result showed a correlation value of 0.811. This revealed a positive and significant relationship between disruptive technology and operational efficiency of agricultural merchants in Rivers State. Therefore the null hypothesis was rejected in favour of the alternate hypothesis. The finding however corroborates with the findings of Dominic and Wilhelmina (2012), who analyzed the impact of disruptive technology on the success of SMEs. While the authors, obtained data from 101 owners or managers of SMEs in South Africa, however, they found out that disruptive technology has a positive and significant effect on SMEs success

Hypothesis two (H<sub>02</sub>) aimed to examine if there exist significant relationship between disruptive technology and profitability of agricultural merchants in Rivers State. The hypothesis was tested using Spearman Rank Correlation and result showed a correlation value of 0.829. Our analysis revealed a positive and significant relationship between disruptive technology and profitability of agricultural merchants in Rivers State. Therefore the null hypothesis was rejected in favour of the alternate hypothesis. This finding was in line with the argument of Ehui and Tsigas (2015), when they mentioned that 21<sup>st</sup> century organizations that want to build sustainable competitive advantage in-terms of high productivity and operational efficiency must do this with a smart energetic and innovative workforce that understand and appreciate the importance of innovative technologies. They further revealed that disruptive innovativeness reduces substantial cost in the long-run and enhance organizations profitability.

### CONCLUSION AND MANAGERIAL IMPLICATION

Innovative technology has become part of Nigerian agricultural supply chain. Therefore, agricultural merchants that want to compete at any level should learn how to not only welcome new technology, but also, have a policy of implementing such ideas in order to out-pace competitors and enhance organizational success. Though disruptive technology is relatively new in the agro-sector in the country, therefore new firms have the strategic window to introduce new ways or processes that result to additional value for customers and other stakeholders. There are also opportunities for new entrants to create and target profitable niche markets within the agro-market.

In addition, it is important to note that the use of new technology may encounter customer resistance; however, organization must investigate deeply in order to anticipate the rate of adoption and spread of the new technology. Nevertheless, this research confirms the importance of disruptive technology in command and enhancing organizational productivity. In line with this thought, new innovative technology within the agricultural supply chain can help agricultural producing firms improve operational efficiency, which will in-turn lead to organizational profitability. Based on the above findings and conclusions, the research recommends that agricultural producing companies that want to improve employee productivity should endeavour to

continuously research on new and innovative processes that deliver superior value to customers as this research has proven how agricultural merchants can strategically enhance their operational efficiency and profitability through disruptive technological innovativeness.

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