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ENGAGING TECHNOLOGY ADOPTION PRACTICE AS A  
FARM STRATEGY AMONG PINEAPPLE FARMERS IN  
NIGERIA

MOSHOOD OLATUNDE OLADAPO

A thesis submitted to the University of Huddersfield in partial  
fulfilment of the requirements for the degree of Doctor of  
Business Administration

April 2020

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## **Dedication**

This research work is dedicated in memory of my late sister – **Mrs F.T.Kolawole.**

I can never forget your contributions and support to get this far.

## **Abstract**

Studies around farm level technology transfer have grown up in the last decade with a central focus on technology adoption. However, literature has failed to explain the convergence and relevance of specified technology and associated farm practices as components of technology adoption. The omission of these crucial parts of adoption may lead to inappropriate recommendation and policy designs. The study investigates how farming practices enhance technology adoption within the horticultural farm setting. It also extends investigation to how technology adoption and farm practices support competitive strategy at the farm level.

The study considers a qualitative case study approach of pineapple farmers in Ejigbo, Nigeria, using a Straussian grounded methodological approach to explore the adoption of farm practices support for competitiveness. The purposive method of data collection includes focus group discussion, semi-structured interview, field observation and memo. The storylines that explain the emerging theory of engaging technology adoption through farm practices are grounded in the empirical data collected to explain the phenomenon.

Findings from the study generate two storylines and reveal that attributes such as farming system, fruit quality and mindset enhance the production of pineapple while community cohesion, mutual relationship with change agent, learning from errors and skills development through training foster and strengthen competitiveness at the farm level. The findings suggest that the passion of the farmers for the cultivation of pineapples lies in the attributing factors supporting the technology adoption practices as well as the dynamic reinforcing capabilities strengthening the competitiveness.

The research contributes to the general body of knowledge in the field of strategic management theory and practice. Specifically, it makes a significant contribution to how well pineapple farmers can manage their production system to gain competitive advantage.

The research recommends that agricultural and rural development policy should focus on supporting farmers through reinforcing factors. The research also gives recommendations for potential future research studies in the field of strategic management and agribusiness.

## **Dissemination of the Research Study**

The initial outcomes of the research were discussed and disseminated on the following occasions.

- Oral presentation at the University of Huddersfield postgraduate research conference on the 13<sup>th</sup> November 2015
- Poster presentation at the Business School Research Conference, University of Huddersfield, the United Kingdom on 14<sup>th</sup> January 2016
- Seminar presentation at The Department of Construction Management and Economics, Chalmers University of Technology, Gothenburg, Sweden on the 23<sup>rd</sup> of May, 2016 (Academic study tour sponsored by Santander Bank, United Kingdom)
- Presentation at the European Operations Management Association (EurOMA) 2017 Conference hosted by Heriot-Watt University, in Edinburgh, the United Kingdom between July 1-July 5, 2017. (Conference expenses sponsored by the University of Huddersfield, United Kingdom)
- Presentation of findings from the research to pineapple farmers and other participants at the Pineapple Farmers Association, Ejigbo, Nigeria on 23<sup>rd</sup> August 2018
- Potential submission of an article to the Journal of Technology Transfer after the award of the DBA.

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## List of Acronyms

CL	-	Collective Learning
DC	-	Dynamic capability
DOR	-	Director of Research
EA	-	Extension Agent
FAO	-	Food and Agricultural Organisation
FAOSTAT	-	Food and Agricultural Organisation Statistics
FFG	-	First Focus Group
FZ	-	Fruit size
IF1...IF8	-	Individual Farmer 1...8
LO	-	Learning Organisation
NIHORT	-	National Horticultural Research Institute
MBV	-	Market-Based View
OC	-	Organisational Capability
OL	-	Organisational Learning
PFA	-	Pineapple Farmers Association
RBV	-	Resource-Based View
RM	-	Research memo
RQ1	-	Research Question 1
RQ2	-	Research Question 2
RS	-	Research Scientist
RV	-	Relational View
SCA	-	Sustainable Competitive advantage
SFG	-	Second Focus Group
SRQ1	-	Sub research question 1
SRQ2	-	Sub research question 2
TAP	-	Technology Adoption Practices
TC	-	Technological capability
TFG	-	Third Focus Group
WTO	-	World Trade Organisation

# 1 CHAPTER ONE

## 1.0 Introduction

The economic importance of pineapple is on the increase due to the general increase in the pattern of demand for fruits and vegetables in both domestic and international markets (Viswanathan & Satyasai , 1997). Such an increase in demand necessitates farm producers and those in the supply chain to look for ways of improving the production process to face the increasing demand challenges. These challenges are particularly acute in developing economies such as Nigeria which is the focus of this thesis. Whilst the Nigerian production statistics for pineapple in 2016 and 2017 constitute about 1.4 million metric tons yearly (Iwuchukwu , et al., 2017 ). Yet, studies conducted by Baruwa (2013) and Adegbite et al. (2014) confirm an underutilisation of farm resources. However, Fawole (2008) attests that the cultivation of pineapple through an expansion of smallholders' farmers can increase the national income and livelihood of rural dwellers. To achieve an improved level of livelihood and combat the challenges particularly among the small-scale producers in developing economies, farmers compete with available resources, both (tangible and intangible) to match the increase in consumer demand with the supply for horticultural products (Viswanathan & Satyasai , 1997).

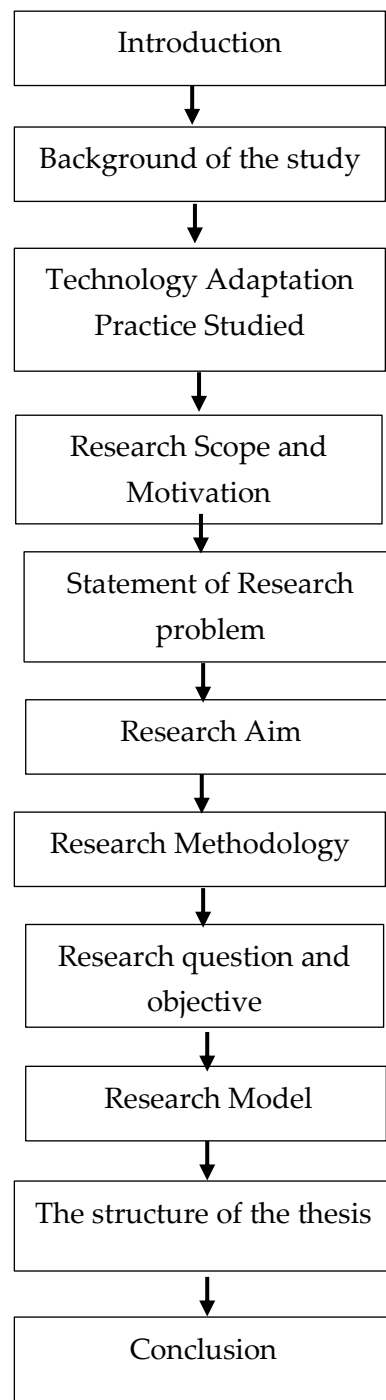
In horticultural farming, technology adoption remains one of the intangible resources aiding farmers and farming communities to increase yield and quality of farm products. The role of technology change at the farm level constitutes and adds to both structural change and innovation. A farmer's ability to adopt new technologies is paramount to the growth of the farm affecting both the inputs, i.e. planting materials and the product in a horticultural farm business. It is, therefore, suffice to say that farmers will always need to create a positive difference through product differentiation to capture the expanding horizon of customers, as well as farmers satisfaction to outperform their competitors. However, to compete and gain an

advantage over other producers, farmers need to incorporate farming practices in conjunction with technology adoption. Thus, adoption of horticultural technological practices at the farm level is central to the development and transformation of rural farm business and a path to improving livelihoods among farmers in developing countries.

The research aims to investigate the realities of technology adoption practices as a source of competitive advantage among farmers producing pineapple primarily in Nigeria but specifically in Ejigbo community. It focuses explicitly on a farm-level exploration of farming and management practices within the Ejigbo community. The context of analysis is horticulture with pineapple production as the subject of emphasis. Thus, the study explores the competitive position of pineapple farmers in Ejigbo community in the southwestern zone of Nigeria. From a professional practise standpoint, the study gives an insight into how farmers attempt to proffer solutions to practical problems encountered during the production process.

The chapter presents an overview of the thesis. It describes the research background, the research questions and the methodology employed for the thesis. The latter part of the chapter concludes with an outline of the background of the thesis; It also gives a guide to the structure of the thesis. The chapter establishes the rationale behind the research study. Thus, chapter one serves as a general introduction to the whole thesis. Chapter one is structured, as shown in Figure 1. It starts with the introduction explaining the background of the study, followed by the method of propagating pineapple specifying the three methods of propagation. The definition of relevant concepts was explored to clarify the meanings of concepts in the study. Other sections covered in chapter one in chronological order include research scope, identification of research problem, research aim, research questions, research methodology, research model, the significance of the study, thesis architectural background and summary to the chapter.

**Figure 1: Chapter One Structure**



## 1.1 Background of the study

Horticulture is a branch of agriculture that concentrate on the cultivation and utilisation of fruit (pomology), vegetable (olericulture), flowering and ornamental plants (floriculture) (Van Wesenbeeck, 2014). They are also perishable crops that contain high moisture content in their freshly harvested state (Desai & Salunkhe , 1991). In the context of the current research, pineapple production falls under pomology as a subset within the discipline of horticulture.

According to the central intelligence agency (2017), agriculture serves as a means of livelihood for about 70% of the workforce. It generates 40% of Nigeria gross domestic product (GDP). The diversity of climatic conditions across Nigeria provides an ideal environment for the production of a variety of crops with a vast potential for domestic trade (Iwuchukwu , et al., 2017 ). Horticulture contributes to the gross domestic product of Nigeria and as well serve as a means of livelihood to horticultural farmers, It also plays an important role both in nutritional and economic security (Iwuchukwu , et al., 2017 ).

FAO (2016) affirms that the level of development of horticultural production in Nigeria is still at the elementary stage despite its prominence in significant cities in the country. The report by Thomas (2012) on urban and peri-urban horticulture in Africa with reference to Nigeria indicates lack of support for horticultural production in Nigeria despite its contribution to food security, immunity booster and poverty alleviation among rural dwellers. A case study of the horticultural value chain in Ibadan and Lagos, Nigeria by Thomas (2012) indicates that pineapple farmers make substantial earnings from its cultivation, thereby improving their livelihood. Nevertheless, most of the small-scale farmers in agriculture operate in this sub-sector with lack of finance, inadequate modern adoption techniques and practices relating to farming (Kainga & Johnson , 2012 ). The researchers find out that farmers earn a high profit despite the challenges. Other findings from the study include lack of adequate policy, poor technological support and absence of excellent extension

services. The findings suggest that Nigeria has great potential in transforming the economy through intervention in the horticultural subsector.

However, Nigeria, in the past, emphasises on enhancing production and productivity of other crops while neglecting horticulture, including pineapple (Khalid , et al., 2007 ). Nevertheless, Nigeria occupies a notable position of the seventh-largest producer in the world as well as a leading producer in Africa (FAOSTAT, 2018) with a production capacity of 1.4 million metric tons. Nevertheless, Nigeria does not export pineapple fruits. As a consequence, farmers result in an objective of production purely based on domestic purpose.

It is interesting to know that the area under pineapple cultivation in Nigeria is about 121 thousand hectares with an average production of 917,000 tons backed up with productivity of 7.6tons/ha (Mark , 2010). The above statistics suggest that Nigeria contributes about 13.5 ha of land to pineapple cultivation and 5.1 % tons of output in the world. Thus, land allocation to the cultivation of pineapple in Nigeria seems not to commensurate with the potential output indicating low yield and productivity (Mark , 2010).

In the quest to overcome the problem of low yield, pineapple farmers are keen on a strategy to make their product to be competitive and acceptable in the market. In this regard, as support to farmers in Nigeria, the Nigerian publicly financed agricultural research institute, National Horticultural Research Institute (NIHORT), with its headquarters located in Ibadan, Nigeria has a central position in the testing and introduction of new production technologies. The institute collaborates with national universities as well as international research organisations in order to access new knowledge, techniques and improved varieties for onward transfer and implementation by the farmers. The extension department which is responsible for information and knowledge transfer from the institute to the farmers disseminates knowledge and technology as well as projects from non-governmental organisations (NGO) to farmers through the facilitation of farming activities and the provision of

training as well as communicating agricultural information on the best use of farm resources. Thus, in the recent past, NIHORT has introduced different technologies to pineapple farmers in Nigeria, some of which include improved varieties, agronomic practices (sucker multiplication methods and mulching which is technology-induced farming practices) and management practices in order to increase farmers' productivity. However, the results from past studies among farmers revealed that adoption of new technologies is still low (Egyir, et al., 2011; Weyori et al., 2018) possibly because of farmers insisting on traditional propagation method rather than the adoption of modern technology.

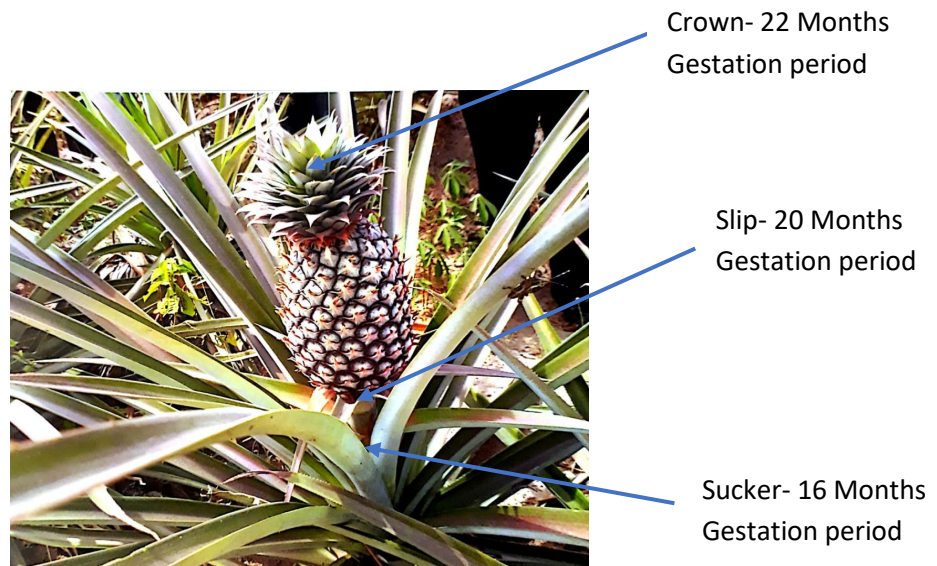
## **1.2 Technology Adoption Practices Studied**

The technology under study is the adoption of smooth cayenne suckers as planting materials for the cultivation of pineapple. The corresponding practices considered include farming practices and operational activities at the planting, weeding and harvesting stages of production. These practices were selected because of the significant role in improving the yield of the crop. The adoption of the technology requires a simultaneous adoption of the corresponding farm practices to achieve an outcome that makes the crop competitive among pineapple farmers. Subsequently, it increases revenue and improves the means of livelihood of the farmers. The main advantages of the technology and associated farm practices are reduction in the production period and uniformity of the output (Denton , et al., 2000).

Traditionally, Propagation of pineapple can be through the crowns or slips which takes twenty-two months or twenty months, respectively as the production cycle. The production cycle or the growing period usually referred to as "gestation period", therefore, depends on the planting material used for propagation. However, National Horticultural Research Institute (NIHORT) develop technology and advice to farmers in the selection of the planting materials (smooth cayenne variety) as well as the planting method as a means of intervention to produce uniformed pineapple fruit with an average size of 1kg. The Institute, through the intervention, encourages the planting of the suckers, which confers a sixteen month gestation period against the

conventional twenty-two months. Apart from the time advantage, if the farmers adjust and adopt the farm practices in conjunction with the technology of planting suckers of smooth cayenne, the overall yield will increase with good quality fruit as well as fruit size acceptable to different markets.

**Figure 2: Method of Pineapple Propagation**



Pineapple's gestation (production cycle) on the average cuts across three stages:

- Stage one - Sprouting /growing plant (7 to 8 months)
- Stage two - Flowering until harvest (6 to 8 months)
- Stage three - Sprout production for replanting (3 to 6 months)

Monitoring of farming and management practices boosts the growth of pineapple at the first stage. Primary farm practices at stage two include weed control and flower induction. The flower induction treatment (FIT) triggers flowering, and therefore fruit-bearing leading to the uniformity in fruit size to meet consumers' demand. However, FIT would be ineffective if applied during the rainy period because the active ingredient could result in leaching (UNCTAD, 2016). The third stage requires field maintenance and adequate weeding. For clarity, Table 1 shows a piece of clear information regarding the different stages of TAP in the pineapple production cycle.



**Table 1: Adoption Stages and Associated Practices**

<i>Adoption Stage</i>	<i>Adoption Practices</i>	<i>Method</i>	<i>Process</i>
<i>Planting</i>	<i>Farming system practices</i>	<i>Spacing of suckers</i>	<i>Land preparation/ Planting of suckers</i>
<i>Maintenance</i>	<i>Pest/Disease Management practices</i>	<i>Weeding/ fertiliser application</i>	<i>Mulching/Fertiliser/Manure application process</i>
<i>Harvesting</i>	<i>Flower Induction/Harvesting</i>	<i>Flower induction</i>	<i>Flower induction process application</i>

Source: Field Observation

The technology introduced by NIHORT is the planting of the Smooth Cayenne, a variety that originated in Hawaii. It is sweet, juicy and especially well-suited to canning and processing.

*‘Its cylindrical shape, the small number of spines and good organoleptic qualities long made it the prototype mass-market pineapple’ (UNCTAD, 2016).*

Also, the choice of the initial parent stock makes it possible to predict the harvestable fruit size (UNCTAD, 2016)

In this respect, technology adoption practices are a source to exploit in horticultural farming that can lead to competitive advantage. Despite its importance, researchers widely misunderstand the relationship between technology adoption and competition as there is no precise definition mainly due to variability in types of technology and circumstances under which they are adopted (Porter, 1985). For a better understanding of the research study, the following subsection gives a clear definition and relevance of some basic concepts.

### **1.3 Major concepts and Definitions**

Majority of the terms considered in the current research study may appear ambiguous based on typical usage. However, for clarity and avoidance of confusion,

the following section defines and explain concepts that are central to the perspective developed in this study.

## **Technology**

Researchers define technology in various ways depending on the unit of analysis of their study. For instance, Porter (1985) view technology as a general knowledge that guides to an accomplishment of specific tasks. With specific reference to agriculture, Sunding and Zilberman (2001) classify technology as embodied and disembodied innovations. They define embodied technology as physical assets designed to improve the production of crops while disembodied technology as a practical application of knowledge to achieve the desired outputs — however, Glover et al. (2019), incorporates farming practices to loosely define technology as embodied and disembodied innovations characterised by either production or consumption of crops and livestock. Thus, technology in agriculture generally considers being the application of improved scientific knowledge and practices to achieve the desired goal (Grant , 1991).

Since technology aims to improve the current situation of practice through saving time and cost of labour (Bonabana-Wabbi , 2002 ), the paradigm of technology in Agriculture has moved from a relatively fixed position in traditional agricultural era to dynamically- improved seeds and planting materials in modern agriculture characterised with technical experts such as research scientists, proffering solutions to technical issues at the farm level. In the current study, the technology is the introduction of an improved smooth cayenne variety of pineapple suckers supplied to farmers with the ability to reduce the gestation period of pineapple from twenty-two months to sixteen months and an average size ranging from 2.2 kilograms to 1 kilogramme The effectiveness of the improved pineapple planting materials contributes to the quality of the fruit as well as reducing the growing period.

## **Technology Adoption Practices (TAP)**

Loevinsohn et al., (2013) define adoption of technology as a blend of new ideas into current practices while Bonabana-Wabbi (2002) views it as a process from awareness phase of the technology to the implementation phase emphasising the rate of adoption as a reference for definition. The researchers viewed adoption from different perspectives based on the rate or intensity of adoption. The variability of different types of technology makes the definition of technology adoption to be complicated.

TAP is the regular performance of activities to acquire skills or proficiency to achieve competitive advantage. Farming practices focus on the active involvement of farmers in the technology of production (Loevinsohn , et al., 2013). Adoption practices include a farming system, cultural and management practices (Nakano , et al., 2018). In the current study, technology adoption is the acceptance by pineapple farmers to plant the improved variety of suckers (smooth cayenne) supplied by the research institute while technology adoption practices are the continuous usage of the series of recommended activities involved in the production of pineapple fruits from planting to harvesting stage. The study considers pineapple farmers that have continuously adopted the recommendations in the last two production cycles.

## **Farm Practices**

Researchers (Beai & Rogers, 1960; Lapple & Thorne, 2018; Iradukunda et al., 2019) have referred to farm practices as innovations or new ideas. However, the idea of farm practices introduced to farmers may be new, improved or recommended (Beai & Rogers , 1960 ). In the restricted usage of the term in this study, farm practices are the recommended practices along with the adoption of the recommended variety of the planting material by the research Institute (NIHORT). Although the recommendation of TAP by NIHORT may or may not be new to the farmers, farmers have not been adopting the practices before the recommendation.

## **Quality**

Quality refers to the features and distinctive attributes of pineapple that give its fruit value. The current research study perceives quality in terms of both product and process. Quality components include visual appearance, texture and taste of pineapple fruit. The components of visual appearance include size, shape and uniformity of the product (Pineapple). Quality in terms of the process includes the farming practices in conjunction with technology adoption of planting smooth cayenne.

**Input** - These are the tangible and intangible resources that transform to the output after going through the necessary process (production/adoption)

**Output** - Pineapple fruits with uniformity in form and shape with an accompanying reduction of the gestation period.

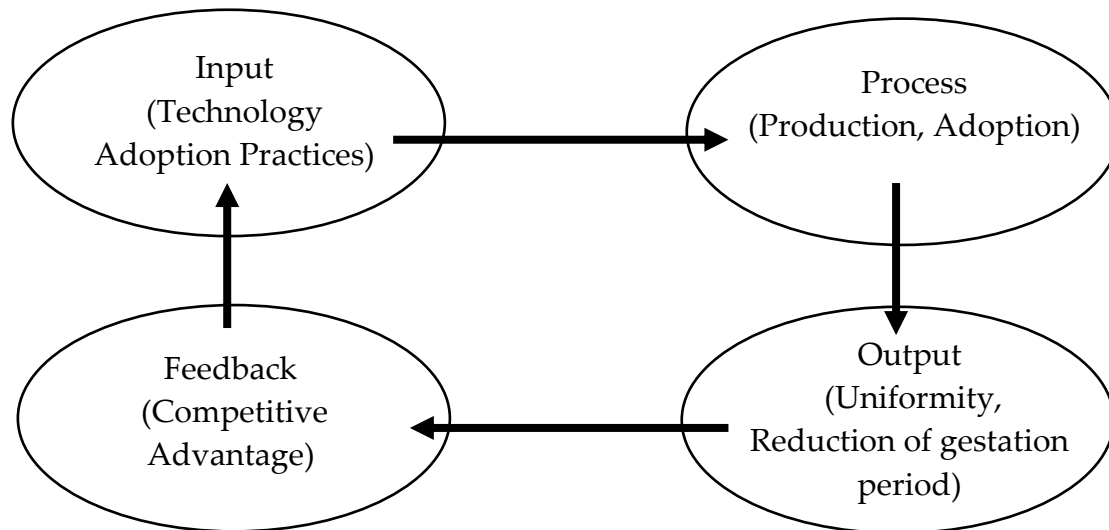
## **Process**

Processes are the actions within the farm that allows conversion of inputs to an output. It is the mechanism for the transformation of input to output (Sorensen , et al., 2010). The relevant processes in the current research are production and adoption dependent. The production process is a temporal series of practices and actions of farmers to achieve a specific objective within a time frame along the production chain. The production process of pineapple at each stage has a definite start and exit points with a specific benchmark (Charmaz , 2014 ).

The process of adoption of technology starts from the awareness and identification of the resource to the field demonstration of the appropriate usage. Between these extremes, farmers assess and evaluate the usefulness and relevance of the technology and make a decision to accept or otherwise. The dynamics of interaction between technological characteristics and farm level circumstances influence the decision on the adoption of technology (Mwangi & Kariuki , 2015 ). In this context, the

motivating factors for acceptance or a reject determine farmers decision. For clarity, Figure 3 depicts the relationship between technology adoption practices, process and competitive advantage at the farm level.

**Figure 3: Farm Level Relationship of TAP, Process and Competitive Advantage**



Source: Adapted from Sorenson et al. (2010)

In the context of the current study, Inputs are the total package of technology transferred by the research Institute (NIHORT) to farmers. The total adoption package includes the recommended planting of smooth cayenne suckers and the implementation of associated farming and management practices. The expected output (with total adoption) are uniformed pineapple fruits in terms of shape and form coupled with a time advantage over the gestation period. The competitive advantage (feedback) is the gain derived from the adoption of the total package (technology adoption practices), in terms of reduction in the growing period as well as the flexibility in terms of the fruit size.

**Farm** - A portion of the landmass meant for the production of the agricultural crop with specific reference to pineapple cultivation. It represents all the resources and the organisational aspects that support the production of pineapple (Grando et al. 2016).

**Farmer** - A part or full-time occupier of farms engaged in farm-dependent activities for crops and rearing livestock as the primary source of income for livelihood and sustainability (McElwee , 2004)

**Strategy** – Strategy is an intended course of action to deal with a situation (Mintzberg , 1987 ).

**Farm Strategy** - integration of a set of actions in terms of farm practices and activities that provide value to farm produce to gain competitive advantage (Boehije et al. 2004). In the context of the current study, it is the development of farmers' long-term plan to increase the profitability and competitiveness of pineapple fruits through technology adoption and farm practices

**Farming Community** - A set of institutional systems that exhibits purposeful characteristics of behaviour subject to social prescriptions within the community. The action of one farmer may influence the conduct of another farmer within the community. Thus, the interconnectivity of farmers' behavioural pattern towards farming practices is influenced and accomplished by other farmers' behavioural pattern (Somerville & McElwee, 2011; Sharp &Hanks, 2018)

**Adopters/Non-adopters** - Adoption is dichotomous (Bunclark , et al., 2018). Adopters include farmers that grow improved varieties of pineapple planting materials (smooth cayenne) with associated practices while non-adopters are those that do not plant the improved variety. The benefit of the improved variety includes reduction of the gestation period from twenty-two months to sixteen months and fruit size adjustment

**Successful adopters** – These are the farmers that have adopted the technology and its associated practices as transferred from research experts and extensionists from the research institute to the farmers. The increase in yield and reduction in the production cycle reflects the benefit of adoption. Farmers in this category gain market advantage as their products reach maturity earlier than other farmers

## **Change Agent**

The agency of the Government that design and disseminates recommended ideas to farmers to achieve a procedural change in farming activities embarked upon by the pineapple farmers. In this study, NIHORT is the change agent.

**Resources** - Firm resources include all assets, capabilities, organisational processes, firm attributes, information, knowledge, knowledge transfer, technology, technology transfer and technology adoption (Daft, 1983). The current study considers technology adoption practice as a resource.

**Capability** - A capability “refers to the ability of an organisation to perform a coordinated set of tasks, utilising organisational resources to achieve a particular result” (Helfat & Peteraf, 2003, p. 999).

**Dynamic Capability** - The ability of the farm to integrate and reconfigure internal and external competences to address rapidly changing environments. (Teece, Pisano, & Shuen, 1997).

**Competitive Advantage** - What the farmer does better than other competing farmers that give it an edge in serving consumers’ needs and maintaining mutually satisfying relationships with other stakeholders (Ferrell, 2012).

**Farm Level Competitive Advantage** - The use of available resources at the farm level to gain an advantage over other competing farmers (Sachitra & Chong , 2018 ).

**Mulching** – This is the agronomic practice of covering the soil surface to minimize the effect of erosion and soil water losses on growing pineapple. It is a protective cover over the soil surface (Amorim , et al., 2013). The main objective of mulching as a farm practice is to conserve the soil moisture and reduce weed growth. Mulching improves vegetative growth and slips production

## **1.4 Research Scope and Motivations**

### **1.4.1 Research Scope**

The extent of this investigation focuses on technology adoption practices of pineapple farmers as a source of competitive advantage in horticultural production. The research investigates the role of technology adoption practices as a strategic intangible resource. It explores how the horticultural production process creates a competitive advantage. The research concentrates on the adoption of farm practices in line with the production of pineapple fruits in the Ejigbo community of Osun State in Nigeria.

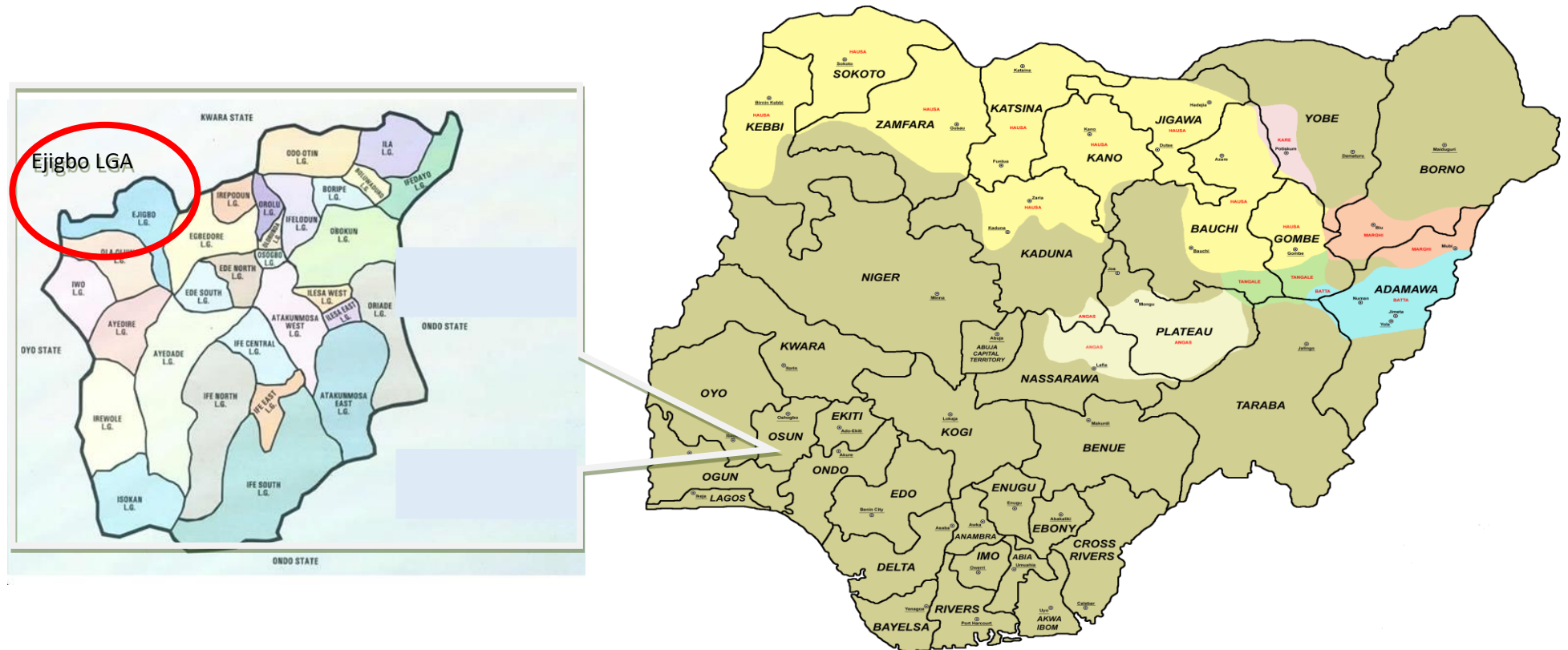
### **1.4.2 The study area**

Ejigbo is a prominent community in Yoruba land and the headquarters of Ejigbo Local Government Area of Osun State. Strategically, Ejigbo is located in the middle of Southwestern Nigeria and lies within latitude 4° 05" and 4° 24" and longitude 7° 40" and 7° 55" of the equator. Major towns in Oyo and Osun states surround the community. It is bounded in the North by Ogbomosho and South by Ede. (See Figure 1-2). Ejigbo is located 35 kilometres north-east of Iwo, 30 km from Ogbomosho and about 95 km north-east of Ibadan. The land area is about 502 square kilometres while the 2006 census put the population at 132,641. Naturally, two different seasons (dry and wet) operate over six months throughout the year in southwestern Nigeria. The dry season starts in November while the wet season starts in April. The positioning and natural qualities and ability within the community support the cultivation of pineapple on a large scale. The choice of Ejigbo as the study area is because of my access to most of the farmers and the community at large. Furthermore, its strategic location in Southwestern Nigeria has unique demographics and successful adoption of the identified technology and practices (Section 1.2). The community is renowned for producing food crops and a significant producer of pineapple fruits in the Southwestern part of Nigeria. Furthermore, pineapple can be cultivated all the year-round with the support of irrigation. Thus, the cultivation does not follow a seasonal calendar. Ejigbo's climate and relative proximity to different markets gave it both cost and quality advantages in the domestic market for fresh, smooth cayenne pineapple.



Figure 4 indicates the locational position of Ejigbo within Nigerian geographical boundary.

Figure 4: Map of Nigeria highlighting Ejigbo, the study area



1.4.3 The socioeconomic characteristics of pineapple farmers in Ejigbo community

Ejigbo is a farming settlement community with farming as the primary occupation and means of livelihood of the inhabitants. The community runs an agrarian economy with considerably large hectarage of pineapple orchards. Ten successful adopters of TAP were purposefully selected for the research (details of sampling in section 3.11). About seventy-five per cent of the farmers in the community concentrate on pineapple cultivation as a mono-crop, while the remaining very few operate mixed farming (NIHORT annual report, 2010). The age of the sampled pineapple farmers ranges from twenty-five to seventy-two years spreading across male and female farmers. Nine out of the ten sample farmers were males, while the females constitute the minority (Research sample). From the sample, there is an indication that ninety per cent of the pineapple farmers had no formal education. In comparison, ten per cent had formal education up to a degree level in agriculture. The size of individual farm ranges between 2-10 hectares of farmland, indicating that pineapple farmers in Ejigbo are smallholder farmers (McElwee & Wood , 2017). The pineapple farmer seeks the support of the family members and hired labour to carry out daily operations and management at the farm level. Although, all the farmers belong to the Pineapple Farmers Association (PFA) as members, none of the farmers export pineapples. Instead, they depend on local demand for products (pineapple) for domestic consumption as a means of income. The primary source of information is through farmer to farmer and the umbrella PFA. Other sources of information include media, agricultural development programme extension linkage and research institute extension linkage with farmers. Thirty per cent of the pineapple farmers engage in non-agricultural activities as a guarantee to mitigate against risks in farming whenever it occurs. The level of experience in pineapple farming among the sampled farmers ranges from five to forty-eight years. From the sample, I estimate an average level of experience exclusively on pineapple cultivation in Ejigbo as twenty-seven years indicating that an average pineapple farmer in Ejigbo has a long-standing and vast experience in the cultivation and practices of farming activities.

#### 1.4.4 Research Motivations

The curiosity for the research is a follow up to previous research I carried out for a PhD programme in Agricultural Economics. Furthermore, I grew up in the community and has been a knowledge exchange extensionist to horticultural farmers within the community, which gives me access to the farmers on data collection. Thus, the research emerged because of my desire to understand how practice-based farming activities has enhanced and lead to competitive advantage in horticulture. Other motivating factors include the link to professional practice, that incorporates the prospect of investigating specific value-adding practices in solving an agricultural problem. Interestingly, the farmers identified the problem of not achieving the expected yield in pineapple production despite the adoption of technology transferred to them. Specifically, I am interested in how pineapple farmers addressed the problem through the adoption of farming practices in conjunction with the adoption of technology. The result can be translated directly to the horticultural industry for change management.

#### 1.5 Statement of Research Problem

Although, few researchers, including Mugeru (2012); Diiro & Sam (2015); Sachitra and Chong (2018) have researched competitive advantage in some area of agriculture, however, there is limited information regarding resource-based empirical evidence on horticultural studies in Nigeria. For instance, the study by Diiro & Sam (2015) on agricultural technology adoption and nonfarm earnings in Uganda recognises that internal resources serve as a source of competitive advantage in a firm, but could not establish the link between technology adoption practices and competitive advantage.

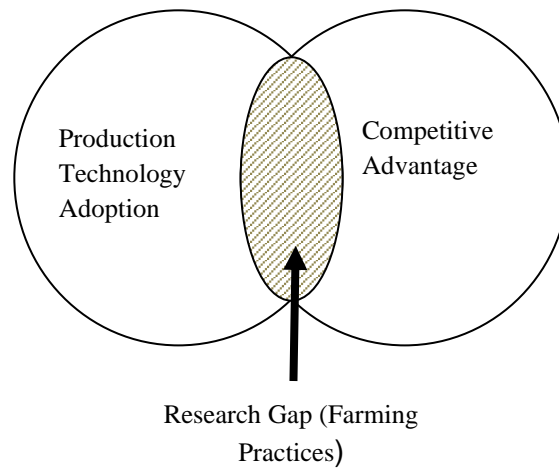
The available published studies that try to capture the two concepts (technology adoption and competitive advantage) relate to general agriculture but not horticultural crops and do not emphasise technology adoption as it relates to competitive advantage (Sachitra et al., 2016; Sachitra and Chong, 2018). For instance, Asfaw & Neka (2017) and Zeweld, et al., (2017) attempt to highlight the economic

theory underpinning farmers' behaviour in decision making over conservation practices but does not show any linkage with a competitive advantage. Other related studies by Karidjo, et al., (2018); Mariano et al., (2012) and Kolackova et al., (2017) also indicate specific factors that try to explain farmers behaviour on technology adoption rather than explaining how it leads to competitive advantage through the adoption of farming practices. These studies fail to show the linkage between technology adoption practices and competitive advantage. Thus, the emphasis of most researchers on-farm technology adoption has been on factors affecting technology adoption at the farm level rather than the complementary effect of farming practices on adoption at the farm level. However, pineapple farmers realised that despite, the functional adoption of technology transferred from research institutes and information from co farmers to improve both production and productivity, production output and crop yield still fall short of expectation. Because of partial adoption (adoption of technology without imbibing associated farm practices), farmers face threats of not achieving the optimum yield expected from the technology package transferred, thereby creating a research gap. Therefore, a gap exists regarding the relationship between TAP and competitive advantage in horticultural production despite its significant contribution to the gross domestic product in both developing and developed economies.

The paucity of research in this regard is filled by exploring the link between technology adoption practices and competitive advantage in horticulture by considering pineapple production as a crop of reference. TAP could enhance competitive advantage in domestic pineapple production leading to the competitiveness of the product in the domestic trade. Thus, bridging a gap in the literature relating to competitive advantage in horticulture

For an improvement of the position of the farm, there is, therefore, the need to reconcile between technology adoption and adoption practices in achieving competitive advantage as illustrated in Figure 5.

**Figure 5: The Research Gap**



### **1.6 Research Aim**

Technology adoption is a necessary condition that can lead to competitive advantage in any industry (Porter, 1985). However, farmers may fail to achieve a competitive advantage in Horticultural production without adopting necessarily associated practices. Thus, the research aims to investigate the realities of technology adoption practices as a source of competitive advantage among farmers producing pineapple primarily in Nigeria but specifically in the Ejigbo community. It specifically discusses how technology adoption practices (TAP) could lead to a competitive advantage in horticulture with particular reference to the production of pineapple fruit in Nigeria. From a professional practise standpoint, the study will give an insight into how farmers attempt to proffer solutions to practical problems encountered during the production process. Thus, the research study will examine the role of technology adoption practices as a strategic resource and explores how technology adoption processes create competitive advantage.

### **1.7 Research Question and Objectives**

With reference to the research aim, the current study will explore the role of technology adoption practices as a competitive strategy in Horticulture, i.e. the

development of farmers' long-term plan to increase the profitability and competitiveness of pineapple fruits through technology adoption and farm practices. The research question is developed based on the research problem identified in section 1.5, coupled with the identification of the research gap, as indicated in Figure 5.

The two research questions formulated to achieve the research aim of this study are:

RQ1: How has farming practices enhance technology adoption in the production of pineapple fruits?

RQ2: How has the adoption of technology and farming practices in pineapple cultivation lead to a competitive advantage?

The sub-questions that emanated from the primary research questions include:

SRQ1: How do pineapple farmers view acceptance of technology adoption practices transfer from research institute?

SRQ2: How have farmers capabilities serve as a complement to technology adoption practices in the production of pineapples?

While SRQ1 serves as a link guide for RQ1, SRQ2 give clear guidance towards understanding RQ2

The above-stated research questions will be able to give insight to explain the objectives of the research study. The four primary objectives are:

1. To identify research gap through the exploration of ideas among experts and farmers
2. To identify and explore pineapple farmers' competitive skills and associated capabilities that enhance technology adoption practices in pineapple cultivation.
3. To identify and explore emerging storyline embedded in the emerged theory
4. To develop practical guidance and recommendations to pineapple farmers and the Government based on findings from the research study.

## **1.8 Research Methodology**

The exploratory nature of the research necessitates the adoption of a qualitative research approach since it seeks to explore human behaviours and phenomenon that cannot be quantified (Hunold , et al., 2017 ). Different agriculture and management research (Sachitra and Chong, 2018; Schubert et al. 2018; Spyropoulou et al. 2017) have successfully used qualitative research methodology.

The research adopts an interpretive approach which is consistent with the qualitative research mode chosen. Thus, it adopts the qualitative methodology put forward by Saunders et al., (2016) as it provides a model for a complete qualitative research process.

The research also employs a case study strategy which is appropriate for investigating a contemporary research phenomenon. Eisenhardt (1989) stress that qualitative researchers study things in their natural settings, attempting to make sense of phenomena regarding the meanings people bring to them. Also, Yin (2017), affirms the appropriateness of case study design for the collection of empirical data through an in-depth examination of an event in a particular group, organisation or situation. In line with the assertion, the research seeks to understand the relationship between technology adoption and adoption practices by pineapple farmers in Ejigbo community. The participants selected for the study include pineapple farmers, research scientists and extension agents.

The management of the research methodology for this study is in three stages. The first stage involved a thematic literature review of the relevant theories associated with a resource-based view and dynamic capability view within the context of farm strategy and technology adoption within the context of pineapple production as a horticultural crop. The second stage involved case study research, which used a case study protocol that included initial field observation to elicit information as a guide to focus group discussion. For triangulation, the methods considered within the methodology include focus group discussion, individual interview, field observation



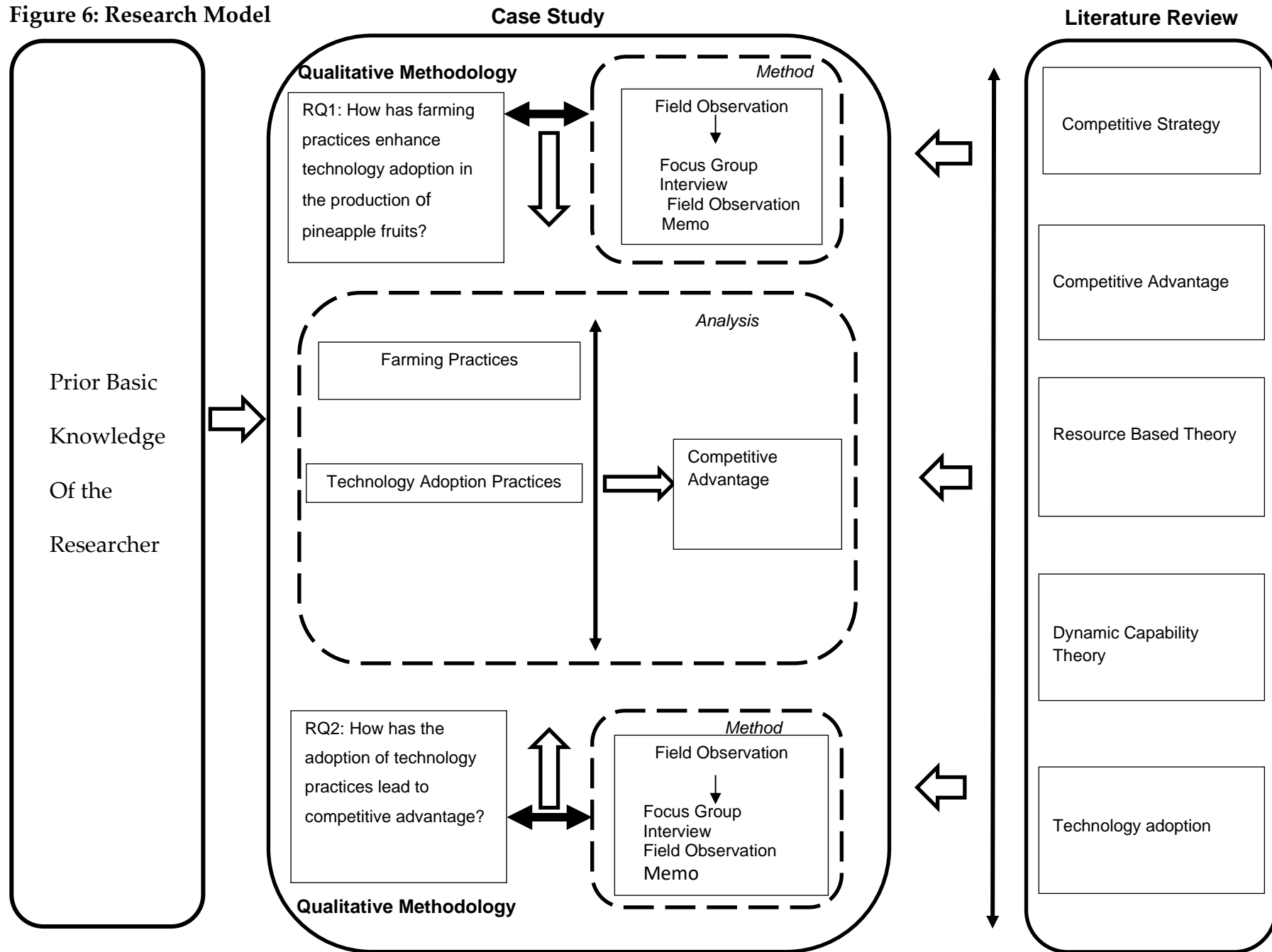
and memo writing. Personal face-to-face conducted interviews with research officers, knowledge transfer officers and pineapple farmers within the case study geographical boundary. The face-to-face interviews focused on the research questions identified from the practical problem faced by farmers in the production of pineapple. Both focus group discussion and interview methods involved open-ended questions and semi-structured questions, respectively, for me to investigate and explore the uniqueness of technology adoption practices and associated dynamic capabilities that combine to serve as sources of competitive advantage in pineapple production.

The third stage of the research methodology relates to the analysis of the data collected from the case study. The data from the open, unstructured questions from focus group and semi-structured from interviews were transcribed and coded using manual coding to generate the themes and storylines emanating from the data. This research used narrative analysis to identify the developmental process of farmers' long-term plan to increase the profitability and competitiveness of pineapple fruits through technology adoption and farm practices. The narrative analytical procedure involves the use of different emerging storylines as higher-order themes. The justification for the narrative analytical procedure is that it provides detailed descriptions of experiences that are often neglected by the positivist, scientific method (Eisenhardt, 1989). Braun & Clarke (2014) describes the approach as flexible - suitable for analysing qualitative data. Nie (2017) also advocate and encourage a narrative analysis as an analytical method that is popular in qualitative research. Based on the consideration of the reasoning of the past researchers and emerging themes, the current research extrapolates the narrative analysis method to complementary capabilities such as cohesion and learning among the farmers in the community.

## **1.9 Research Model**

The research model of the current study builds upon the resource-based view (RBV) and dynamic capability view (DCV) of the firm. Figure 6 depicts the research model within a case study methodology. The research methodology considers the Straussian grounded theory approach, where the field data collected guided the researcher to the relevant literature review.

Figure 6: Research Model



### **1.10 The structure of the thesis**

The thesis consists of six chapters. The first chapter discusses the background to the research problem. It gives definitions of terms within the context of the study. Furthermore, a brief on pineapple production was discussed, linking it to research scope and motivation. The section that follows discusses the research problem, aim and objectives. It also identifies the research gap. Section 1.8 discusses the research questions and objectives linking up with the methodology employed in eliciting information from participants. The three sections following section 1.8 discuss the research methodology, research model and the structure of the entire thesis. Lastly, the chapter concludes with a summary of chapter one.

Chapter two presents the literature review for this study highlighting the selection of methods for the review of the literature and the insight for the framework while considering a review of previous applications of basic methods employed in the study. Section two gives a summary of various theories underpinning the research study. The concluding section of the chapter reflects a framework based on the insights from participants and previous studies.

Chapter three covers the methodology employed for the research. The first section introduces the chapter on research philosophy, methodology and methods. In contrast, section two of the chapter discusses the methodological choices. Section three describes the procedure for data collection with an explanation of the methods of data collection. The last three sections explain the methodological approach of the study with an evaluation of the research credibility coupled with ethical consideration in the study.

Chapter four represents the analysis and findings of the research. The chapter includes an introduction, presentation of findings/evidence and summary of key points from the findings. It also presents emerging storylines from the case study and the results

of the findings. The chapter is rounded up with a conclusion that links up with the chapter on the discussion of findings

Chapter five explains the findings and relates them to the existing literature. The chapter starts with the introduction with a brief outline of the findings. Sections one to three of the chapter presents the storylines developed from the empirical data while section four describes the relevance and evaluation of sustainable competitive advantage in horticulture

Chapter six draws the main conclusion of the research. Section one summarises the findings and links to the research question. The chapter also concludes the research questions by discussing each research sub-question. Section two indicates the recommendation of the researcher based on empirical evidence. The third section describes the contribution of the research to theory, practice and policy. Section four describes the contribution and limitations of the thesis with an emphasis on critical evaluation of the methodology and limitations of the research study. The last section of the chapter recommends further study for future research.

**Figure 7: Summary of Thesis Structure**

<b>ABSTRACT</b>	<ul style="list-style-type: none"> <li>• Summary of research work</li> </ul>
<b>CHAPTER 1 INTRODUCTION</b>	<ul style="list-style-type: none"> <li>• Background of the Study</li> <li>• Technology Adoption Practices Studies</li> <li>• Major Concepts and Definitions</li> <li>• Research Scope and Motivations</li> <li>• Statement of Research Problem</li> <li>• Research Aim</li> <li>• Research Question and Objectives</li> <li>• Research Methodology</li> <li>• Research Model</li> <li>• The Structure of the Thesis</li> <li>• Conclusion</li> </ul>
<b>CHAPTER 2 LITERATURE REVIEW</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Position of Literature Review in Grounded Methodology</li> <li>• The Competitive Strategy</li> <li>• The Theory of Competitive Advantage</li> <li>• Combination of RBV and DCV as Source of Competitive Advantage</li> <li>• Technology Adoption Practices at the Farm Level</li> <li>• Competitive Advantage at the Farm Level</li> <li>• The Theoretical Framework</li> <li>• Conclusion</li> </ul>
<b>CHAPTER 3 RESEARCH METHODOLOGY</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Research Design</li> <li>• Research Approach</li> <li>• Research Strategy</li> <li>• Research Methods</li> <li>• Research Time Horizon</li> <li>• Data Collection</li> <li>• Procedure of Data Collection</li> <li>• Data Analysis</li> <li>• Evaluation of Trustworthiness of the Research</li> <li>• Ethical Considerations</li> <li>• Conclusion</li> </ul>
<b>CHAPTER 4 DATA ANALYSIS AND FINDINGS</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Overview of Categories</li> <li>• Emerging Storyline from the Study</li> <li>• Storyline One – Attributing</li> <li>• Storyline Two</li> <li>• Core Category</li> <li>• Summary of the Findings</li> <li>• Conclusion</li> </ul>
<b>CHAPTER 5 DISCUSSION</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Major Findings</li> <li>• Production Characteristics</li> <li>• Farmers Satisfaction</li> <li>• Farmers' Cohesion</li> <li>• Mutual Relationship with the Change Agent</li> <li>• Skills Development</li> <li>• Conclusion</li> </ul>
<b>CHAPTER 6 CONCLUSION</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Achieving the Research Objectives</li> <li>• Explanation of Research Questions</li> <li>• Alignment of Objectives with Evidence from the Research</li> <li>• Recommendations</li> <li>• Contributions to the Knowledge</li> <li>• Limitations of the Study</li> <li>• Future Research</li> <li>• Overall Conclusion</li> </ul>

### **1.11 Conclusion**

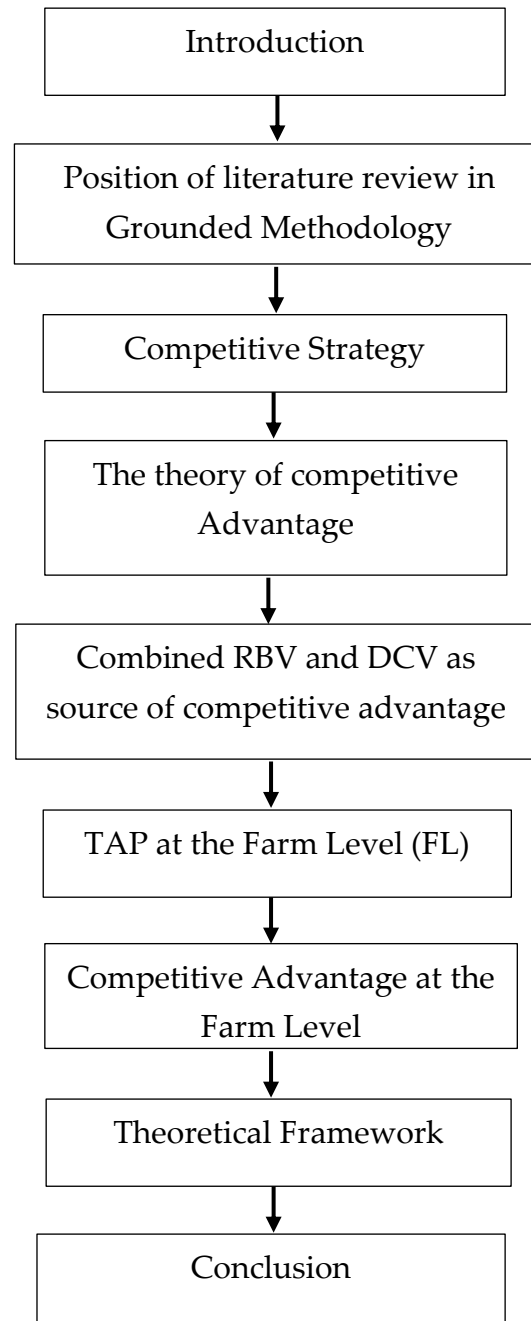
The chapter discusses the background to the research problem. It gives definitions of terms within the context of the study. Furthermore, a brief on pineapple production was discussed, linking it to research scope and motivation. The section that follows discusses the research problem, aim and objectives. It also identifies the research gap. Section 1.8 discusses the research questions and objectives linking up with the methodology employed in eliciting information from participants. The three sections following section 1.8 discuss the research methodology, research model and the structure of the entire thesis. The chapter concludes with a summary of chapter one.

The next chapter presents the literature review for this study, highlighting the position of literature review in grounded theory methodology. It extends the review of the literature to competitive strategy and the theory of competitive advantage with reference to the resource base and dynamic capability views as theory underpinning the research study. It also discusses the conceptual framework of the study.

## CHAPTER TWO - LITERATURE REVIEW

Chapter two is structured as follows in Figure 8

**Figure 8: Structure of Chapter Two**





## **2.0 Introduction**

The chapter presents the literature review for this study, highlighting the selection of methods for the review of the literature and the insight for the framework. It also justifies how the literature review fits into the grounded theory methodological approach described in detail in chapter 3, the approach used in this research and finally summarises theories underpinning the research study.

Chapter two begins with a discussion of the philosophical stance of the literature review. It then introduces a competitive strategy and competitive advantage as the primary theoretical foundation of the study. It also identifies and emphasises the relevance and vital organisational resources and capabilities in a resource-based view (RBV) and dynamic capability view (DCV) literature that emanates as sources of competitive advantage. The chapter extends the literature review to technology adoption with an emphasis on adoption practices at the farm level. The last section examines the theoretical framework of the study and concludes by establishing the relationship between the theories and the relevance to the research questions from the study.

## **2.1 Position of literature review in Grounded Methodology**

Many qualitative research studies emphasise the importance of the review of existing literature before the commencement of data collection. However, the issue of positioning literature review within a grounded methodology research design has been a dominant discourse in qualitative research studies. While some authors think that a literature review should commence before data collection (Strauss & Corbin , 1990) - others argue that undertaking literature review before data collection/analysis may lead to the imposition of theory on empirical data. As a consequence, there is a detraction from the originality of research against the free emergence of theoretical concepts. Specifically, Glaser (1992) posits that grounded methodological approach should avoid the commencement of literature review before data collection.

In practice, a literature review within a grounded methodology is contentious (Cameron, 2011). Positioning the literature review within the methodological research process in this context depends on the research paradigm guiding the process (Sanyang et al., 2016). Thus, the philosophical stance of the researcher is relevant when considering where the literature review should feature in the research design (Charmaz, 2017).

The position advocated by Langley (1999) dictates three processes of theory building: include induction, deduction and abduction (creativity and insight-driven). In line with this position by Langley (1999), my motivation is partly due to a previous related study which indicates a prior knowledge and understanding of related literature. As such, I cannot exclusively eliminate previous knowledge and ideas. Thus, the philosophical stance of the current research subscribes to the pragmatic position of data collection and iterative analysis with an abductive approach. It, therefore, position the fieldwork as a prerequisite to the literature review with a basic conception of literature at the onset of the research (Details in Chapter three).

The literature review considers various categories which emanate from the data as supported by grounded theory methodology (Charmaz, 2017). The review considers a thematic literature review style rather than methodological or chronological style. Thus, the empirical data guides the literature review. The preconceived knowledge of the researcher and concepts that emanates from the data collection dictates the theory underpinning the research. The literature review categorises the underpinning theories into two: the core management theory of competitive advantage and its approaches. The study considers these theories because of its relevance in strategic management and adoption studies.

## **2.2 The Competitive Strategy**

Boehije et al. (2004) define competitive strategy as the integration of a set of actions in terms of farm practices and activities which provide value to farm produce to gain competitive advantage. The definition suggests that the adoption of transferred

technology and associated farm practices serve as a set of actions that improve the quality and value of farm produce. The relevance of technology adoption practice in determining the future value of produce encourages farmers to adopt a strategy that suits the purpose of value addition to achieving a higher profit margin. Consequently, it enhances the livelihood of farmers.

In this regard, Smith et al. (2017) classify practical farm strategies into three broad groups of competitiveness that includes price or quality (Porter 1985), service innovation (Storey, 1994) and dominating market niche Birley and Westhead, 1990). Contrastingly, the study by Grando et al. (2016) identifies six groups of farm strategy in agriculture enterprise based on the similarity of the harvesting, organisation and technology adoption as a linkage to the aim of the farmers. The six types of identified groups include agro-industrial competitiveness, blurring farm borders, rural development, risk management, political support, and coping with farming decline. Farmers select one or a combination of the groups within the evolving context to mitigate farm losses or enhance farm productivity. Each of the farm strategies depicts a potential avenue for competitive advantage.

However, the most popular competitive strategy postulated by Porter (1985) extends through three typologies: cost, focus and differentiation (David & Sutton , 2011). Porter (1985) asserts that any organisation in any sector of an economy can adopt one of these strategic typologies. Each of the strategic typologies has its area of emphasis.

The emphasis in the discourse of cost strategy is to bring the cost of production to the barest minimum such that the firm can operate at the minimum industry cost of production. In most cases, cost strategy is about achieving high profits by large firms via the principle of economies of scale. However, focus strategy usually aims at a segment of a market within which a firm develops a low-cost but well-specified product for the market. The differentiation strategy emphasises on offering unique products and services in various dispositions such as technology/technology adoption

and improvement in techniques of production — the differentiation strategy associates with changing the quality and value of the product. Wang et al. (2011) affirm that the success of firms with this strategy depends on factors such as the adoption of techniques by users through innovation.

Within the agricultural sector, evidence suggests that farmers operate and take strategic decisions based on one of the typologies depending on the production objective of the farmers and the market niche (McElwee, 2006; Sachitra and Chong, 2018; De Rosa et al. 2019). Generally, farmers consider either cost or focus strategies as farmers are continually considering a reduction of production cost to a minimum or a focus on a crop or market segment. The study by Shadbolt (2012) on the competitive strategy analysis of New Zealand pastoral dairy farming systems is an example of studies that supports cost strategy in achieving competitive advantage while Binswanger and Pingali (1988) in their study on technological priorities for farming in sub-Saharan Africa lay emphasis on focus of production as a strategy to achieve competitive advantage.

In some situations, farmers consider the differentiation strategy to achieve a competitive advantage when the strategic resource for consideration is intangible. The finding from the study by Maruo (2002) on the differentiation of subsistence farming patterns among the banana growers in Northwestern Tanzania suggests that differentiation strategy at the farm level serve as a buffer towards production, yield and productivity. Consequently, farmers achieve competitive advantage through the quality improvement of the product generated by the adoption process. Other studies that have reported the importance of differentiation as a farm strategy include Defranesco (2003); Bapista and Biswas (2010); Valle et al. (2019); Yukio and Nubuo, (2019); Berti, (2020) and Cruz et al. (2020) among others. In the same direction, successful pineapple farmers in the study area embark on differentiation strategy through technology adoption practices to gain a competitive advantage over other producers.

### **2.3 The theory of competitive advantage**

The theory of competitive advantage refers to an advantage that a firm has over its competitors which makes it retain more customers over and above the competitors (Nagle, et al., 2016). Martinez (2014) defines competitive advantage at the firm level as the propensity of products to exceed the average potential customer satisfaction among equals while Sachitra, (2016) views it as an ability to reduce the overall cost of production while optimising the entire value chain. In reconciling the different ideologies about the concept of competitive advantage, Gonzalez-Rodriguez et al., (2018) mediate to clarify that competitive advantage lay emphasis on the strategic advantage created by strategic resources of an organisation over its competitors.

The underpinning theory of strategic management that addresses the origin of competitive advantage links their argument to its theoretical foundation, referred to as approaches. Research highlights approaches towards understanding the theory of competitive advantage.

Mellahi and Sminia (2009) identify two broad approaches to understanding the competitive advantage theory. These approaches are industry position approach and resource-based approach. The first contends that the position of the firm within an industry is the source of advantage while the latter accepts that internal resources and capabilities of the firm are its primary source of advantage.

Lapersonne (2013) identifies three types of approaches to understanding the theory of competitive advantage. The scholar classifies competitive advantage to be activity-based, resource-based and relational view. The activity position has its focus on identifying core activities, determining the industry's value chain for the core activities as well as determining the cost drivers for each value activity in the value chain (Beheshti, 2004). The relational view focuses on routines and processes as a unit of analysis for understanding the competitive advantage. It also encourages the

collaboration of resources but fails to examine efficiency enhanced by competition (Kobayashi , 2014).

Building on the theoretical foundation, Peteraf (1993) as well as (Eloranta & Turunen, 2015) identify four strategic approaches as market-based (MBV), the resource-based view (RBV), relational view (RV) and dynamic capabilities view (DCV). Since the emphasis on MBV is on structure- conduct-performance, which is activity-based, Schendel (1994) argues that the activity-based structure is synonymous to MBV based on the level of analysis. Researchers in this category consider the strategic context to be the industry relative to the firm's position within the industry. Thus the level of analysis becomes relevant to the choice of the approach to competitive advantage. In general, Table 2 shows a summary of past studies indicating the ideological, competitive advantage theories with different levels of analysis.

**Table 2: Summary of competitive advantages theories**

<b>Theory</b>	<b>Sources of competitive advantage</b>	<b>Level of analysis</b>	<b>Previous research</b>
<i>Market-based view (MBV)</i>	<i>The industry structure determines and limits strategic choices and any available competitive advantage</i>	<i>Industry</i>	<i>Porter (1980,2008) Shapiro (1989) Utterback and Suarez (1993) Molly and Barney (2015)</i>
<i>The resource-Based view (RBV)</i>	<i>Competitive interaction and entrepreneurial actions can be used to manipulate the market environment. The competitive advantage lies in the upstream and is based on the organisations idiosyncratic and difficult to imitate</i>	<i>Firm/Farm</i>	<i>Rumelt (1984) Werneltfelt (1984) Barney (1991) Helfat and Peteraf (2003) Lin &amp; Wu (2014) Bromiley and Rau (2016)</i>  <i>Sachitra &amp; Chong (2015)<sup>a</sup></i>  <i>Mugera and Bitch (2016)<sup>a</sup></i>  <i>Lin and Lei-Yu (2014)</i>  <i>Yu et al. (2018)</i>
<i>Dynamic Capabilities approach (DCA)</i>	<i>Competitive advantage depends on a farm's capabilities to adapt, integrate and reconfigure skills, resources, and functional competencies in a dynamic environment</i>	<i>Firm</i>	<i>Quinn (1985), Teece et al., (1997) Hobday (1998) Roberts (1998) Powell (1998), Eisenhardt and Martin (2000), McElwee (2006)<sup>a</sup> Teece (2007) Helfat and Peteraf (2015) Sachitra and Chong (2016)<sup>a</sup></i>  <i>De Rosa et al. (2019)<sup>a</sup></i>
<i>Relational view (RV)</i>	<i>Competitive advantage can only be gained through the idiosyncratic joint contributions of alliance partners and the service ecosystem</i>	<i>Industry</i>	<i>Dyer and Singh (1998)</i>  <i>Dyer et al. (2018)</i>

<sup>a</sup>special reference to farming or agriculture

Source: Adapted from (Eloranta & Turunen, 2015)

The choice of approach and relevant competitive advantage theory depends to a large extent on the level of analysis as a point of reference (Eloranta & Turunen, 2015). Building on this proposition, this research considers the firm (firm level) as the unit of analysis, thereby making RBV and DCV relevant approaches in this circumstance (See table 2)

### 2.3.1 The Market-Based View (MBV)

The primary determinants of firm performance according to this view, are the integration of industry factors and external market orientation. (Peteraf & Barney, 1993; Porter, 1980, 1985, 1996). In this regard, the origin of competitiveness lies in the strategic positional activities of the firm performed differently by the competitors. Such that it is defined by how a firm performs similar activities in different ways. In this perspective, Schendel (1994) argues that the structure and competitive dynamics of the industry determine the firm's performance within which it operates. The emphasis is, therefore, on structure – conduct performance strategy. Researchers in this category consider the strategic context to be the industry relative to the firm's position within the industry.

### 2.3.2 The Relational View

The line of argument in the relational view (RV) lies in consideration of inter-firm linkages and network as a source of competitive advantage (Lavie, 2006; Dyer & Singh, 1998). Specifically, Dyer et al. (2018) emphasise relational interfirm knowledge sharing as a source of competitive advantage such that alliance partners contribute complementary resources, thereby creating value via trust and customised assets. The RV, therefore, considers joint contributions of alliance partners as a source of competitive advantage (Dyer, et al., 2018).

### 2.3.3 The Resource-Based View (RBV)

Past works of literature consider Porter's diamond model to explain the position of industry in competitive advantage. However, the identified limitations of Porter's diamond model expose it to further discourse on competitive advantage. Sachitra and



Chong (2016) argue that the model failed to explain the factors that create sources of competitive advantage, among other limitations. In order to adjust and resolve the limitation, researchers have resulted in the approach of RBV to identify and explain the firm's resources as sources of competitive advantage at the firm level. Hence, RBV has continued to gain popularity in explaining competitive advantage across different organisations (Hitt et al.,2016). The assumption of RBV centres on the heterogeneity and imperfect immobility of the firm's resources. The fundamental basis established by RBV is its position on the best use of resources to differentiate among competitors such that that the uniqueness of the resources dictates its operation and relevance to competitive advantage. Although resource-based theory demonstrates the link between the resources and capabilities in an enterprise, the existing internal resources and the capabilities aimed at providing evidence towards the resource-based approach within the enterprise define the core aspects of the resources

Although farmers require resources to translate the farming inputs to an output, the definition and interpretation of resources differ depending on the perception of researchers. Some researchers consider resources in terms of assets, while others view it as chains of activities. However, some group of researchers consider it as both an asset and routine activities. In this category, Barney (1991, p. 101) cross-referenced Daft (1983) defined resources as "all assets, capabilities, organisational processes, firm attributes, information, knowledge, controlled by a firm that enables the firm to conceive and implement effective and efficient strategies. The scholar's definition appears to be encompassing. It cuts across and considers a resource as both asset and routine chain of activities which depicts a regular pattern that is unique to the firm. The uniqueness attribute is a significant characteristic of RBV, which centres on the exploitation of substantial resources to achieve competitive advantage. Thus, it establishes reasoning that resources are scarce relative to the demand within the industry. The implication and fall out of the reasoning translate to the heterogeneity of resources and capabilities (Bhuiyan, 2011).

The RBV seeks to understand that resources and capabilities are the foundations underpinning any source of competitive advantage (Barney , 1986). It emphasises on the internal resources as a bundle of firm resources that can serve as sources of competitive advantage. The focus of RBV is specifically on the resources that are very difficult to imitate by other competitors (Hamel and Prahalad, 1996). Although the emphasis of RBV lies on resources that are exclusively unique to the firm seeking a competitive advantage, previous work on RBV indicates that organisational factors such as learning and culture are equally important in achieving competitive advantage (Hamel and Prahalad, 1996; Campbell and Luchs,1997). Thus, researchers have classified resources under the RBV approach to include the firm attributes as well as organisational processes (Sachitra & Chong , 2018 ). The combination of a plethora of resources at the firm level dictates the extent and variation of how the firm gain a competitive advantage.

#### 2.3.4 Dynamic Capability View (DCV)

A significant limitation of RBV is its focus on internal resources ignores the role of other factors that can influence a firm's competitive advantage (Priem & Butler , 2001 ).

Also, the criticism that RBV fails to explain why some firms sustain competitive advantage over others in a rapidly changing environment calls for an extension of RBV to incorporate dynamic capability view as a joint approach to achieving competitive advantage (Eisenhardt & Martin , 2000). Nevertheless, Eisenhardt & Martin (2000) gave a note of caution that dynamic capability can either integrate or reconfigure resources depending on the strategic source identified through RBV.

However, some scholars of DCV (Zoollo and Winter, 2002; Baretto, 2010) have a strong opinion that dynamic capabilities transform firm's resources into improved performance (Lin and Lei Yu, 2014). Thus, the focus of DCV is mainly on the development of capacities and the differential influence of the capability adjustment on the performance of the firm (Stoelhorst & Bridoux , 2007). Researchers on strategic

management studies affirm the necessity of integrating both the RBV and DCV as a conventional lens towards achieving competitive advantage in a dynamic environment.

The current discourse on competitive advantage has identified both resources and processes of production as sources of competitive advantage (Sachitra and Chong, 2018). The emphasis on the resource-based view (RBV) and dynamic capability view (DCV) stipulates that firms acquire competitiveness via the deployment of internal resources and capabilities, which eventually leads to competitive advantage.

Although, the commitment of firm's internal resources within the concept of RBV is a precondition to attaining competitive advantage, a recent study by Sachitra and Chong (2018) affirm that both the resource commitment and capabilities development within the firm setting leads to sustainable competitive advantage (SCA). The researchers argue that the RBV is not sufficient to explain the sources of competition at the firm level due to dynamic positions of the firm within an industry. Nevertheless, RBV specified the relevance of firm's owned resources to achieve a competitive advantage. Firms also need reliance on the use of its capacities to adjust the changing demand pattern of the consumers as well as free entry of competitors in a perfectly competitive market. Thus, the incorporation of DCV to RBV enhances sustainable competitive advantage.

In another research study on the linkage between intangible resources and export performance in Portugal, Monteiro et al., (2017) considered an extension of RBV to DCV towards achieving long term performance goal (sustainable competitive advantage) of the firm. Also, Schubert et al., (2018) in line with Haas & Hansen (2005) reiterated the relevance of DCV to RBV in achieving competitive advantage. They emphasised that the integration of a firm's resources with the capabilities portrays a clear and better understanding of competitive advantage among the competitors. Evidence from the study by Carrick (2016) on the linkage of research and development (R&D) to firm's performance indicated both firm's ability to integrate

resources and learn from earlier paths as meaningful connections towards the development of R&D resources. The study considers R&D as a strategic resource and learning as a dynamic capability towards achieving competitive advantage.

To have a better understanding of the integral effect of resources and capabilities in the concept of competitive advantage, Hill and Hill (2009) raised the theory of order qualifier and winner to explain the concept of competition in marketing/consumer economics. According to Hill & Hill (2009), an order qualifier is the minimum attribute expected from a product for customers to consider its purchase while order winner is a characteristic that allows for gaining consumer confidence. Drawing from these ideas and relating it to the production context, farmers require the qualifiers to maintain or stay in the production of the crops. To achieve qualifier status, farmers need only to be as good as their competitors. Failure to do so may result in production shortage and productivity. However, to demonstrate at the level of order winners, farmers must be better than their competitors by developing the competitive skills relevant to gain competitive advantage (McElwee , 2006 ). It is essential to note that order qualifiers are as crucial as order winners; they are just different dimensions to understanding the competitive advantage. Although, Hill and Hill (2009) liken order winners and qualifiers as market and time-specific, however, it can be production-specific when the level of analysis is production rather than consumption. Hence, farmers need to develop different strategies to support different production needs, and these strategies can change over time. Recently, Hernandez-Aguilera et al., (2018) show how consumer preferences for product quality can influence desired farmers' outcomes, and that dynamics of food value chains can encourage the adoption of practices that promote environmental sustainability. Thus, the level of demand for a product can equally trigger supply from the production side.

## **2.4 Combination of RBV and DCV as Source of Competitive Advantage**

The extension of RBV has led to the incorporation of DCV as components of competitive skills that creates an advantage among firms (Lopez , 2005 ). Malik et al., (2012) in their study on quality management systems and the development of organisational learning capability identified shared vision and learning as competitive skills that can create long term advantage for the firm. They suggest that an organisation will quickly achieve sustainable competitive advantage through the transformation of learning as a skill in response to changing demand pattern. Also, recent exploration by Cox et al., (2019) on the application of theoretical perspective on organisational transformation in a Saudi Arabian context has equally highlighted organisational learning capability and culture as a source of competitive advantage in a dynamic environment. Thus, they stressed the importance of these capabilities in an organisational setting.

Lin and Wu (2014) define learning as a process of improving firm operations through repetition and review of processes and activities. The implication of the definition indicates that learning is continuously required to gain an advantage in the production and distribution process of a product. In line with the definition, Cohen and Levinthal (1990) describe learning capability as an organisational operation that creates a competitive advantage through a learning mechanism. Consequently, Sachitra and Chong (2018) present learning capability as a multidimensional resource that could create a competitive advantage at the farm level. Thus, the learning mechanism identified by scholars (Yalcinkaya , et al., 2007 ) includes individual, collective, exploratory, exploitative and organisational, among other nomenclatures. Besides, Lin and Wu (2014) identify training as an internal learning mechanism which can enhance competitive advantage. Evidence from past research shows that learning processes and gains from learning in a cluster occur mainly in an informal way that reinforces the effects of social cohesiveness, trust and connectedness among farm families. (Ng , et al., 2017). Thus, the dimensions to learning such as exploratory,

exploitative collective and experiential among farm families cuts across different levels of farmers in a communal set up such that individuals learn through participation and interaction in groups. In a related approach, Schein (1993) considers organisational culture and shared values as a form of learning. The study argues that culture is a learned product of experience. Therefore, learning capability in the study considers different components and dimensions to learning. In the context of the current study, learning occurs either in form or place when a farmer shares knowledge within the limit of the community culture and shared values to enhance the quality of farming operations and practices in order to realise a change and achieve personal and communal goals.

## **2.5 Technology Adoption Practices at the Farm Level**

A widely used theory in the area of technology adoption and diffusion is that by Rogers. Rogers (2003) viewed technology as an application of knowledge to achieve a practical purpose. Thus, technology enhances the current human and natural environment as well as some other socio-economic activities (Rogers , 2003). The study further emphasises that agricultural technologies might not be new as such, but novel to the farmer. Thus, following Rogers (2003), new technology is an idea, practice, or object that is perceived to be different by a farmer or other unit of adoption. In agreement with Rogers, Whitney et al. (2018) asserted that a farming system is an outcome of a complex interaction of several interdependent components of crop production system– soil, water, crops, livestock, labour and another resource- within an environmental setting. They categorise the farm environment into two elements: technology and human. The technology development modifies the physical and biological factors. The human element has both exogenous (community structure and external institution) and endogenous factors, which can be controlled by the farmers. Thus, the farmer decides on the assignment of resources within the farm setting and importantly, whether to adopt technologies and farm practices or otherwise based on trust among stakeholders (Pirson , et al., 2017 ). However, the farmer's decision to

adopt technology will depend on trust and his evaluation of the expected outcomes, in term of his disposition to the associated farming practices.

Although Rogers (2003) indicated that technology is a holistic design for a practical action to achieve the desired outcome; however, Ingold (2002) clarifies that the technique is different from technology. Technique refers to skills, regarded as the capability of human subjects, and technology means a corpus of generalised, objective knowledge, capable of practical application. Thus, technology and its associated farm practices can get to farmers for adoption through technology transfer from a scientific research institute. To bridge the gap, Valera & Plopino (1987) refer to technology transfer as the general process of moving information and skills from research laboratories and universities to clients such as farmers. The outcome of new technology transfer is the farmers' adoption of the technology and associated practices (Valera & Plopino , 1987). In a related study on the factors influencing the adoption decisions of maize farmers in Nigeria, Fader, et al., (2014) demonstrated the justification for practices and experience as a function of factors is influencing the adoption decisions of maize farmers. Also, it was noted that introduction of improved maize variety is not enough without proper complementary practices such as planting distance, seed dressing, a method of fertiliser application, weed control method and storage technique to aid the better performance of agricultural technologies (Oladele , 2006).

Specifically, Hotegni et al. (2015) mentioned that the yield from pineapple in the Benin Republic is high but backed up with poor quality and heterogeneity. Furthermore, they asserted that the choice of right planting material with a follow up cultural practices affect the quality of pineapple fruits produced. They suggest that the type and weight of planting material determine average fruit quality and its uniformity of production in pineapple cultivation. However, Lee et al., (2013) affirmed that the success of the adoption of any technology transferred to farmers depends on the

acceptance of the technology as well as accompanying the adoption of prescribed associated practices. Adoption of improved agricultural technology practices is therefore considered to be central to the development and transformation of pineapple fruit size and a path to accommodating varying demand patterns thereby improving livelihoods among pineapple farmers.

The evidence provided by Young and Coleman (1959) in the study of neighbourhood norms and the adoption of farm practices revealed three patterns of adoption in a farming community. The identified patterns which relate to the farm capabilities include: (1) different communities adopt recommended farming practices to a different extent depending on the resource (2) Adoption of farming practices are usually guided by the influence of neighbours within the community and (3) the adoption of differential recommended farming practices among different communities is based on social cohesion. It is worth to note that all three patterns reflect the composition of RBV and DCV as drivers of competitive advantage.

According to (Okoedo-Okojie & Aphunu, 2011), the core reasons behind the increasing technological adoption in farming is to minimise the cost of production while maintaining or improving productivity to enhance competitive advantage. Nevertheless, a preview on Pineapple farming in Nigeria offers clear insight into some of the core challenges, developments and the possible solutions that can be implemented to create a competitive edge. The resources, capabilities, competencies in the industry are some of the components applicable to creating a clear insight into the core entities applicable to demonstrate the internal perspective on the farmers' capabilities.

In a research study, Cavatassi et al. (2010) examine the adoption of new varieties of sorghum seeds in Ethiopia. The study indicated that using modern varieties appears to be a strategy suitable to handle moderate risk if farmers monitor the associated farming practices. However, the results show that the most impoverished farmers are



least likely to adopt such management practices. The current study will look out for farmers' adoption of practices associated with technology adoption rather than the mere adoption of technology without practices.

In another study, Deepa et al., (2013) found out that the highest technological gap in the production of pineapple was in the treatment of planting materials, desuckering, fertiliser application and micronutrient application and found no gap in case of regulation of flowering, protection against sunburn and ripening acceleration. It is useful to note that the production technology gap was identified in a region outside the current study region, justifying the need for farmers to adopt the technology on improved pineapple planting materials. Also, the findings by Amare et al. (2011) indicated the relevance of strategic resource in farm operations via access to information through extension workers.

In the study conducted by Adegbite et al. (2015), the authors indicate that the quantity of labour and suckers applied in Pineapple production in Nigeria is positive and significant at 5 per cent with the farm size at 1 per cent enough to support the crop. On the other hand, the capabilities and the competencies of Pineapple farming are negative, as demonstrated by the study by (Okoedo-Okojie & Aphunu, 2011). The researcher supports his observation by the fact that the lack of current technology use in the industry has limited the full potential of the farmers to benefit from the industry entirely. In recent years, modern technology advancement in agricultural production has not entirely made an impact on crop production and productivity in Nigeria, demonstrating the need for a complete change in the industry. Capabilities, according to Kamil, (2005), can be boosted through the adoption of modern farming technologies by the small-scale farmers who are the key to Nigeria's food supply.

The study by Oyewole and Ojeleye (2014) on the use of improved farm practices among small-scale farmers in the Kano State of Nigeria reveals that 74.5% of the farmers adopt the use of improved seeds to increase productivity. The result suggests

a high level of awareness of farmers towards the importance of improved seeds as primary planting material. However, the scholars recommend improved extension linkages to sensitise small-scale farmers on the need to adopt improved farm practices. Contrastingly, Adesope et al. (2011) in their study on the adoption of organic farming practices by farmers in Nigeria conclude that the adoption of organic farming practices was low as farmers adopted only 5 of the 14 practices identified. Also, the lack of understanding of the integration of proper farming practices to technology adoption by pineapple farmers poses a threat to most of them by recording reduced yield and poor quality. Thus, farmers are unable to create a competitive edge.

The study on the adoption of improved farming practices among arable crop farmers in Iwo, Nigeria by Busari et al. (2015) indicates that the majority (99.1%) of the arable crop farmers still employ a low level of improved farming technologies. The findings by the scholars also justify the necessity for extension linkages to sensitise small-scale farmers on the relevance of integrating adoption practices with transferred technology.

As reported by Coulibaly et al. (2010), the profitability of cropping systems depends mainly on the types of varieties used (local or improved) as well as the cropping practices adopted by the farmers. The assertion by the scholars also justifies the need for incorporating relevant farm practices to technology adoption by farmers.

In Northern Bangladesh, the study by Farid et al., (2015) on factors affecting the adoption of farm practices threw a preliminary insight into how farmers make use of modern technologies to cope with the challenges associated to farm production. The study points to the relevance of technology adoption practices in achieving increased productivity in different geographical regions.

## **2.6 Competitive Advantage at the Farm Level**

Some past studies have attempted to link farm resources to competitive advantage. For instance, the study of farmers in Finland by Kallio and Kola (1999) cross-

referenced by Mc Elwee (2006) attempt to determine factors that contribute to farmers competitive advantage at the farm level. The scholars suggested seven characteristics which include production profit, continual professional development, goal-oriented operation, positive work ethics, utilisation of information, availability of tangible resources and cooperation with others in the supply chain. Also, the result of the study by Becot et al., (2015) indicated that skills acquisition and informal learning are necessary ingredients required by rural farmers and potential student entrepreneurs to become successful in farming. Although, the studies tried to identify capability as a contributory factor towards competitive advantage but did not explain how intangible resource could create a competitive advantage.

The literature on technology adoption confirms that adoption of improved varieties by farmers translates to an increase in the output yield (Takahashi , et al., 2019a). For instance, Villano et al., (2015) on the study of the adoption of improved maize variety affirm a yield increase with the adoption planting improved maize variety. Other studies that have reported a positive correlation of improved variety with yield increase include Shiferaw (2015) on drought-tolerant groundnut variety in Uganda and Omotilewa et al., (2018) on improved maize variety also in Uganda.

In another study on the adoption of improved cassava varieties in Nigeria, Wossen et al. (2019) found out that the adoption of the improved cassava varieties increases the output yield. However, they assume that technology adoption includes both the planting of improved cassava varieties and associated farm practices. The assumption may not hold for all farmers involved.

Subsequently, Takahashi et al., (2019b) in their study on the impact of technology adoption raised a concern on the adoption of technology without a back up on the adoption of farm management practices. They argue that farm-level technology adoption and practices lead to an increase in yield. It, therefore, suggests that the

combination of technology adoption and associated farm management practices result in increases in yield and not just the sole contribution of technology adoption.

Teklewood et al., (2013) in their study on the adoption of improved variety of maize, find out that yield increase is higher if both technology and practices are adopted together. Similarly, Rusinambodzi et al. (2011) find that the combination of conservation tillage and mulching on light-textured soil results into a higher yield of improved varieties.

Other studies related to the combined adoption of technology and practices include the study by Nakano et al. (2018) on rice farming in Tanzania. They affirm that the adoption of improved rice varieties combined with seed selection practices results in an optimum yield of the output.

With reference to pineapple production, Chanu et al., (2014) find out that majority of the pineapple farmers in Manipur Village, India did not adopt the recommended farming practices, the study suggests that extension workers should give attention to the missing gaps. The implication of the finding is that pineapple farmers in the district could not achieve the expected yield from the assumed total adoption of the package.

Similar finding by Singh et al. (2016) on the adoption of improved practices of mango production in Muzaffarnagar district of Uttar Pradesh in India confirms that technology adoption includes the adoption of both the technology and the associated farm practices.

However, Yamano et al. (2018) caution that education and training of farmers is the bedrock of adoption of technology. The implication of this is that training of farmers should be a concern to any change agent introducing a new technology for adoption. In this regard, researchers such as Nakano et al. (2018) and Kijima et al. (2012) indicate that training enhances the adoption of improved crop variety. Apart from training,

existing studies suggest that farmers consider learning as a dynamic capability that encourages the adoption of technology (Takahashi , et al., 2019b ).

Specifically, Takahashi et al. (2019b) caution that training all the farmers for the purpose of technology adoption may be costly. They suggest learning among farm family and the farming community as an option to training. Takahashi et al., (2019a) in their study on the impact of technology adoption on rice production in Sub-Sahara Africa suggest farmer-farmer learning as an alternative and effective method of disseminating information to farmers on technology adoption practices.

Furthermore, the results of the study on learning interactions in rural farming communities in Manicaland, Zimbabwe by Pesanayi (2009) concludes that there are multi-level learning interactions that take place within communities of rural smallholder farmers, which in turn affect the farmer's strategy. Although, the conclusion will require further explanation for clarity in literature. However, Sachitra (2016) identifies the use of competitive advantage at the farm level. The scholar emphasises on the relevance of technological improvement towards achieving an advantage in a competitive environment. Consequently, it provides opportunities for smallholder farmers to compete in the domestic market. To corroborate Sachitra's assertion, Wang (2014) discovers that technological competencies are one of the three (with marketing and integrative competencies) competencies of the firm that significantly contributes to firm performance. Also, Franco & Filson (2006) claim that a higher level of technological capability enhances the probability of firm survival which can lead to competitive advantage. In another study on the empirical examination of the agribusiness sector, Sachitra and Chong (2017a) identify how farm resources contribute valuable insights to the empirical support of specific farm capabilities. It suggests that the government can support the farmers to gain competitive advantage through intervention and the provision of adequate technology and training.

## **2.7 The Conceptual Framework**

Researchers have developed different types of approaches to understanding the theory of competitive advantage (see section 2.3). Irrespective of the adopted theoretical foundation, the common ground in strategic management research points to the desirability of the firm to make use of strategic resource in order to achieve or gain sustainable competitive advantage which consequently enhances the performance of the business (Porter, 1985).

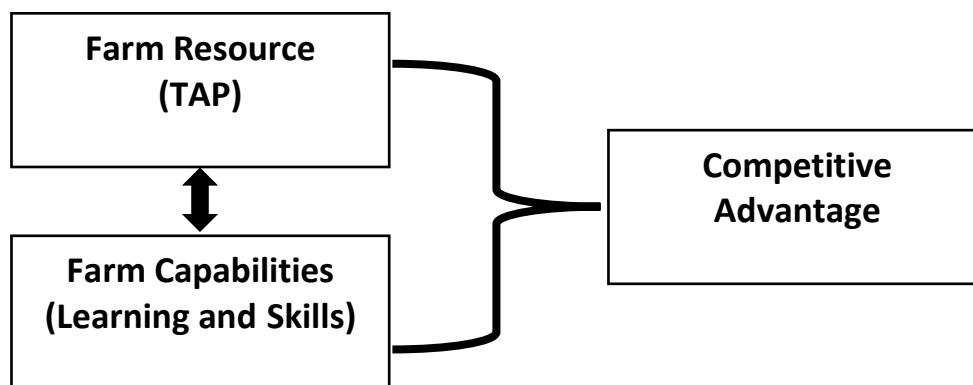
This research study develops an insight into the actual practice of technology adoption. It establishes a thematic framework that links and identifies the contribution of the different themes towards achieving competitive advantage in the production of pineapple fruits. In this regard, a review of relevant literature and discussion on competitive advantage and the competitive strategy theory has been widely adopted by researchers to study the importance of strategic resources as sources for competitive advantage in a business unit. Hence the relevance of competitive advantage theory to the current study.

Based on grounded theory methodology, empirical data were collected with iterative corresponding data analysis before the literature review. The literature review was based on themes emerging from the empirical data which serve as a guide for the theoretical framework. The framework, therefore, helped to identify what motivates farmers to adopt and incorporate farming practices to achieve a competitive advantage.

The framework indicates an integrative relationship between the resource-based view (RBV) and dynamic based view (DCV). The framework follows a link of the role of learning and skills development as a compliment that is transformational to demonstrate the competitiveness of farm-level technology adoption practices in an agrarian community. The framework also depicts the moderating effect of farmers transformational skills and learning (individual, collective and organisational) on the relationship between TAP and competitive advantage. Thus, the visual representation

of the framework for the current study, as shown in figure 9, links technology adoption in pineapple production to a competitive advantage within a farming community.

**Figure 9: The Conceptual Framework**



*Source: Adapted from Sachitra, (2017a)*

In this research, the focus on competitive advantage is from the dimension elicited by the response of participants of the research. Smooth cayenne, an improved planting material for pineapple, is developed by a research institute and transferred to farmers for adoption. The combined effect of the resource and capabilities create a competitive advantage.

## **2.8 Conclusion**

The chapter discusses the theoretical underpinnings for the study. It focuses on competitive advantage theory with an emphasis on resource-based view and dynamic capability view as indicative theories to achieve competitive advantage among farmers in Ejigbo, Nigeria. The chapter starts by highlighting the position of literature review in grounded theory methodology. It extends to how farming capabilities contribute and enhance competitive advantage. Consequently, based on the

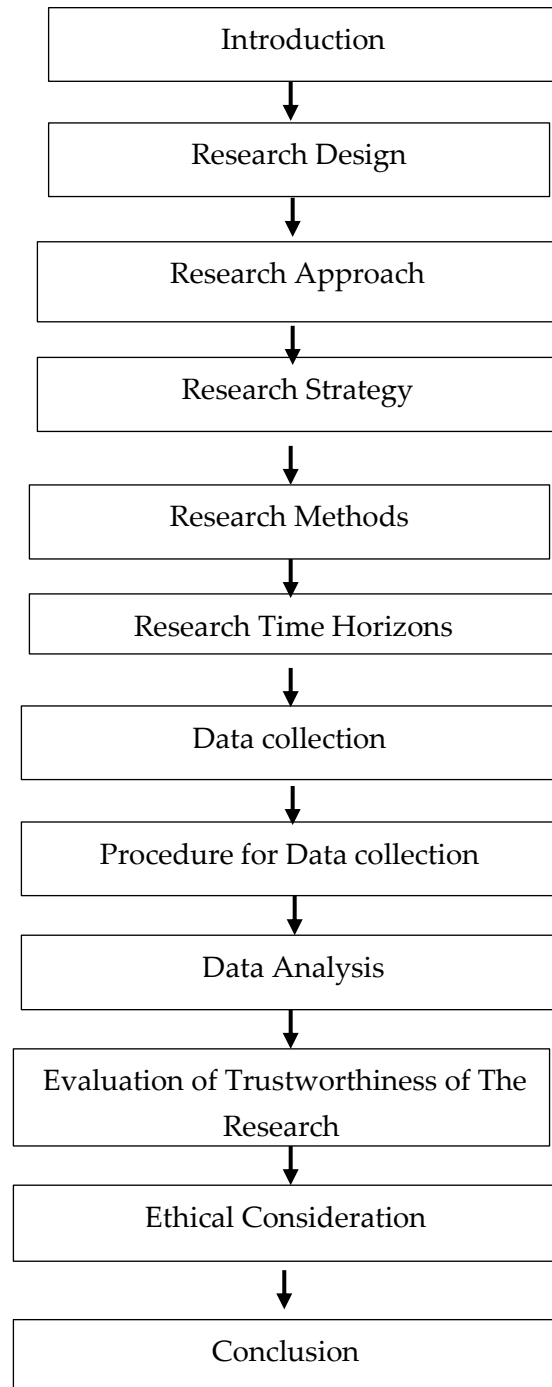
theoretical review and empirical findings, a conceptual framework was established to guide the research process.

The next chapter will introduce the methodology of the research. The first part introduces the chapter to the employed research design, approach, strategy, methods and research time horizon. Part two of the chapter discusses the procedure for data collection with an explanation on the approach to data analysis and its methodological choices. The last two sections evaluate the credibility of the research, coupled with ethical consideration in the study.



## CHAPTER THREE- RESEARCH METHODOLOGY

Figure 10: Chapter Three Structure



### **3.0 Introduction**

Chapter three covers the methodology employed for the research. The chapter explains why the adopted research philosophy is chosen and deemed most appropriate and presents the research design for the study. The first part of the chapter introduces the research design, approach, strategy and methods employed. The second part of the chapter discusses the procedure for data collection with an explanation on the approach to data analysis and justification for the methodological choices. The last two sections evaluate the credibility of the research, coupled with ethical consideration in the study.

### **3.1 Research Design**

Saunders et al. (2016) offer a research 'onion' diagram in which they depict how data is collected. Techniques for this are shown in the centre of the onion with several layers depicting issues underlying the choice of data collection techniques and analysis procedures in a typical research study. The research "onion" also shows how the research philosophy, approach, strategy, choice, time horizon, and techniques can be explained. Although different classifications and definitions of these terms exist, the study adopts the classification put forward by Saunders et al. (2016) which is logical and consistent with the research questions and objectives. The adoption of the framework provides a clear and comprehensive overall framework for a complete research process.

#### **3.1.1 Paradigm of Inquiry**

A chosen research paradigm serves as a philosophy that guides a research design (Saunders , et al., 2016 ) which suggests how the world views the conduct of the research in alignment with the assumptions and belief about the nature of knowledge in the research process (Kuhn , 1962). It also enlightens on the method of data collection and analysis for a research study (Wahyuni, (2012). However, the understanding and classification of the research paradigm vary among scholars. For example, Schwandt (2001) explains a paradigm as a shared world view that represents

the beliefs and values in disciplines which guides how research problems are solved. The research paradigm explains the relationship between ontology, epistemology and research methods employed by the research study (Saunders , et al., 2016 ). It further explains the impact of the reasoning of the researcher on the development of knowledge and by extension, the research philosophy. In this regard, Lather (1986) explains that a research paradigm reflects the researcher's beliefs about the world and principles/beliefs that shape how a researcher sees interprets the world. Cresswell (2013), as well as Saunders et al. (2016), classify the concept into three broad areas consisting of epistemology, ontology and research methodology. Alternatively, Mackenzie and Knipe (2006) classify research paradigm into broad theoretical positions irrespective of the ontological or epistemological orientation. However, Kuhn (1974) presented a challenge over the discourse on the paradigm and argued that paradigms are incommensurable due to different interpretations of situations. Subsequently, different interpretations lead to a variety of legitimate explanations to research findings. The extended position put forward by the scholar suggests that the theoretical orientation of a paradigm depends on the research epistemology and methodology that directs the research questions. Irrespective of the classification and its criteria, there is an alignment of ideas regarding the belief about the existence of knowledge and the assumption for the validity of the research design. While ontology indicates, the reflection about the set of beliefs regarding the nature of reality investigated, epistemology deals with the assumptions about ways of inquiring into reality for better understanding (Easterby-Smith , 1997). The next section concentrates on the epistemological (interpretivism) and ontological (pragmatism) position of the current study.

### 3.1.2 Interpretivism

Research from an interpretivism (social constructionist) perspective is concerned with identifying the various ways of constructing a social reality that is available in a natural setting, to explore the conditions of their use and trace their implications for human experience and social practice. The fundamental assumption of social

constructionism emphasises that the interaction between people and their social/physical environment leads to knowledge construction. Therefore, culturally specific subjective shared knowledge serves as a transmitter to social interaction (Saunders, 2016). A perception of reality, according to Burr (2003), varies across different social settings with different organisational cultures. This suggests that reality, at any point in time, depends on values and cultural belief within the community setting. In this regard, scholars have continually reinforced the relevance of interpretivism epistemological philosophy to understand the perception of different participants in any research study. For instance, Bryman and Bell (2019) argue that conducting research using interpretivism view helps the researcher to reach surprising findings by allowing an in-depth interpretation of the appropriate participants to gain an insight into the phenomenon of enquiry. This philosophical stance allows the researcher to have a better understanding of the social processes and gains more profound knowledge about the research questions (Raddon, 2010).

The epistemological stance of the current research follows an interpretivism approach because of the quest to obtain insights and reveal the creation of social reality. This research seeks a deeper understanding of the farming community realities using individual opinions and experiences of farmers and other participants as the research data source and interpreting the data in the research. The research seeks to investigate how successful technology adoption practices by pineapple farmers lead to a competitive advantage within a community setting. It permits a good comprehension of the social process within the farming community and searches for interpretations of concepts from participants rather than through hypothesis. Furthermore, it regards the empirical data as scientific evidence in understanding farmers position on TAP and considers individual participant response and belief as subjective. In line with this approach, the current study operates within the interpretivism paradigm to gain insight and in-depth understanding of technology adoption practices by pineapple farmers in Ejigbo community. Based on the interpretivism philosophy, the current

research seeks to achieve interpretative philosophy by collecting the data from a purposeful sample of farmers, extension agents and research scientist to achieve multiple perspectives about reality.

In this study, I seek to understand the world of pineapple farmers (Cohen & Manion , 1994) through gaining insight into their backgrounds, beliefs and experiences of the participants (Cresswell, 2013; Yanow and Schwartz-She, 2011).

### 3.1.3 Pragmatism

The current research tapped its philosophical foundation from the symbolic interactionism, which is pragmatic rather than a realist position. It focusses on the dynamic relationship between the meaning of farm practices and field actions by the farmers. The research question on how the adoption of technology and farming practices in pineapple cultivation leads to a competitive advantage addresses the processes through which farmers create and interpret meanings (Charmaz , 2014 ). The pragmatist assumes that truth is conditional while there are multiple perspectives to reality (Ritzer, 1992; Saunders et al., 2016). Thus, farmers hold different meanings to what constitute farm practices and processes. An essential element of pragmatism in the current research include practical application of farm practices by the farmers, which gives insight into the knowledge of what is practically obtainable on the farm.

I adopt a pragmatic symbolic interactionism position because of my assumption that reality is a projection of human imagination and interactions. This is in line with Blumer (1984) process of interpretation which considers human interpretation to be two steps. The two steps of human interpretation, according to Blumer (1984) include:

- Participants determine the meanings of objects
- Participants carry out interpretation based on perspectives

The subjective position of the research opts to obtain information based on the revelation of opinions and ideas from pineapple farmers and other participants. My main goal is compatible with that of symbolic interactionism since the assumption of

symbolic interactionism lies in the interactive linkage between me and the participant in the natural farm setting – which is so in the current research.

The research also explores how farmers behave towards the adoption of farm practices (Hall et al., 2019). The provision of a framework (grounded methodology) to data collection further strengthen the relevance of symbolic interactionism. Also, the systematic approach of the methodology sheds light to farmers changing behaviour as a social process. My position agrees with Charon (1979) that the interpretation of cultural objects is always changing as there is no fixed meaning to them. Interpretation of activities and practices are redefined continuously through participants' interaction. Furthermore, Glasier (1978) affirms that social interactionism is a relevant philosophy to examine the behaviour and the interpretation of meaning within a natural setting. The assumption is supported by Chenitz and Swanson (1986) that conceptualisation of human behaviour as a unit of analysis guides researchers to investigate behaviour and adoption of practices within the social circumstances.

In this regard, I have considered symbolic interactionism as a philosophy underpinning the study because it seeks to give an understanding of how social interaction has shaped the adoption of farm practices by the pineapple farmers. Other factors that justify the relevance of symbolic interactionism in the current study include participants definition and meanings attributed to technology adoption practices. Thus, the interpretive process of adopting the farming practices in addition to the adoption of the technology takes its origin from symbolic interactionism because of refinement of interpretation as an instrument of the actions of the farmers.

### **3.2 Research Approach**

The fundamental question of whether research should start with a theory by testing hypothesis or the findings leading to a theory was raised by Haven (2019). An attempt to answer the question by Saunders et al. (2016) establish two approaches to research: deductive and inductive. The thought process of deduction moves from theory through the research question, to data collection and findings to conclude on either

confirmation or rejection of hypothesis (Quinlan, 2011). Convincingly, Haven (2019) argues that the testing hypothesis clarifies the relationship between two or more concepts. Thus, deductive reasoning is appropriate for quantitative studies. However, the inductive approach follows a process in the opposite direction to the deductive approach with a focus on the research problem but not the existing theory. It implies that the research goes from research question to observations and description to analysis and finally, theory (Flick , 2007). In this case, the research develops theories in explaining empirical observations of the real world. The inductive approach, therefore, suits research that builds on constructivism to conclude with a theory proposition.

Nevertheless, both approaches have their limitations. While it is challenging to validate the empirical analysis in the deductive approach, the subjectivity of opinions creates biases in the inductive approach (Bryman and Bell, 2019). However, in line with the traditional approaches by Saunders et al. (2016), I use inductive reasoning because the study tries to proffer answers and insights into the research questions through empirical investigation. Furthermore, the current research builds on social constructivism by following the bottom-up approach (Daff, 2011) where the identification of specific information about farm practices guide towards the findings of the results.

### **3.3 Research Strategy**

Bryman and Bell (2019) refer to a research strategy as the style that the researcher employs to collect and analyse data to answer the research questions. It also gives the plan of action and direction for the conduct of research by following a specific approach. In this regard, Saunders et al. (2016) identify different approaches such as experiments, surveys, case studies, action research, ethnography and grounded theory to answer different types of research questions. Table 3 gives a brief description of the six approaches by Saunders.

**Table 3: Comparison of six approaches to qualitative research**

Approach	Brief Description
Experiment	The strategy compares the expected result against actual to establish variance of results
Survey	The research strategy looks for contributing variables among classified data
Case Study	The strategy explores a particular research problem using the case as an illustration. The focus is on a specific unit to establish the unique features of the case
Grounded Theory	Generates concepts framework grounded in the data. The strategy deals with processes or actions with distinct phases
Action research	The strategy of inquiry through progressive problem-solving. It is based on a reflection on practice
Ethnography	The strategy looks at behaviour belief and language in a specified setting. The methodology develops a full description of the culture of a group

Source: Adapted from (Saunders et al. 2016).

A comparison of the description of the six approaches guides me to a choice of research methodology following the case study and grounded theory methodology, as highlighted in table 3.

### 3.3.1 Justification for The Research Methodology

I have selected grounded theory as a methodology to investigate the research questions because of its robustness and my philosophical belief about reality (See section 3.2.3). My construction of reality about technology adoption practices comes from the social perception of participants either as an individual or a group (focus group). The epistemological position indicates that knowledge about farming and farm practices lies within the context of culturally bounded farming experience. The real knowledge within this context relies on an individual and group perceptions belief and their cultural systems. Also, the choice of grounded theory methodology seeks to generate answers to the research questions that are grounded in the empirical data by providing specific tools for the research processes. It also promotes openness to the theoretical understandings by providing connections and interpretations about



the data through codes and categories. Subsequently, the methodology supports coding for processes and actions rather than topics and themes advocated by other qualitative methodologies (Charmaz , 2012). Also, the approach builds on systematic checks of theoretical categories and allows for flexibility in the research process to make sense of people's actions and experiences in the social world (Belgrave & Seide , 2018).

Another factor that guided my methodological approach arises from methodological recommendations of existing works of literature. Existing literature on grounded methodology (Glasier and Strauss, 1967; Strauss and Corbin, 1998; Charmaz,2014) support the overall process and procedure of data collection while Strauss and Corbins (1998) precisely conform and guides the procedure for investigating the research questions through a robust and flexible data collection process. Furthermore, the relevance of multiple sources of data collection methods and procedure for data collection as posited by Heskisson et al. (1999) and Yin (2017) in a case study approach guides me to gain in-depth knowledge and insights towards how the adoption of farming practices enhance cultivation of pineapples in a rural setting.

In this regard, I consider a combination of grounded theory methodology embedded within a case study approach by excluding other approaches because of its focus on the insights and in-depth analysis of the adoption of farm practices rather than comparing an established benchmark or expected results with the actual results. The focus of the study is neither to investigate the contributing variables among classified data nor to develop a methodology that considers the full description of a cultural setting(ethnography) in the case study. Following the submission of Robson (2011) on case study as an empirical investigation that relates to real-life observation through a collection of evidence via multiple sources; it is worthy to note that the current research takes place within a natural farming setting where pineapple farmers make their livelihood. The techniques for gathering data in this study include interviews, field observations, memo and literature reviews as guided by grounded methodology.

Such methods of triangulation allow me to gain an in-depth understanding of farm practices in a rural setting (Patton & Patton , 2002 ).

The decision to incorporate grounded theory within a case study conforms to the recommendation of Laws and McLeod (2004) that integration of grounded theory within a case study allows the empirical data to be used to describe the phenomenon of the research exceptionally well. It also allows for flexibility in the research process. Eisenhardth & Graebner (2007) indicate that a combination of qualitative methodology and case study research design builds an explicit theory. The studies by (Clulow et al., 2003, 2007; Gaya & Smith, 2016) specifically support the use of single case study as the basis for empiricism. In a similar study, Eisenhardt (1989) affirms the use of the case study as the most suitable strategy when research subjects are in their exploratory stage. A single case study is appropriate for this research since the aim of the research is to reveal processes within the context of the study (Yin, 2017). Other studies that consider a combination of grounded theory within a case study include Devadas (2018) and Che et al. (2020). Specifically, Pandit (1996) emphasised the relevance and fitness of incorporating elements of the case study research method within the realms of Straussian grounded theory methodology (SGTM). On this note, the current research conforms to the position of Walsham (1995) and that of Riege & Nair (1997) that case study research methodology focuses on the part of an organisation or industry to rigorously explore and analyse contemporary real-life experiences in depth using a variety of evidence. Precisely, it agrees with Yin (2017) who view the case study as an empirical investigation within its real-life context. Furthermore, the relevance of a case study in the current study seeks to explore an empirical investigation that relates to real-life observation by collecting evidence through multiple sources, i.e. (triangulation).

Overall, in practice, the combination of the two methodologies, (grounded theory and case study), provides insights into how technology adoption practices can serve as a source of competitive advantage among farmers. The knowledge gained is grounded

in the data collected such that the research could account for a practical solution to the research questions (Cibangu, 2012).

The next two sections discuss in more detail the grounded theory methodology and case study research as it applies to the current study.

### 3.3.2 Grounded Theory Methodology (GTM) and its divergence

Chun Tie et al. (2019) like other researchers (Glaser and Strauss, 1967; Strauss and Corbin, 1990; Charmaz, 2017) describe the grounded theory as a research methodology set to discover theory from data systematically. However, the viewpoint differs depending on the philosophical positioning of the research; thus, the research philosophy determines the different genre of the grounded methodology employed in the research process. In this regard, the existing literature has indicated divergence in the methodological procedure. Those following a positivist paradigm assume the reality of being objective such that knowledge is independent of the researcher's view (Polit and Beck, 2017) whilst post-positivist approach acknowledge the subjectivity of knowledge (Strauss & Corbin, 1990).

The three divergent approaches - Classic Glaserian Grounded Theory Methodology (CGGTM), Straussian Grounded Theory Methodology (SGTM) and Constructive Grounded Theory Methodology (CGTM) identified by Charmaz (2014) has a unique characteristic. Generally, all the three approaches to grounded theory elucidate the research process by beginning with simultaneous data collection without initial ideas to prove or disprove. The grounded theory methodology also develop ideas through consistent comparison as well as keeping a written record of analytical thoughts about the collected data. The concepts that emanate from the initial analysis guides the theoretical sampling that leads to the development of grounded theory. Overall, the primary aim of grounded theory is to establish and generate theories from data that are empirical. It builds an analytical sensitivity case by continually seeking new

categories of evidence which leads to data saturation, where no new data is resulting from additional data collection.

The unique characteristics of grounded theory serve as influencing factors that create a rigorous methodological process in grounded theory methodology. However, the distinguishing characteristics of the three approaches explain the divergence and the relevance of each approach to a specific situation. The origin of divergence is specifically around the philosophical differences, the relevance of the literature review before the research process and the analytical coding procedure. Thus, researchers face the dilemma of which version is applicable for consideration in practical terms (Glaser, 2014). For clarity of purpose, the following subsections explain the three different versions in grounded theory method (GTM) literature.

#### *3.3.2.1 Classic Glasserian Grounded Theory Methodology (CGGTM)*

The philosophical position of the classic Glasserian grounded theory methodology (CGGTM) is ambiguous as there is no clear epistemological position (Moore, 2009). However, Charmaz (2014) asserts that CGGTM has a positivist connotation with an objectivist ontology. It assumes neutrality of the observer as well as an external reality of truth.

Glaser (1992) asserts the avoidance of pre-assumptions and construction of ideas and beliefs, such that the researcher should not necessarily undertake literature review before commencing the study. A purely grounded theory approach strictly ignores initial literature review and facts about the area of study to avoid contamination of the emergence of categories (Glaser & Strauss, 1967). The approach further asserts that any pre-study of literature or review of literature could be regarded as time-wasting and a derail of relevance for the grounded theory methodology. However, Glaser (2002), in its report on the conceptualisation of grounded theory, does not support the Straussian approach. Glaser (2002) states that Strauss is forcing a theory from the data

by forcing data into a predetermined paradigm model relationships rather than the emergence of theory.

The Glaserian approach does not support preconceived causes, consequences or action/interaction relationships (Glaser , 1992). The CGGTm emphasise that the paradigm model is the aim of qualitative data analysis referred to as conceptual description. The emphasis of the CGGTm is on formulation and abstraction of data that can apply relative to time, place and people. Thus, Glaser and Holton (2004), as well as Holton (2010), identify the coding procedure of CGGTm involves two stages: substantive coding and theoretical coding. The substantive coding starts with open coding, followed by selective coding. Halaweh et al. (2008) however, claims that the researcher who uses CGGTm should analytically move from description to formulation in the selective coding stage.

Furthermore, Glaser (1992) believes that the coding process will dictate the direction of analysis since the research problem is not pre-empted but becomes emergent during data collection or analysis. For this reason, Glaser claims that Strauss and Corbins (1990) approach is relevant as a method providing techniques for data analysis, rather than methodology. Glaser (1992) claim that the original version of grounded theory (Glaser & Strauss , 1967) is a methodology while the later versions are qualitative data analysis. (QDAs).

### *3.3.2.2 Straussian Grounded Theory Methodology (SGTM)*

The SGTM establishes an interpretivist paradigm of inquiry within the philosophy of symbolic interactionism and pragmatism (Kenny and Fourie, 2015). Also, Charmaz (2006) endorses the assertion by Strauss and Corbin (1994) on the philosophical foundation of SGTM leaning towards post-positivism. The SGTM researchers (Corbin and Strauss, 2015; Corbin, 2013; Devadas, 2018) agree that acquisition of knowledge serves as a guide towards an innovating idea which in turn leads to action — thus leading to

insights about the phenomenon of study. The philosophical stance of SGTM is that of subjective epistemology (See Section 3.2). In contrast to other approaches, SGTM assumes interpretative pragmatic/symbolic interactionism with the belief that reality comprises of various mental construction which can be interpreted accordingly (Denzin & Lincoln, 2011).

Alammar et al. (2018) clarify the philosophical view of SGTM by indicating that the approach has both an inductive and deductive approach. It is inductive as new concepts may emerge while deductive as it may consider established concepts. The philosophy positioned the researcher or observer as an insider to the research study (Kenny and Fourie, 2015).

Strauss and Corbin (1990) appreciate the relevance of literature review before the commencement of fieldwork. They argued that it would allow the researcher to acquire some knowledge of the phenomenon to be studied as well as derive questions that might be relevant to the fieldwork. They affirm that the research question in a grounded theory informs the researcher what the researchers want to focus on and what the researcher wants to explore regarding the subject (Strauss & Corbin , 1990). They also emphasise that the literature direct the theoretical sampling, which allows for analytical sensitivity. Furthermore, Alammar (2018) ascertain the necessity for a review of the existing literature in SGTM before the commencement of research. It helps the researchers to identify the relevant concepts and theories of research, which further enables the researcher to make sense of data collected from the fieldwork.

Regarding coding and analytical procedure, Strauss and Corbin (1990) establish four coding stages in SGTM as against two in CGGTM. The four stages include open coding, axial coding, selective coding and conditional matrix. The explicit analytical stages enhance the clarity of the procedure (Strauss and Corbin, 1998). Thus, Strauss and Corbin (1990) assert that the combination of SGTM with case study aligns towards analytical rather than statistical generalisation.

### 3.3.2.3 *Constructivist Grounded Theory Methodology (CGTM)*

The philosophical position of CGTM conforms with relativist and subjective epistemology (Charmaz , 2014 ). Researchers following this divergence assume that researchers are integrated into the research (Charmaz, 2000: Mills et al., 2006). Thus, the interaction of the researcher with the participants and data can influence the research study (Charmaz., 2014). In this regard, CGTM assumes the cocreation of knowledge such that the reality of truth is subject to the interpretation of participants' words, expressions and actions which depicts an image of reality rather than reality (Charmaz , 2000). The approach equally acknowledges the relevance of reflexivity in the research study.

The version assumes a continuous literature review throughout the research process; however, the version suggests that a delay of immersion of literature till the end of data analysis. The proponent of the version (Charmaz , 2014 ) argues that late immersion of literature reinforces the credibility and knowledge of the researcher.

The code analysis in CGTM is more interpretive as it emphasises an in-depth interview to elicit variation of meanings to the phenomenon of study (Strauss & Corbin , 1990). The coding procedure involves two stages of initial or open coding and refocussed coding (Charmaz , 2014 ). The data analysis usually concludes with the **interpretation** of the process rather than an explanation of the social process (Hallberg, 2006).

**Table 4 : Philosophical approaches to Grounded Theory Methodology**

<i>Philosophical approach</i>	<i>CGTM</i>	<i>SGTM</i>	<i>CGTM</i>
<i>Philosophical perspective</i>	<i>Positivist</i>	<i>Interpretive pragmatic/symbolic</i>	<i>Critical Realism</i>
<i>Role of the researcher</i>	<i>Detached observation. No influence on data. The researcher is passive.</i>	<i>The researcher is active.</i>	<i>Researcher influences research.</i>
<i>Position of literature review</i>	<i>No Literature review before data collection.</i>	<i>Literature review informs the research question.</i>	<i>Literature review leads to RQ before the commencement of research.</i>
<i>Data analysis /coding procedure</i>	<i>Theoretical coding</i>	<i>Open, Axial and selective. (abductive)</i>	<i>Initial coding. Focused coding.</i>
<i>Proponents/Reference study</i>	<i>Glaser and Strauss (1967)</i>  <i>Glaser (2011; 2012)</i>	<i>Corbin (2013)</i>  <i>Strauss and Corbin (1990; 1998)</i>  <i>Corbin and Strauss (2015)</i>  <i>Devadas (2018)</i>	<i>Bryant (2017)</i>  <i>Bryant and Charmaz 2007</i>  <i>Charmaz 2014, 2018</i>  <i>Charmaz and Bryant (2016)</i>

Source: Adapted from (Saunders, 2016).

### 3.3.3 Justification for SGTm as a choice in the current study

Glasserian school of thought emphasises that the problem statement emerges as a guide to theoretical sampling such that one does not need a prior literature review. However, the literature review comes up and combine into the emerging theory as extra data for constant comparison (Glaser,1998).

The position of this research situates it as being led by research questions; hence the Glasserian version of grounded theory methodology was inappropriate. Furthermore, my position as an insider makes the Glasserian approach to be inadequate and unrealistic.



Contrastingly, the Straussian school of thought allows a preliminary study of literature to identify research questions and methods of data collection. The guidelines in the Straussian version does not permit researchers to start with any preconceived theory but instead allows the emergence of theory from the available data. I have, therefore, considered the Straussian version to be an appropriate version of the grounded theory methodology in this study.

I grew up in the locality of the study area with an age-long experience in farming activities. Furthermore, I have served as a knowledge transfer officer between NIHORT and the Ejigbo farming community for ten years. Therefore, I cannot claim innocence of some basic information and knowledge about farm practices. In this regard, I have some prior knowledge of literature relating to the research study. This prior knowledge and activities placed me to be an insider in the research process.

My role and experiences as a former researcher within the Ejigbo community may tend to influence the analytical procedure. Dwyer and Buckle (2009) emphasise that the positioning of the researcher within the research design determines the philosophical genre. However, as a result of my dual role as a professional farmer and a researcher, I do not consider myself as a complete insider nor an outsider; instead, I occupy a space between. My position as a space between conforms with the assertion by Dwyer and Buckle (2009) that “the intimacy of the researcher with the research does not allow researchers to be placed as true outsider nor a complete insider, rather the researcher occupy the space between”(p.61) which suggests abductive reasoning supported by SGTM. In this regard, I have prior knowledge of related literature but not immersed in the literature.

The research question on how technology adoption practices influence the cultivation of pineapple emanates from my curiosity for knowledge while the question of how technology adoption practices create competitive advantage emanates from the field data. The resulting procedure of analysis is, therefore, abductive as supported by SGTM. The element of case study in the current research (the unit of analysis of how pineapple farmers have adopted farming practices) is compatible with the concept of

grounded theory on theoretical sampling (Strauss & Corbin , 1990) which seeks to develop related concepts.

Overall, the philosophical stance of this study is subjective. It establishes an interpretivist paradigm of inquiry within the philosophy of symbolic interactionism and pragmatism (Kenny and Fourie, 2015). The research assumes that acquisition of knowledge and experience by pineapple farmers serves as a guide towards technology adoption practices which in turn leads to action on the farm — thus leading to insights about the phenomenon and subsequent interpretations of reality. Furthermore, the data analysis follows a thematic storytelling approach as supported by SGTM since storyline approach ensures that the theory is grounded in the data. Thus, the distinguishing characteristics of SGTM in the current research offers a clear and detailed description of the research procedure (Walker and Myerick 2006) and focus on data collection procedures to achieve rigorous data analysis (Mills et al., 2006)

### **3.4 Research Methods**

The grounded theory emphasises on the utilisation of a variety of data sources that are grounded in a context (Hussein , et al., 2014 ). The available choices identified by Saunders et al. (2016) include questionnaire, interviews (focus group/Individual), observations and memos. I consider a combination of qualitative methods to achieve a methodological triangulation and ascertain consistency in the data collection process. In this regard, the study research methods include focus group interview, individual farmer interviews, individual interview with extension agents, interview with the research institute personnel, field observation, and field notes (memo). The justification for the choice of method allows for different information-gathering methods (triangulation) suitable for a qualitative research process as guided by the grounded theory methodology.

### **3.5 Research Time Horizons**

Bryman and Bell (2019) indicate that a longitudinal time horizon for data collection

implies repeated observations over a more extended period. It is most relevant when studying changes and development over time. A cross-sectional study, on the other hand, collects data at a given point in time and can be thought of as a snapshot image of the observations taken at the moment (Bryman and Bell, 2019).

I monitored farm management practices for twenty-two months from the period of planting pineapple suckers to the period when it is sold to consumers to identify and explore technology adoption practices that could lead to competitive advantage. I consider a cross-sectional approach to ascertain the various farm practices within the production cycle for the period of data collection. The justification for the choice of time horizon is to be able to gather in-depth information on the farm practices covering the pineapple production cycle from planting to harvesting stage.

### 3.6 Data collection

The method of data collection in the current study follows the guiding principles of grounded theory methodology embedded as a case study. The method of data involves triangulation through focus group meetings, individual interviews, field observation and memo writing (Bryman & Bell , 2019). The decision to consider data triangulation contributes to the rigour and robustness of the approach

With regards to this study, the method includes identification of background knowledge and experience of participants in the cultivation of pineapples, three focus group meetings, conducting semi-structured interviews with participants (farmers, extension workers, research institute representative) and field observation with picture evidence of the farm practices. The data collection period spread across sixteen months which also serves as a minimum production cycle of pineapple from land preparation to harvesting.

#### 3.6.1 Data Sampling

I consider a purposive nonprobability sampling technique for the study. This is because it allows me to choose the samples of farmers that fits in with the aim and

objectives of the case study research. It also allows gaining an in-depth insight on technology adoption of smooth cayenne and associated farm practices. Where participants for the study meet the criteria of the study, the purposive sampling is a deliberate choice based on the possession of the pertinent qualities of investigation (knowledge and experience). It emphasises on a comprehensive understanding of the phenomenon of interest until it reaches saturation where there is no emergence of new information (Etikan , et al., 2016). Thus, the technique allows me select pineapple farmers that have successfully adapted the planting of smooth cayenne variety as well as the associated farm practices in contrast to those farmers that have not fully adopted the technology and associated farm practices. The choices of sampling technique conform with Etikan et al. (2016) on the use of purposive sampling to conform with research objectives.

I select eight professional pineapple farmers, four of whom have successfully adopted the practices and four that have partially adopted the farm practices, two extension agents and one research scientist. The complementary case study approach guides towards the classification of successful adopters or otherwise and provides insights into the evolvement of storylines in the current study. Although, the number of focus group interview required to reach theoretical saturation could not be predetermined; however, Charmaz's (2006, p.113) concept of saturation ("nothing new happening") guides me to ascertain data saturation when the focus group discussion eventually got to three.

### **3.7 Procedure for data collection**

This section outlines the procedure I used to collect data and document the research study. The procedure includes identification of background knowledge and experience of participants in the cultivation of pineapples, three focus group meetings, conducting semi-structured interviews with participants (farmers, extension workers, research institute representative) and field observation with picture evidence of the

farm practices. A detailed analysis was carried out on completion of data collection and reported to the participants and documented for future reference.

#### 3.7.1 Permission from the community head

In conjunction with one research scientist and an extension officer of NIHORT, I visited Ejigbo farming community in July 2015 to assess the relevance of the research study and ascertain the production cycle of pineapple. The visit also achieves taking permission for the study from the community head as well as the leaders of pineapple farmers association (PFA). I explained the purpose of the research study and the process at each level to both the community leader and the leadership of PFA. On this day, we (myself and the community leaders) arrange a future date to meet and discuss the details of the research process with the farmers and other participants.

#### 3.7.2 Familiarisation meeting with pineapple farmers

The second visit to Ejigbo farming community also in July 2015. I arranged the meeting to coincide with the PFA meeting on a Thursday. My purpose for the arrangement to coincide with PFA meeting day was to make sure that I meet with the majority of the pineapple farmers. The meeting was arranged to meet the farmers and other participants expected for the study. The extension agents and research scientist from NIHORT came on time to attend the meeting.

In the meeting, I discuss the methodology for the case study as well as a detailed plan and schedule for the process of data collection. During the meeting, I identify the necessary procedure of interview and focus group discussion. I categorically stated that participation in the study is voluntary and define the goals of the research during this meeting. Following the purposive sampling for the study, the extension agents and the representative of PFA present at the meeting identified pineapple farmers relevant to the study. It was interesting to understand an in-depth background of the community and the role of PFA at this meeting. The leaders of the PFA explained the roles of PFA within the confine of the community to me. According to the leaders of PFA, the primary role of the PFA is to provide advice and support to her members

through liaising with the change agent and extension workers. The extension agents and the research scientist also elaborate on the relevance of the study to the change agent and their commitments to support the research study (See appendix 9). The pineapple farmers suggest that data collection and interviews should be on PFA meeting days when farmers will be in relax mood to answer any question relating to the study. A representative of the pineapple farmers nominated by other farmers gave assurance of their support for the research study. The farmers' representative also declares his willingness to sign the necessary paperwork associated with the ethical requirement of the study (see appendix 7). The meeting lasted for forty-five minutes and documented. The meeting concludes and agrees on the procedure of data gathering activities. Each of the data collection method and activities is discussed in detail in the subsequent sections.

### 3.7.3 Focus Group Meeting

Focus group is a form of data collection method that relies on communication and discussion among participants in order to create data (Stalmeijer, et al., 2014 ). It provides a detailed set of data about participants impressions, thoughts, perceptions and details of the situation surrounding the phenomenon of study (Stewart and Shamdasani,1990). The relevance of the focus group as a data collection technique in qualitative research study arises from its uniqueness in the homogeneity of characteristics in the subject of reference (Powell & Single , 1996). Participants come together to discuss a common issue relating to the adoption of farm practices as a complement to the planting of the suckers of smooth cayenne variety. The discussions were interactive and cut across social belief, perceptions as well as opinions and attitudes such that participants express their opinions with other members of the group irrespective of the social or economic classification (Powell & Single , 1996).

The focus group method of data collection conforms with Kitzinger (1994) method for investigating a specific issue of interest either to the researcher or the subject of

reference (participants or community) to elicit in-depth information on the issue at stake from the participants. The strength of the method lies in the fact that the discussions were organised and well planned such that I can gain varied information from different perspectives and opinions. It also allows me to gain insights into the issue of reference (Kitzinger , 1994 ). Its complementary role to other qualitative methods is its major strength (Morgan, 1988).

The focus group discussion as a source of data collection in this study explores in-depth details around the adoption of farm practices among pineapple farmers in Ejigbo, Nigeria. In this context, I visited farmers in their natural environment to discuss issues around the research questions – how the adoption of farm practices has enhanced technology adoption as well as how farm practices lead to competitive advantage. The aim of adopting this method of data collection in the current study is to enhance theoretical sensitivity (Charmaz , 2014 ) around farm practices and establish the underlying issues such as norms, beliefs and values that are common to the participants. In this regard, adopting a focus group method of data collection explores insights into participants' shared understanding of technology adoption practices and how pineapple farmers decisions influence one another in a group situation.

The focus group discussion serves as a follow up to the initial meeting with the village head and the subsequent meeting with the pineapple farmers and leaders of PFA on two days in July 2015. I consider different stages of the production cycle (land preparation/planting, weeding and harvesting periods) as a framework for discussion to elicit the experience and observation of the farmers' field at different stages of production. My decision to conduct focus group discussion in three stages conform with the advice of Parker and Tritter (2006) as well as Stalemeijer et al. (2014) that researchers may reconvene participants for further discussion if the focus of the study is in stages. Three focus group meetings were arranged to cover the planting period, weeding period and harvesting period running between the maximum twenty-two

months production period(see figure 2). Due to the production cycle of pineapple, a focus group meeting came up three times between planting and harvesting period to cover the planting, weeding and harvesting periods running between twenty-two months. The first one, during planting, the third one during harvesting while the second comes up between the first and last one when farm operation practices are critical. I consider the alignment of the focus group discussion with other methods of data collection as a complement to validate the research questions and design of the case study (Yin, 2017).

The focus group meeting was a follow up to the initial meeting with the village head. It was much detailed and spread across the cultivation period to discuss farming practices at various production period. Three focus group meetings were carried out to cover the planting period, weeding period and harvesting period running between twenty-two months. Due to the production period of pineapple, a focus group meeting came up three times between planting and harvesting period. The first one, during planting, the third one during harvesting while the second comes up between the first and last one when farm operation practices are critical. Before the discussion on each occasion, I got into a brainstorming session with two professors and a research director that are knowledgeable about the subject at the University of Ibadan, Nigeria. This gives me the zeal and the confidence to focus on the questions that will drive the discussion guide. To establish a structure for discussion, I follow the discussion guide by Krueger and Casey (2009) starting from opening question through an initial question to transition question and critical questions. I conclude each session by incorporating ending and summary questions (see tables 5; 6 and 7). It is important to note that the sitting arrangement on benches provided by PFA depicts that of a discussion rather than an interview.

At each stage, eight pineapple farmers and two extension agents were considered as members of the focus group. However, the eight farmers were maintained within the



meetings for consistency of ideas over the production cycle to comply with the assumptions of grounded methodology.

Each meeting begins by giving a review of the purpose of the research and modify as necessary to comply with the grounded theory methodology. It is worthy to note that the discussion at each stage operates on open-ended questions rather than leading questions (see appendix 1). After each focus group meeting, then the group reviews the discussion and make appropriate corrections and clarifications. Also, after each meeting, the researcher carries out the field observation on farmers field and schedule the individual interview depending on the convenient time of the participant. For each focus group discussion, the researcher has detailed information that was audio recorded with pictures of field observation and written memo documented. At the end of each discussion, I transcribe the audio-recorded data for further analysis and reflect on the content and process to review the collected data for analysis. The discussion at each stage also generates memo and ideas. Subsequently, I refine the interview questions for the next stage to incorporate a constant comparison of data. The stagewise analysis of data before conducting individual interviews establishes the aspects of the data that require further clarification, confirmation or exploration (Botherson & Goldstein , 1992 ).

#### *3.7.3.1 First Focus Group Discussion*

The first focus group discussion took place in July 2015 for one hour twenty minutes. The group consists of eight pineapple farmers, two extension agents, one research assistant and myself. Four out of the eight farmers have successfully adopted the farming practices in conjunction with the technology transferred by the change agent. The other four farmers have either partially adopted or non-adoption of the technology from the change agent. The two extension officers are representative of the change agent saddled with the responsibility of transferring the technology to pineapple farmers. The first focus group discussion aims to find answers and insight

into the research question (RQ1) of how farming practices have enhanced technology adoption in the production of pineapple fruits?

The first focus group meeting began with a prayer from two participants( representing the religion of the participants). Pineapple farmers in Ejigbo consider prayer to be essential before the start of any fam operation or activities. After the prayer, I introduced myself and reiterated the purpose of the research. The introduction of each participant follows this. The introduction took the form of a story about their background and experience in farming with particular reference to pineapple cultivation. The categorisation of questions and discussion guide follows the guideline of Krueger and Casey (2009), as shown in table 5.

**Table 5: Categorisation of questions at the first focus group meeting**

<i>Type of question</i>	<i>Purpose</i>	<i>Specific question</i>
<i>Opening</i>	<i>To motivate participants towards the discussion</i>	<i>What is the composition of the focus group</i>
<i>Introductory</i>	<i>For participants to link the relevance of the meeting to the discussion. It gives me a clue towards participants views.</i>	<i>What do you think guides farmers towards the cultivation of pineapple?</i>
<i>Transition</i>	<i>The transition of the discussion towards the critical research question.</i>	<i>How do you view the technology adoption and farm practices in the production of pineapples?</i>
<i>Key</i>	<i>Questions that drive the study</i>	<i>What do you understand about technology adoption practices in pineapple farming?</i>  <i>Can you tell me about the importance of technology adoption practice in pineapple farming?</i>  <i>Kindly explain what you mean by change in method and belief.</i>  <i>How will you assess your likelihood of effectively managing and considering technology adoption practices?</i>  <i>How will you find out its impact on the final yield? Can you explain it better?</i>  <i>Can you tell me what you understand by management practice?</i>

<i>Type of question</i>	<i>Purpose</i>	<i>Specific question</i>
<i>Ending</i>	<i>Enables participants to reflect on previous comments.</i>	<i>Can you reflect on the summary of the discussion to check for omission, addition or clarification?</i>
<i>Final</i>	<i>Assurance that nothing was left out.</i>	<i>Is there anything that you would like to add that I have not covered.</i>

*Source: Adapted from Krueger and Casey (2009)*

The opinions of the participants on the key questions serve as a guide towards the design of questions for the individual interview. It also triggered some probe questions, as indicated in appendix 1. The follow up on-farm observation gave some insights towards farm practices at the onset of land preparation and planting. It equally triggers writing some memos on the nature of farmers field.

#### *3.7.3.2 Second Focus Group Discussion*

The schedule of the meeting for the second group discussion came up within the period of planting but before the emergence of the fruit. The second focus group discussion took place in February 2016 for one hour, thirteen minutes. The group consists of the same number of participants, as present in the first focus group meeting. The composition of the group members is equally the same. However, one of the members requested that he wants his nineteen-year-old agricultural undergraduate to serve as an observer at the meeting. The meeting follows the protocol regarding prayer.

The second focus group discussion aims to gain deeper insights into the first research question (RQ1) and part of the second research question (RQ2) on how farming practices lead to competitive advantage among pineapple farmers in Ejigbo community.

The meeting starts by reporting on emerging issues from the first focus group meeting. The emerging issues were about the source of the planting materials and what motivates pineapple farmers to adopt the farming practices. (I need to clarify between motivation for pineapple cultivation and motivation for adopting farm practices).

Afterwards, the meeting continued by allowing responses to questions in the form of storytelling such that participants were not restricted or guided with their responses. Also, the discussion guide follows the guideline of Krueger and Casey (2009), as shown in table 6.

**Table 6: Categorisation of questions at the second focus group meeting**

<i>Type of question</i>	<i>Purpose</i>	<i>Specific question</i>
<i>Opening</i>	<i>To motivate participants towards the discussion</i>	<i>What do you think is our purpose for gathering today</i>
<i>Introductory</i>	<i>For participants to link the relevance of the discussion to the last meeting. Gives me a clue towards emerging issues on motivation</i>	<i>What do you think motivates farmers towards the adoption of farm practices?</i>
<i>Transition</i>	<i>The transition of the discussion towards the critical research question.</i>	<i>Which planting material will you prefer and why? What are your sources of planting materials?</i>
<i>Key</i>	<i>Questions that drive the study</i>	<i>Which resources can you consider to be relevant in pineapple production?</i>  <i>Can you explain what you mean by physical and human resources?</i>  <i>Where will you place planting materials?</i>  <i>Can you explain what you mean by those resources we can see and those we cannot see?</i>  <i>What is your view about the effect of technology adoption practices on competitive advantage?</i>  <i>Apart from technology adoption, what other resource do you think can lead to competitive advantage in pineapple production?</i>

<i>Type of question</i>	<i>Purpose</i>	<i>Specific question</i>
<i>Ending</i>	<i>Enables participants to reflect on previous comments.</i>	<i>Can you reflect on the summary of the discussion to check for omission, addition or clarification?</i>
<i>Final</i>	<i>Assurance that nothing was left out.</i>	<i>Is there anything that you would like to add that I have not covered.</i>

*Source: Adapted from Krueger and Casey (2009)*

The emergence of data at the second focus group meeting guides me towards theoretical sensitivity and comparison of activities on farmers fields. It is worthy to note that the second focus group meeting appeared to be more interactive as participants built up confidence in the conduct of the meeting. Participants were free to share their stories with specific examples. The meeting was concluded with the usual farm visit to farmers fields to compare the data with the practice on the farm. The visit on this occasion generates few memos to reconcile shreds of evidence from the field with the discussion.

### *3.7.3.3 Third Focus Group Discussion*

The third focus group discussion was conducted in October 2016 for one hour, twenty-five minutes. The group discussants consist of the same number of participants as present in the first and second focus group meetings. The composition of the group members is equally constant. However, one of the participants that were present in the first two discussions was unavoidably absent but was represented by his spouse at the meeting. The discussion gain insights into the second research question (RQ2) on how farm practices adoption leads to a competitive advantage among successful adopters. The discussion guide follows the guideline of Krueger and Casey (2009), as shown in Table 7. However, the key questions were developed from the initial analysis of the transcripts of the first and second discussions. The questions for discussion also reflected issues that require clarification or confirmation from the previous discussions.

**Table 7: Categorisation of questions at the third focus group meeting**

<i>Type of question</i>	<i>Purpose</i>	<i>Specific question</i>
<i>Opening</i>	<i>To motivate participants towards the discussion</i>	<i>Are we all happy to start the discussion for today? There was a chorus of yes with positive body languages</i>
<i>Introductory</i>	<i>For participants to link the relevance of the meeting to the discussion.</i>	<i>What is the current stage of production in the production cycle of pineapple fruits? Every response pointed to the harvesting stage as some farmers brought harvested fruit to the discussion forum</i>
<i>Transition</i>	<i>The transition of the discussion towards the critical research question.</i>	<i>How has your level of adoption of farm practices given you any advantage over other farmers?</i>
<i>Key</i>	<i>Questions that drive the study</i>	<i>Can you tell me how you view the adoption of technology practice in pineapple farming brought to you by Research Institute?</i>  <i>Can you tell me some of the practices with high risk?</i>  <i>Can you tell me how competitive advantage in Ejigbo could be prolonged in Ejigbo community?</i>  <i>If you could add any feature to improving the production of pineapple apart from technology adoption practices, what would it be?</i>  <i>It appears most of us emphasise on learning either collective or individual plus experience. How do you access learning to improve the production of pineapple?</i>  <i>How has the adoption of technology practices lead to a change of ideas in the production of pineapple?</i>  <i>Can you tell me why farmers may not want to implement change?</i>
<i>Ending</i>	<i>Enables participants to reflect on previous comments.</i>	<i>Can you reflect on the summary of the discussion to check for omission, addition or clarification?</i>
<i>Final</i>	<i>Assurance that nothing was left out.</i>	<i>Is there anything that you would like to add that I have not covered.</i>

Source: Adapted from Krueger and Casey (2009)

The visit to farmers field was a bit delayed as participating farmers needed to attend to some unforeseen cultural activities within the community. However, the farm visit

was concluded by noon. On this occasion, I raised further memo to complement what I found in the literature regarding the maturity period of pineapple fruits cultivated through suckers that were practically evidenced on the farmers' field.

#### 3.7.4 Semi-structured interviews

Interviewing is a type of qualitative research method in which I collect the data from participants through a question and answer process. It allows me to follow up questions by the probe (Robson, 1995). My choice of the semi-structured interview following Halloway (1997) allows me to focus on emerging issues to facilitate theory development via theoretical saturation of data. Also, Robson (2011) considered it to be an appropriate method for case studies where the researcher serves the dual role of an interviewer and a researcher as it is in this case. In the current study, I consider individual interview of the participants as a follow up to group discussions to explore specific opinions of the participants as well as generates a storyline that addresses a continuous individual experience (Duncan and Morgan, 1994). The combination of focus group and individual interview adds to the depth and breadth of the research (Morgan, 1996). My choice for this method of data collection allows for subsequent robust data analysis in a natural form. It also allows probes to grab a better understanding of farm practices, which eventually guides towards subsequent robust analysis (Bryman & Bell, 2019). Eleven interviews comprising of eight pineapple farmers, two extension officers and one research scientist were conducted at various times after the third focus group discussion depending on the convenience of the interviewees. However, the design of the questions for the research scientist differs from other participants as it focuses on issues arising from the focus group discussions that require clarification from the change agent (See appendix 5). Overall, all the interview questions irrespective of the interviewees explicitly focus on the research questions and objectives of the research (See appendices 4 and 5).

On this note, I conducted semi-structured interviews (depth interview) at each farmer's field while the extension workers and research scientist interview took place

at their demonstration plots to gain further insights into the technology adoption practices as well as gather knowledge and understanding of each participant about technology adoption practices without any influence on the data that can arise from other farmers/participants. An average individual interview session with farmers and extension workers took me forty minutes while that of research scientist was forty-five minutes. Thus, the cumulative number of hours on the individual interviews was seven hours twenty-five minutes.

Conclusively, on completion of each interview, I review the responses together with the interviewee for clarification and further analysis from the data pool.

### 3.6.1 Field Observation

Field observation is a useful means of measuring routine activities (Shoemaker , et al., 1992). Recording participants' action on the farm activities provided a direct indicator of farmers' activities within the farm setting. The combination of interviews and observation methods clarifies the variation in participants thoughts and actual farm practices. Apart from the focus group discussion and interview, I spent time on-farm plots before and after each focus group meeting date observing the tasks and processes of different pineapple farmers and their farm plots. While observing the process of farming practices, I try to get a better understanding of the various farming tasks by observing the farmers and the extension workers on their farming plots. I observed both processes and farming activities that were mentioned in the focus group discussion and interviews. I also look at processes and procedures that were against the discussion in the group or at the individual level — the field observation guides towards goals layout within the literature of the technology adoption and competitive advantage. The field observation also helps to determine the acceptance of farmers to adopt farming practices in conjunction with technology adoption. On this note, I organised three field visits to reconcile major farming activities during planting, weeding and harvesting periods.



The field visits to farmers plots were explicitly in July 2015, February 2016 and November 2016 while the field visit to extension workers and the research scientist plots were in November 2016. (See appendix 10 for pictures). Table 8 shows the summary of the farm field observation.

**Table 8: Field Observation Schedule**

<i>Stage</i>	<i>Farm Practices Observed</i>	<i>Period</i>	<i>Size of pineapple fruit (Kg)</i>
<i>One</i>	<i>Planting operations</i>	<i>One to six months</i>	<i>No fruit</i>
<i>Two</i>	<i>Weeding operations</i>	<i>Seven to twelve months</i>	<i>&lt; 1kg</i>
<i>Three</i>	<i>Harvesting</i>	<i>Thirteen to twenty-two months</i>	<i>1kg &lt;fruit size&lt;1.5kg</i>

Source: Compiled by the Researcher

I made field notes to reflect upon and explain meanings and processes, including identifying relationships between codes and categories, as well as providing a depth of understanding of the concepts (Strauss & Corbin , 1990). The field visits provide the farmer with the opportunity to show and explain aspects of farming practices that they felt is essential or otherwise. These visits also allow me to observe body language, such as facial expressions and gestures that could not have been captured just by explanation. In this regard, I write memos (appendix 11) to describe and explain relationships between concepts and categories as well as grouping them. I also photographed pineapple fields to serve as evidence in report writing. Pictures of the field observation before a focus group discussion on the scheduled date is shown in appendix 10

### 3.7.5 Memo Writing

Strauss & Corbin (1998) emphasise the use of memo as a data collection technique to enhance the quality of research and provide sound recording of ideas which allows

and encourages data amendment without bias. Corroborating their view, Lawrence & Tar (2013) affirm that memo writing creates an opportunity for researchers to maintain awareness of the interrelationship concerns that generate explanations for the emerging concepts.

*“Memos make it possible to record what you saw and why you saw it in the data” (Seldana and Omasta, 2017: p54).*

Memo writing is, therefore, an essential strategy for maintaining communication, consistency and interconnectedness regardless of the magnitude of the research (Belgrave & Seide , 2018).

In the course of my research, writing memo allows me to construct reality in practice (Birks and Mills, 2011). I recorded my opinions and ideas in the form of the memo as it generates from other data collection methods (See appendix 11). I employed the three types of memo writing as distinguished by Pandit, (1996) as an additional source of data collection throughout the research process. I used the code memo to establish the link between the data and the emerging constructs while the operational and theoretical memo guides me towards establishing the code memo. These categories of memos allow the current research to be embedded in the empirical reality and contributes to the trustworthiness of the research (Pandit , 1996). In practice, the code memo relates to aggregate dimension while operational and theoretical codes relate to the axial and selective coding, respectively. Overall, Table 9 shows the summary of the triangulation of data collection methods for the current study. Figure 11 illustrates the timelines of the data collection.

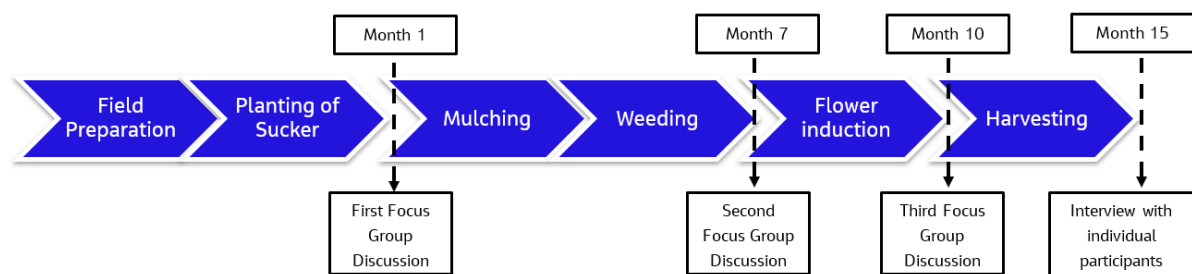
**Table 9: Summary of the methods of data collection**

Method	Venue	Activity	Participant	Type of question
Focus group meeting	Farmers Community	Three meetings <ul style="list-style-type: none"> <li>Planting Period</li> <li>Weeding period</li> <li>Harvesting</li> </ul>	Eight pineapple farmers Two extension agents	Open
Interview	Farmers various farm	One to one	Eight pineapple farmers Two extension agents One research scientist	Semi-structured
Observation	<ul style="list-style-type: none"> <li>various farm units</li> <li>research institute</li> </ul>	2 field observation <ul style="list-style-type: none"> <li>planting</li> <li>weeding</li> <li>harvesting</li> </ul>	Eight pineapple farmers Two extension agents	Observation
Memo	<ul style="list-style-type: none"> <li>community research</li> <li>institute research</li> </ul>	Various periods, depending on the emergence	Researcher	Open

Source: Compiled by the Researcher

The period for the process and activities timeline for data collection from the field preparation to harvesting was fifteen months, as illustrated in figure 11. A detailed transparent explanation of each level of activity and data collection procedure is described in the sections above.

**Figure11: Timelines for data collection**



### 3.8 Data Analysis

The analytical procedure in the current study follows the flexible guidelines and procedure for coding by Strauss and Corbin (1998). Hence, the study develops concepts from the responses of the participants and follows the storyline approach as recommended by Strauss and Corbin (1998). It also involves the simultaneous and iterative process between the data and different methods of collection to ascertain constant comparison between codes and categories. It is worth to note that the SGTM allows flexibility in the analytical procedure by allowing labelling concepts with similar names from other studies provided they share the same interpretations (Morse 2004). Morse (2004) emphatically affirms that labelling with similar constructs from past studies enhance the trustworthiness of the empirical data and confirms what is in the extant literature. Although there are different nomenclatures regarding coding and analysis in grounded theory as shown in table 10, my analytical process follows the procedure in the SGTM approach (See appendix 16)

**Table 10: Comparison of coding nomenclature in grounded theory**

<i>Approach</i>	<i>Coding Nomenclature</i>		
	<i>Initial /Concept</i>	<i>Intermediate/Subcategory</i>	<i>Advanced/Major Category</i>
<i>CGTM</i>	<i>Open</i>	<i>Selective</i>	<i>Theoretical</i>
<i>SGTM</i>	<i>Open</i>	<i>Axial</i>	<i>Selective</i>
<i>CGTM</i>	<i>Initial</i>	<i>Focused</i>	<i>Theoretical</i>

*Source: Adapted from Birks and Mills (2015)*

The following sections explain the analytical procedure and the stages of data analysis in this study.

#### 3.8.1 Open coding

The stage involves a process of conceptual labelling and categorisation of data about the adoption of farm practices. I started with verbatim transcription of the data collected from focus group discussions and individual interviews. Following this, I

immersed myself in the data by reading and understanding the transcript before coding. After immersion in the data, I established a line by line colour coding of the text through a comparison of the empirical data from the perception of the participants. I checked for differences as well as similarities in the original transcripts. Inductively, I identified the codes based on iterative processes of farmers' actions on the field rather than themes. I labelled the codes with an abstract representation of a unique but representative of conceptual similar empirical data from the transcript. My interpretation generated about one hundred and-two codes from the original transcript. At this point, I review all the identified codes to recapture them in a new but reduced number of codes to forty-five (see appendix 13) The categorisation of data leads to data reduction and allows for better data management (Strauss & Corbin , 1998 ). While I considered in vivo codes verbatim based on the concept or relevant concept in extant literature to avoid confusion, I categorise process codes that connote action interchangeably with their gerunds. The open coding process allows me to compare codes and intensify my sensitivity to the initial data collected. It also makes me ascertain the fitness of the data and the emergence of the key concepts with a clear indication of a direction for further analysis. Table 11 illustrates a sample of open coding from the extract of the focus group meetings (See Appendix 15)

**Table 11: An illustration of the open coding process<sup>(a)</sup>**

Research Question	Focus Group Question	Text ID	Line	Transcript	Line by line coding	Paragraph Coding
RQ1: How has farming practices enhance technology adoption in the production of pineapple fruits?	What do you understand about technology adoption practices in pineapple farming?	FFG F6	4-5	"Technology adoption is the incorporation of what is learnt from other farmers and extension agents to improve the production of pineapple production."	Learning from other farmers  Improvement in production	Learning
		FFG F5	12-13	"Technology adoption practices basically explains what routine to be carried out to improve the production of pineapple and when to do it."	Routine  Improvement in production	Learning
		FFG EA1	23-24	"Technology adoption is a process whereby farmers are encouraged to take up different technologies developed by Research Institute to improve both competitiveness of the product (pineapple) as well as improve means of livelihood of the farmers."	Improvement of competitiveness  Improvement of livelihood	Skills  Livelihood

<sup>(a)</sup>Kindly note that some of the codes here may not surface on the final code tree because of renaming or deletion during further analysis. FFG – First focus group; EA – Extension agent interview; F5 – Farmer 5.

Source: sample from open coding

### 3.8.2 Axial Coding

Axial coding builds on the process of open coding. This stage begins by transforming the empirical data into an abstract concept for clear guidance towards the emergence of theory (Birks and Mills, 2011). My choice of category code relies on either a choice among the established code or insertion of a valid code (Strauss & Corbin, 1998). Hence, I establish the critical linkage via the concepts under each category. Specifically, at this stage, I make an intensive interaction with the data by reassessing the meaning to get an assurance of what the data depicts. After gaining assurance on the data's picture, I link the major categories and subcategories to establish a connection via the paradigm model. Thus, I exposed the linkage among the categories by looking for answers to establish the structure and the process. Afterwards, I establish the relationship between categories and subcategories by examining what led to the occurrence of farm practices as well as the relationship of all the farm practices set of actions. At this point, I give further consideration to the conditions (context) for the strategy, intervening conditions, action strategy and outcomes of the action/interaction of the farming system practices. The answers from the categories of "why" exposes the structure while the answers about "how" I carry out the study exposes the process. For instance, the relationship of firm resources to adoption practices and the relationship of leaning to capability. Also, the hierarchy of codes in terms of sub and major categories indicates properties of the parent code tagged as a storyline. Finally, the outcome of the study exposes the consequences of activities in the process. Although, farm practices during the production cycle is a continuum, however, farm practices are time-specific such that the research specified the three distinct stages of planting, weeding and harvesting activities. Hence, the data was broken down into these stages to reflect the conditions associated with each production stage. The axial coding process, therefore, guided me towards data clustering and emerging data as well as enable me to build upon stage-wise processes that lead me towards developing a theory (Appendix 14). Table 12 illustrates a sample of linkage of sub-categories with the emerging categories at this stage of analysis.

**Table 12: Sample of axial coding**

<i>Research Question</i>	<i>Text ID</i>	<i>Subcategories</i>	<i>Emerged Category</i>
RQ1	FFG IF, SFG SFG FV FFGFV	Good Agricultural practices Farm Cultural practices Routine farming Practices	Cultural practices
	FFGFV IF	Systematic planting practices Planting of suckers Adjustment of planting spacing	Farming system
	TFGFV IF	Nutritional value Wholesomeness Pineapple size Climatic and weather condition	Quality
	IF,FFG,SFG, TFG, , FFGFV	Shared vision Values and Norms Cultural identity Collaborating	Community cohesion
	FFG, SFGFV, DOR	Collective action Integrity Trust in Change agent	Mutual relations
RQ2	FFG, SFG, TFG,FFGFV, SFGFV,TFGFV, EA	Individual Learning Collective learning Learning from mistakes Leaning from others	Learning
	DOR, TFGFV, IF	Training Workshops Collaboration in farming techniques	Skills



FFG- First Focus Group; SFG - Second Focus Group; TFG- Third Focus Group; FV – Field Visit; RS- Research Scientist; IF – Individual Farmer

Source: Data Analysis

### 3.8.3 Selective Coding

Glaser and Strauss (1967) emphasise that the stage of selective coding establishes a process of integrating categories to achieve either of the two purposes; build-up or refine a theory. The stage involves selecting a core category and checking for conceptual divergence. Specifically, my task at this stage is to link the sub and major categories from axial coding to a core category (theme) of the research. I identify the core category by examining the concept that frequently appeared in the empirical data. The integration of the core category is similar to the process in axial coding. However, I carry out the analysis at a more advanced level creating a higher level of abstraction linking the subcategories with the major category. The major categories form an explanatory factor about technology adoption practices which forms an analytical storyline about the research problem. I have used the techniques of a final architectural diagram and sorting via a memo to establish the relationship between axial and core category at this stage of data analysis to write a theoretical story (See figures 13 and 17 ). It follows an incursive process which stops when there is no further adjustment of major categories to validate the core category. The two storylines in this study provide an appropriate result grounded in the data to answer the research questions (Miles & Huberman , 1994). An illustration of how theoretical statements guides me towards establishing the core concept is demonstrated in table 13.

**Table 13: Sample of major categories and storyline**

<i>Research question</i>	<i>Source ID</i>	<i>Emerged category</i>	<i>Storyline</i>
RQ1	FFG, SFG, TFG, RS, FFGFV, IPI ,LR	<ul style="list-style-type: none"><li>• <i>Cultural practices</i></li><li>• <i>Farming system</i></li><li>• <i>Quality</i></li><li>• <i>Community cohesion</i></li><li>• <i>Mutual relations</i></li></ul>	<i>Attributing</i>
RQ2	TFG, TFGFV, Memo, RS, SFGFV, IPI, LR	<ul style="list-style-type: none"><li>• <i>Learning</i></li><li>• <i>Skills</i></li></ul>	<i>Reinforcing</i>

Source: Data analysis

FFG- First Focus Group; SFG - Second Focus Group; TFG- Third Focus Group; FV – Field Visit; RS- Research Scientist; IPI – Individual participant interview, LR – Literature Review

### **3.9 Evaluation of the trustworthiness of the research**

I consider the four trustworthiness criteria proposed by Guba and Lincoln (1994) to ascertain the robustness of the empirical data in the study.

#### **3.9.1 Credibility**

I allow and manage the collection of data from participants within a short time that was adequate for data collection. Furthermore, I allow the participants to check and confirm all empirical data collected before and after data analysis. At the subsequent focus group discussion, I review previous discussions with participants for confirmation before proceeding to the next focus group discussion. At each stage of the analysis, I allow the participants to confirm or revise the data.

Furthermore, I provide the transcripts to participants at each stage of the discussion and data collection. Accordingly, the product of analysis reflects the review or confirmation from the participants. The approach to the research counteracts biases by considering all significant stakeholders in the production of pineapple (farmers,

research scientists and knowledge transfer officers) as participants in the study rather than concentrating on one particular stakeholder and probing for further explanation when faced with inconsistencies in the focus group interview and using literature to back up the research findings. Furthermore, I allow an external check by my supervisor to ascertain the convergence of the interview contents, codes, concepts and categories.

### 3.9.2 Dependability

I record all the stages of data collection activities to reduce data interference and kept documentary evidence of field visit in a secured computer archive for the readers who might be interested in tracing the related research activities.

### 3.9.3 Confirmability

I provide detailed information on all the phases involved in the research process for scrutiny. In this regard, I provide a detailed data collection process as well as the procedure for data analysis and categorisation of codes and concepts.

### 3.9.4 Transferability

For the study to be transferable and applicable to a similar situation, I employ a theoretical sampling technique to achieve data saturation and compare the findings with the findings in previous closely related studies. However, the study has an interest in analytical generalisation rather than statistical generalisation. The grounded methodology employed allows constant comparison for assessment of data convergence towards the development of the theory. The choice of storyline approach also aligns with the expectation of the participants.

Reliability was strengthened in this research in several ways. First, it is a case study research. Secondly, there was an initial meeting with the community heads and technology transfer experts from NIHORT to have a general idea of the samples. Triangulation also supports the consistency and reliability of the data (Denzin , 2009 ). Table 14 describes the summary of the soundness and robustness of the case study selected for the current research study.

**Table 14: Robustness of the case method**

Criteria of soundness	How it was achieved in the study	Research stage when applied
<i>Construct validity</i>	<i>Use of multiple sources of evidence</i> <i>Chains of evidence from different data sources</i> <i>A sampling of key participants from the study area</i> <i>Participants review the case study report</i>	<i>Data collection</i> <i>Data collection</i> <i>Sampling procedure</i> <i>Report generation</i>
<i>Internal validity</i>	<i>Matching of patterns</i> <i>Building of explanations</i> <i>Addressing associated explanation</i>	<i>Data analysis</i> <i>Data analysis</i> <i>Data analysis</i>
<i>External validity</i>	<i>Relating the core category to the theory of competitive advantage</i>	<i>Research design and data analysis</i>
<i>Reliability</i>	<i>Followed the case study protocol</i>	<i>Data collection</i>

Source: Adapted from (Yin , 2003 )

### 3.10 Ethical Consideration

My role is strictly that of an investigator without any bias to influence the outcome of the study. Also, I interviewed in the native language (Yoruba) of the participants to develop trust and guide against communication barriers among participants and myself (Easterby-Smith and Prieto 2008). Furthermore, I employ triangulation methods to ensure consistency of data.

The research followed the strict guidelines and guidance instruments of the University of Huddersfield ethical research committee. All the interviewees were requested to sign a declaration form indicating their interest in participating in the research (see appendix 7). Besides, I followed the University of Huddersfield ethical validation process, which ensures research conformity to an acceptable standard. It ensures that the research materials are not sensitive, discriminatory or inappropriate.

In this regard, it ensures that the research design is sufficiently well-grounded such that it does not allow waste of time of the participants during the data collection process. After satisfying all the requirements and criteria of the ethics committee, the committee granted permission to proceed with the fieldwork. The ethics approval indicates the purpose of the research study and emphasises that information provided remain confidential. Another emphasis was on exclusive usage for the study purpose. Hence, I reassure the participants that the data collected will be treated with confidentiality and anonymity of the participants involved in the study. All the focus group discussions and interviews commenced only after each participant agreed to participate.

### **3.11 Conclusion**

The chapter begins with the philosophical position of the research design with a justification for the choice of the grounded theory methodology embedded in a case study research. It further demonstrates the different approaches to grounded theory methodology with the reasons for leaning towards Straussian grounded theory methodology. Furthermore, the data collection methods offer a transparent explanation of the cycles and timeliness of data collection from the participants. The chapter concluded with the procedure for data analysis coupled with ethical considerations for the research study.

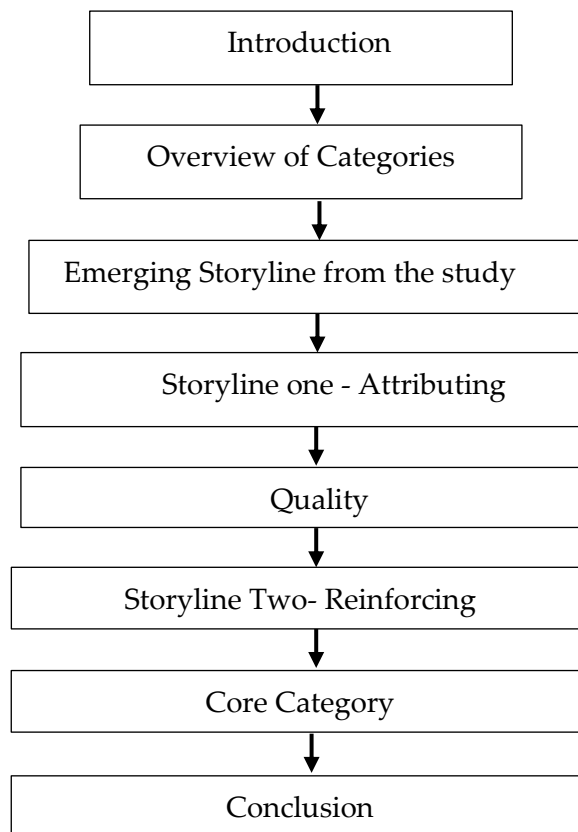
The next chapter will examine and discuss a detailed data analysis and findings from the research study.

## CHAPTER FOUR – DATA ANALYSIS AND FINDINGS

### 4.0 Introduction

Chapter four is structured as follows in Figure 12

**Figure 12: Structure of Chapter four**



The chapter presents the data analysis and findings from the study as guided by the Straussian grounded theory methodology. The emergent theory grounded in the data reflects the perception of participants from different sources of data collection. Section one gives an overview of the different categories, while section two describes the emerging storylines from the study. The third part of the chapter gives an extensive data analysis of the first major category, followed by the second major category in section four. Section five explains the embeddedness of the core category, followed by a summary of findings in section six. A summary/concluding section wrapped up the chapter.

#### **4.1 Overview of the Categories**

The study builds on a constant iterative process of the findings from the data to develop a storyline. The storyline approach allows the in-depth description of the sub and major categories to discover the theory. The process of engaging technology adoption through farm practices represent the overarching outcome of the study. Farmers' understanding of technology adoption practices gives insights to both attributing and reinforcing factors critical to the creation of competitive advantage among Ejigbo pineapple farmers.

The empirical data generated two major categories and one core category. Collectively, the two major categories (attributing and reinforcing) indicate the process of how farming practices enhance technology adoption among pineapple farmers. The core category (engaging technology adoption through farm practices) connects both attributing and reinforcing subcategories to explain how the adoption of farm practices leads to competitive advantage. In line with Charmaz (2014) submission on grounded methodology, the carrying capacity of the core category in the current research reflects the contextual, theoretical concepts. Thus, the core category guides both the analytical and explanatory power of the concepts (Corbin and Strauss, 2015). Therefore, the core category of engaging technology adoption through farm practices give insights to the research questions by aligning the subcategories to give explanations to the storylines.

Following the Strauss and Corbin (1998) guideline, the coding process went through the three stages of coding (open, axial and selective). The data analysis begins with open coding that generates about one hundred and two conceptual categories. The process of axial coding which involves data observation comparison serves as a follow up to open coding to detect the relationship between the conceptual categories while the selective coding process integrates the major categories to validate the emerging theory of engaging technology adoption through farm practices. Table 15 presents an alphabetical order of the rigorous coding process in the study.



**Table 15: Coding Process**

Code Names	Code ID	Code Alignment	Category
Accountability for Actions	056	SC4	MC2
Achievement of Farmers	030	SC4	MC2
Action of Competition	065	SC4	MC2
Adoption Practices	026	SC5	MC2
Alignment of Ideas	053	SC4	MC2
Association Membership	050	SC4	MC2
Calendaring Objectives	100	SC1	MC1
Change Agent	037	SC5	MC2
Cohesion	048	SC4	MC2
Collaboration	080	SC5	MC2
Collective Actions	052	SC4	MC2
Collective Learning	024	SC6	MC2
Commitment	049	SC3	MC1
Communication	061	SC4	MC2
Competitiveness	046	SC4, SC6	MC2
Consumer Preference	066	SC2	MC1
Continuous Learning	102	SC6	MC2
Core Farming Activities	067	SC1	MC1
Creativity	017	SC7	MC2
Culture	068	SC1	MC1
Cultural Identity	092	SC1	MC1
Domestic Trade	039	SC4	MC2
Economic Situation	070	SC3	MC1
Education	005	SC7	MC2
Exchange of Ideas	058	SC4	MC2
Experience	020	SC6	MC2
Experiential Learning	087	SC6	MC2
Exploitation Learning	036	SC6	MC2
Exploration Learning	035	SC6	MC2
Farm Capability	071	SC6	MC2
Farm Management Practices	001	SC1	MC1
Farmers Mindset	012	SC3	MC1
Farmers Objectives	084	SC2	MC1
Farmers Training	095	SC7	MC2
Farming system	082	SC2	MC1
Farming Techniques	064	SC5	MC2
Flexibility	045	SC4	MC2
Focussed Results	054	SC4	MC2
Goal Attainment	060	SC3	MC1
Good Agricultural Practice	009	SC1	MC1
Government Support	006	SC5	MC2
Government Settlement	058	SC4	MC2



Group Decision	059	SC4	MC2
Group Learning	101	SC6	MC2
Group Participation	062	SC4	MC2
Government Policy	069	SC5	MC2
High Cost of Planting Materials	034	SC2	MC1
Human Resources	025	SC1	MC1
Incompetence of Leaders	031	SC4	MC2
Individual Learning	073	SC6	MC2
Innovation	022	SC7	MC2
Insecurity of Leaders	044	SC4	MC2
Integration of Farmers	081	SC4	MC2
Integrity	089	SC3	MC1
Intensity of Competition	077	SC3	MC1
Improved Planting Material	041	SC2	MC1
Knowledge Generation	043	SC7	MC2
Lack of Information	010	SC5	MC2
Labour Management	072	SC2	MC1
Labour Shortage	013	SC2	MC1
Leadership Competence	063	SC4	MC2
Leadership of Farmers	029	SC4	MC2
Learning	004	SC6	MC2
Learning from Mistake	096	SC6	MC2
Learning from Practice	094	SC6	MC2
Limited Access to Resources	023	SC1	MC1
Mindset	051	SC3	MC1
Motivation of Farmers	040	SC4	MC2
Mutual Relations	086	SC5	MC2
Natural Endowment	076	SC2	MC1
Natural Resources	007	SC1	MC1
Negative Learning	008	SC6	MC2
Norms	032	SC1	MC1
Organisational Change	015	SC4	MC2
Physical Resources	024	SC1	MC1
Pineapple Spacing	042	SC1	MC1
Planting Materials Shortage	014	SC2	MC1
Process Quality	078	SC2	MC1
Product Quality	079	SC2	MC1
Production Purpose	090	SC1	MC1
Projected Outcome	055	SC4	MC2
Qualifiers	098	SC1, SC2, SC3	MC1
Quality	003	SC2	MC1
Responsibility of Actions	057	SC4	MC2
Routine Practices	002	SC1	MC1
Scientific Mechanism	016	SC3	MC1
Sense of Mission	093	SC3	MC1

Shared Values	047	SC4	MC2
Size	018	SC2	MC1
Skills	028	SC7	MC2
Subsidy	011	SC5	MC2
Subsistence Production	091	SC1	MC1
Technological Change	085	SC7	MC2
Technology	075	SC2	MC1
Timing	038	SC2	MC1
Training	021	SC7	MC2
Uniqueness of Fruit	019	SC2	MC1
Values	033	SC1	MC1
Value Creation	097	SC2	MC1
Vocational Skills	088	SC7	MC2
Winners	099	SC4, SC5, SC6, SC7	MC2
Wholesomeness	083	SC2	MC2

- SC1: Sub-category 1
- SC2: Sub-category 2
- SC3: Sub-category 3
- SC4: Sub-category 4
- SC5: Sub-category 5
- SC6: Sub-category 6
- SC7: Sub-category 7
- MC1: Major category 1
- MC2: Major category 2
-  Denotes all codes leading to MC1
-  Denotes all codes leading to MC2

Overall, the attributing category (MC1) consists of three subcategories which include; farming system, quality, and farmers' objective, whereas the reinforcing category (MC2) connects with cohesion, mutual relationship, learning and skills development subcategories.

## 4.2 Emerging Storylines from the study

The current research considers an emerging storyline as the aggregate dimension that interprets the empirical data. The storyline guides me to develop the core category which integrates and strengthen the theory of engaging technology adoption through farm practices. The storyline explains the research questions and validates the emerged categories that generate from raw data among participants. Quotes and excerpts from the research study present the justification for the categories. Linked concepts with closely related meanings are formed into categories which I grouped into various aggregate dimensions explaining the story. Two selective aggregate dimensions emerged from the research study. Each selective aggregate dimension explains the links between the relevant subcategories and related concepts from the participants. The selective aggregate dimensions are grounded in the concepts in explaining the engagement of technology adoption through farm practices. Table 16 provides the selective coding semantics while the transcript of the focus group discussions and the interviews are presented in appendices 18-22)

**Table 16: Selective Coding and Semantics**

Research Question	Selective aggregate Dimension	Definition	Semantic Description
How has farming practices enhanced technology adoption in the production	Attributing	<p><i>A distinctive attribute of pineapple. The degree of excellence or superiority of pineapple fruits. It has a direct relationship with values to both farmers and consumers.</i></p> <p><i>The general motivating factor for the production of pineapple.</i></p>	<i>Meeting consumers' expectations, increased the production of pineapple, safe to consume, production reliability, completeness, homogeneity.</i>

Research Question	Selective aggregate Dimension	Definition	Semantic Description
of pineapple fruits?		<p><i>The minimum attribute expected from a product for customers to consider its purchase</i></p> <p><i>The competitive standards that make a farmer consider the production of pineapple as a means of livelihood. These are characteristics that other neighbouring farmers also possess.</i></p>	<p><i>Weather. Vegetation, Land area resources are the source of a firm's capabilities,</i></p> <p><i>The set of norms, values and beliefs shared by a group of pineapple farmers with reference and emphasis on the adoption of technology for increased pineapple production. The glue that holds a community together. The state of togetherness among farmers or in the community, with similar work-life patterns and a shared vision and values</i></p>
	Reinforcing	<p><i>Complementing capabilities of technology adoption practices. Additional capability imbibed by pineapple farmers that sets the product to be unique. It serves as the unique factor for competitive advantage</i></p> <p><i>Organisational capabilities are the supporting source of competitive advantage.</i></p>	<p><i>Acquisition of knowledge and skill from actions, seeing or feeling that enable farmers to comprehend and navigate through pineapple production practice. Learning experiences are indications and effect of learning intervention in the context of desired end goals by the pineapple farmers and outcomes within the farming community. In this context, the experience is much more than what has traditionally been transferred to farmers by external agents.</i></p> <p><i>Learning from other farmers, Learning from research institute's extension agents, Learning from practice, learning from mistakes, learning from the past. Training of farmers. Collaboration in farming techniques. Collective action.</i></p> <p><i>Social connectedness, quality of life levels of confidence in other farmers, level of support, Existence of joint farmers' plot.</i></p>
	Practices	<i>Regular performance of activities to acquire skills or proficiency to achieve competitive advantage.</i>	<i>Traditional process, convention, experience pursuit of farming established</i>

Research Question	Selective aggregate Dimension	Definition	Semantic Description
			<i>method, follow the prescribed procedure. Technology capability, learning capability</i>

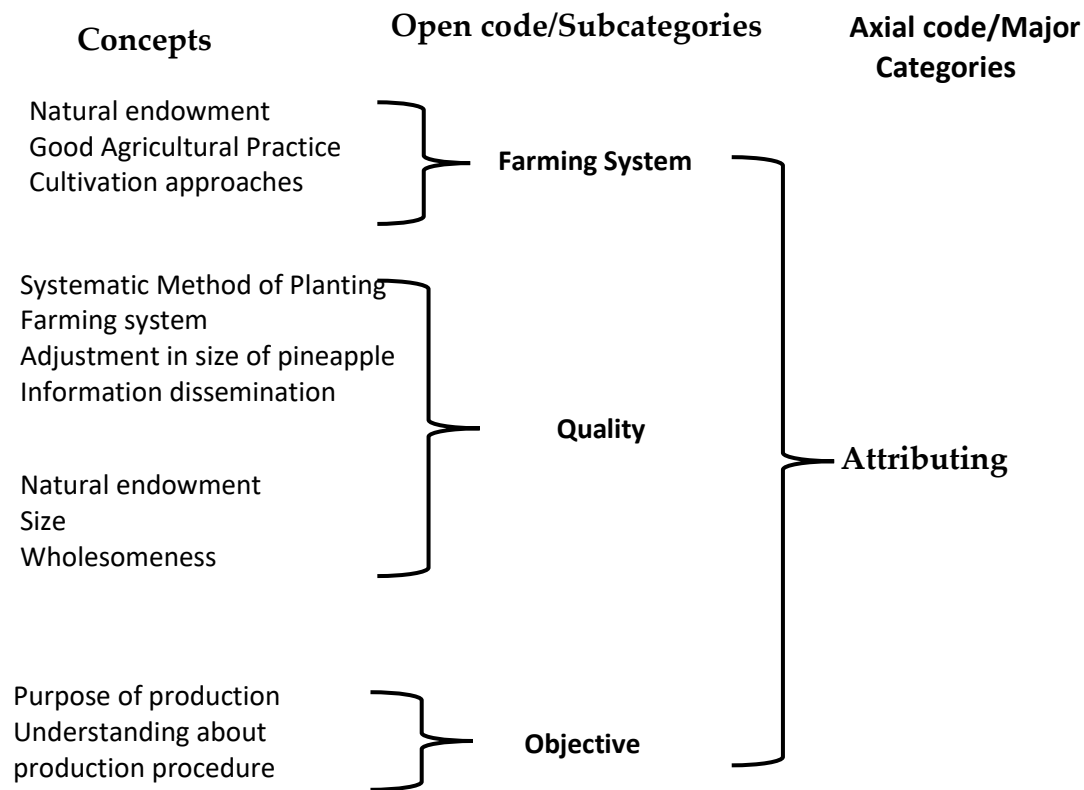
Source: From Research Survey

The following sections present a detailed analysis of the findings from the study.

### 4.3 Storyline one – Attributing

Attributing is one of the two major categories that emerge from the study. It comprises of three subcategories of farming system, quality and farmer's objective. The farming system subcategory developed from three concepts which include natural endowment, good agricultural practice and cultivation approaches. The second subcategory (quality) has three dimensions which comprise of fruit uniqueness, fruit size and wholesomeness. The third subcategory of attributing is the objective of the farmer, which comprise of two concepts viz farmers mindset and production procedure. Figure 13 illustrates the summary of the connections of the subcategories with the major category 1. The subsections following Figure 13 explain how the data is grounded in explaining the connections of the concepts with the subcategories of attributing.

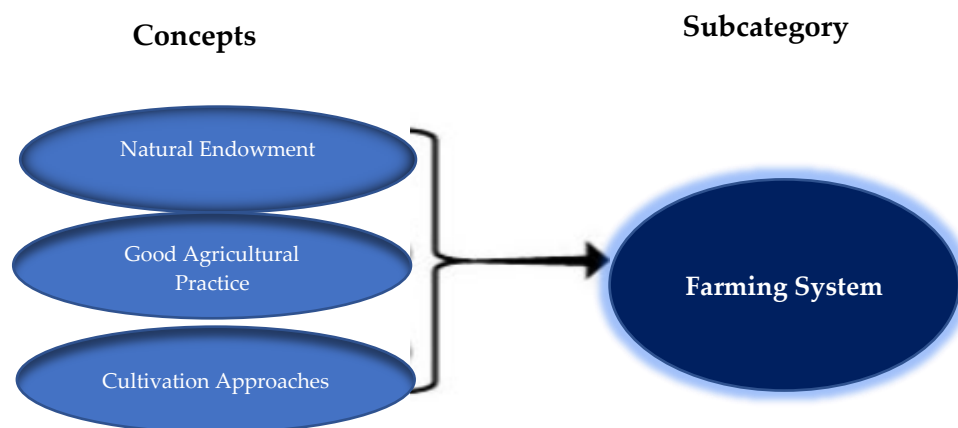
**Figure 13: Connections of the concepts with the subcategories of attributing.**



#### 4.3.1 Farming system

The discussion in this subsection provides a partial explanation to research question one. The question of why farmers prefer to cultivate pineapple, among other crops generates a lot of information and eighteen initial codes. The initial codes were reduced and categorised to three based on the similarity of ideas and concepts. The concepts of natural endowment, good agricultural practice and cultivation approaches give insights to farming system subcategory.

**Figure 14: Farming System as a subcategory of Attributing**



Source: From the Research Study

#### 4.3.2 Natural Endowment

Empirical evidence from the focus group discussions, individual interviews and field observations reflects how natural endowment such as favourable climatic and weather conditions in the community enhance cultivation of pineapple fruits. Majority of the participants identify “resources” as a tool of competitiveness. However, resources in literature have different classifications depending on the subject of the reference. For instance, Barney (1991) with a background in management view resource in terms of physical, human or organisational whereas Dominati et al. (2019) emphasised on just natural resources referred to as natural endowment in agriculture. Shreds of evidence substantiating the relevance of natural resource as a strategic resource in the study are highlighted in the excerpts below:

*“Both physical and human resources have helped to give us an advantage over other farmers in the neighbourhood... Ejigbo climate has been favourable for growing pineapple...” (IF1)*

*“The strength in planting pineapple in this community is the natural endowment of good climate/weather suitable for the cultivation of pineapple”. (IEA2)*

*“Technology adoption practices by pineapple farmers is unique to pineapple farmers in Ejigbo because of another factor such as natural endowment. The resource is, therefore, not substitutable. (RS)*

*“Natural endowment and location of Ejigbo within the geographical zone of Nigerians our major strength. Ejigbo is also close to a lot of Research Institutes in Ibadan. The farmers have access to information from research Institutes and the media (radio and television).” (IF6Q4)*

*“What has given an advantage to Ejigbo pineapple also improve the quality and value of the fruits. These resources give access to improved planting materials (Suckers) from NIHORT; Access to information necessary to improve yield; Natural/geographical location of Ejigbo; Availability of skilled labour although not sufficient; Road network to the farm; The interest of young, educated farmers in production and marketing of pineapple.” (IF8Q4)*

Although, there are pieces of evidence from the study that justifies natural endowment as a strategic resource; however, the finding in this regard must be interpreted with caution as there are different perception to resources. Nevertheless, the finding still provides some insight regarding the relevance and contribution of the natural endowment of resources in enhancing the adoption of farm practices in Ejigbo.

Teece (2007) maintained that the use of traditional resources in determining competitive advantage is necessary to establish sustained superior performance in a changing environment. Therefore, organisational or community success depends on the adequate utilisation of both traditional and natural resources. In this regard, the attributive dimension to understanding the competitive advantage draws from the theoretical understanding of the resource-based view (RBV). Based on the RBV, technology adoption practice is regarded as a strategic resource that contributes to competitive advantage in the production of pineapple fruits. On the question of “What are the resources that give a competitive advantage to pineapple fruit production in Ejigbo community”. Empirical evidence from different sources shows that both farmers and researchers recognise the relevance of resources as sources of competitive advantage in the production of pineapple fruits.

The finding is consistent with the assertion of Mugeru (2012) that farms with natural endowment are economically productive such that they can compete in the market.



Also, the finding indicates that natural endowment is a motivating factor for farmers' consideration for the cultivation of pineapple in Ejigbo.

#### 4.3.3 Good Agricultural Practice

The data concepts indicate that good agricultural practices include the application of knowledge and experience of farmers to influence the production of pineapple fruits. Participants identify good agricultural practices as a key ingredient that supports the enhancement of pineapple production. Participants describe good agricultural practices as the adoption of the variety introduced by change organisation as well as the associated practices. The response of IF4 on what the participants understand by technology adoption practices in agriculture (see appendix 18) generates insights into the importance of good agricultural practices in enhancing the production of pineapple. This is evident from the empirical data and observation of the farmers' field. The discussion on-farm practices at the first focus group meeting gave an insight into the perception of the participants on good agricultural practice and its impact on the production of pineapple. The excerpts below present a useful explanation towards answering the research question one. It also confirms the linkage point between a good farming system as a contributor to attributes

*"The practices involved in the technology adoption process are numerous ranging from the selection of planting materials, planting of planting materials, spacing, weeding, application of herbicides, fertilisers and flower induction is leading to harvesting and marketing. All these operations involve **good practices that could enhance and improve the production of pineapple.**" (FFGEA1)*

*"Good practices include doing what the research institute recommends at each operational level. It includes both experience and learning from other farmers." (EA1)*

*"Anyway, to me, good practices incorporate what is expected as routine farm operations by the farmers from planting of suckers/planting materials till harvesting. It also includes post-harvest expected routine practices, including marketing or trade of the commodity. It is holistic – involving all aspects of the pineapple supply chain. A good practice is an integral of "good agricultural practice (GAP) identified and emphasised by food and agricultural organisation*

*(FAO). In this context, GAP has different meanings –it is holistic – involving all aspect of learning and transfer of knowledge on the pineapple supply chain.” (EA2)*

The assertiveness of good practice was further emphasised at the individual level of farmers’ interview to corroborate the relevance of good planting material and the process of planting. Specifically, IF8 in the excerpt below mentioned the relevance of good planting material from the smooth cayenne variety as an excellent agricultural practice that enhances technology adoption practice

*“I also consider the planting material from the variety as a good practice. The older farmers that are conservative has always maintained to plant the crown. Nowadays, planting suckers leads to early maturity and saves time.” (IF8)*

Furthermore, an excerpt of a memo that emanated from the field visit of the farmers’ plots contributed to the consistency of investigation on good practices as claimed by participants.

*“It is evident from the first field observation that the adopters have a well-defined farm layout that embraces good farming practices which incorporates both the technical inter-row spacing as well as the planting of suckers as pointed out in the first focus group discussion.” (Memo 1)*

The findings on good agricultural practices indicate that pineapple farmers realised the advantage of the adoption of the planting of suckers and incorporation of associated practices to ensure proper practices at the weeding and harvesting stages. This suggests that both factors, in no small extent, encourage the farmers to foresee a potential increase in the yield which eventually contributes to competitive advantage. Also, incorporating good agricultural practices will, to a large extent, improve the farmers’ income and subsequently means of livelihood. It should be noted that the participants’ view of good agricultural practices deviates from the standard norm of good agricultural practice. The finding is still relevant because participants link the principle and concept of the enhancement of technology adoption practice. However, it should be clear that good agricultural practice entails a guideline for the operational management of farm produce from planting to harvesting stage and beyond. The

finding in this category aligns with the conclusion of Lubis et al. (2014) on the productivity of pineapple in West Java, Indonesia. Although the study by Lubis et al. was based in Indonesia, evidence from the current study aligns with their conclusion that good agricultural practices enhance crop production.

#### *4.3.3.1 Approach to Cultivation*

The discussion on what constitutes adoption practices generates many insights towards understanding the concept. Participants identify that right planting method guides towards healthy pineapple fruits at maturity. Some participants identify the systematic method of planting, while others referred to it as a scientific method of planting. Reduction of the gestation period and adjustment of the size of pineapple fruits were identified as the actual technology transferred to farmers. However, the farmers, based on their experience, found out that technology cannot work well without complementing it with appropriate farm practices. The data shows that farmers in Ejigbo have a defined farming system approach based on associated farm practices which in turn leads to the improvement in the quality of fruits produced. For instance, some participants stated the relevance of farming practices in achieving a high-quality product. The excerpts below from different sources of data collection attest to the importance of farming practices as a contributory factor enhancing the production of pineapple.

*“NIHORT also came up with the selection of improved planting material through suckers as against the old method of propagation through slips and crowns. The advantage is that time of gestation is reduced from twenty-two months to sixteen months; quality is improved, the yield is improved provided other management practices such as weeding, de-suckering are carried out as at when due.” (IEA2)*

*“Farming practices in the production of pineapple include practices from the production stage to marketing. The practise starts with the selection of planting material, e.g. the old method of planting material is the use of a crown or slip, whereas the new method is the planting of suckers. Land preparation could be a single row, double row or triple row, the one recommended is a single row (60cm x 60cm), and selection of variety is another practice transferred by NIHORT.*

*Smooth Cayenne is recommended rather than other variety that was being planted before now.”*  
(IF2)

*“Farming practices associated to technology adoption starts from the selection of the site for pineapple production through a selection of the variety which is the actual technology transferred to farmers to the selection of the planning material, weeding/management practices to the harvesting and marketing practices are cutting across the supply chain process.”* (IEA2)

*“I adopt practices like the selection of good planting materials (Suckers) and management practices to increase both my income and output. Management practices include weeding and chemical application.”* (IF3)

*“I make sure that activities/practices like good planting calendar is maintained starting from the method of planting, weeding, ripening with the use of chemicals.”* (IF4)

*“From the onset of planting pineapples, I consider the topography of the land, which is essential. A sloppy topographic is not always good for pineapple cultivation; rather a flat topography is better. Also, the variety to be planted is equally important; the old variety takes a longer time to maturity. Weeding and timely application of pesticides are also important.”* (IF7)

The excerpts above validate the importance of the farming system to the production of high-quality pineapple fruits. Expressly, IF3 affirms that management practices such as the selection of right planting materials (Suckers) coupled with farming practices such as weeding increase output, which eventually translates to increased income. Also, from the response from IF4, it indicates that the timing of operations and keeping an excellent calendar of management practices ranging from planting to harvesting in the production process enhance the quality of fruits produced. As part of the consideration to achieve high-quality fruits, IF7 gives credence to the topography of the land and the variety to be planted. It is part of the farming practice to consider a flat topography rather than a sloppy topography to avoid leaching.

The range of perceived and potential characteristics that farmers expected from nature to justify their continuous production of pineapple varies among farmers. However, it is consistent to note that all the participants acknowledge the need for adoption of technology through strengthening routine farming practices. The pineapple farmers

talked about the importance of attributes of pineapple, such as the good agricultural practice and routine farming practices. In literature, resource capability indicates the relevance of traditional farming practices as a guide to success in overall production.

Some of the evidence substantiating the resource-based theory of competitive advantage in the study are highlighted below:

*“Technology adoption practices involve the routine practices carried out from the planting stage of pineapple to the harvesting stage; it incorporates weeding, application of fertilisers, herbicides and other routine practices.” It is very relevant to horticulture concerning pineapple production because it improves the quality of pineapple fruit, thereby increasing the premium attached to the sales of the fruit.” (FFGF1)*

*“In my opinion, technology adoption practices can be loosely defined to include both routine and non-routine farm management that are supported by the institute to achieve improved production level regarding quality and competitive nature..... It includes both physical and non-physical resource skills methods, experience. Technology adoption practices should include dissemination and application of modern practices at the farm level.” (IRS)*

Pineapple farmers and other participants indicated that routine farm activities are an integral portion of the farming system which support them to achieve improved yield and fruit production. The routine farm practices cut across land preparation for the harvesting of fruits. Establishing and incorporating the recommended practices enhance the production of pineapple fruit

*“NIHORT also came up with the selection of improved planting material through suckers as against the old method of propagation through slips and crowns. The advantage is that time of gestation is reduced from twenty-two months to sixteen months; quality is improved, the yield is improved provided other management practices such as weeding, de-suckering are carried out as at when due.” (IEA2)*

*“In my opinion, technology adoption practices can be loosely defined to include both routine and non-routine farm management that are supported by the institute to achieve improved production level regarding quality and competitive nature..... In essence, it includes both physical and non-physical resource skills methods, experience. Technology adoption practices should include dissemination and application of modern practices at the farm level.” (IRS)*

*"I make sure that activities/practices like good planting calendar is maintained starting from the method of planting, weeding, ripening with the use of chemicals." (IF4)*

*"From the onset of planting pineapples, I consider the topography of the land, which is essential. A sloppy topographic is not always good for pineapple cultivation; rather a flat topography is better. Also, the variety to be planted is equally important; the old variety takes a longer time to maturity. Weeding and timely application of pesticides are also important." (IF7)*

The excerpts from the empirical data indicated that pineapple farmers closely link the quality of the output to the routine operation and activities of the farm practices. Evidence from the field shows that sound output is a result of good farming practices coupled with routine farm activities.

Regarding pineapple production, Chaun et al., (2014) find out that majority of the pineapple farmers in Manipur Village, India did not adopt the recommended farming practices, the study suggests that extension workers should give attention to the missing gaps. The finding implies that pineapple farmers in the district could not achieve the expected yield from the assumed total adoption of the package. Similar finding on the adoption of improved practices of mango production in Muzzaffarnagar district of Uttar Pradesh in India confirms that technology adoption includes the adoption of both the technology and the associated farm practices. The finding from this study integrates and conforms with the study from the two districts in India, indicating consistency in the data gathering.

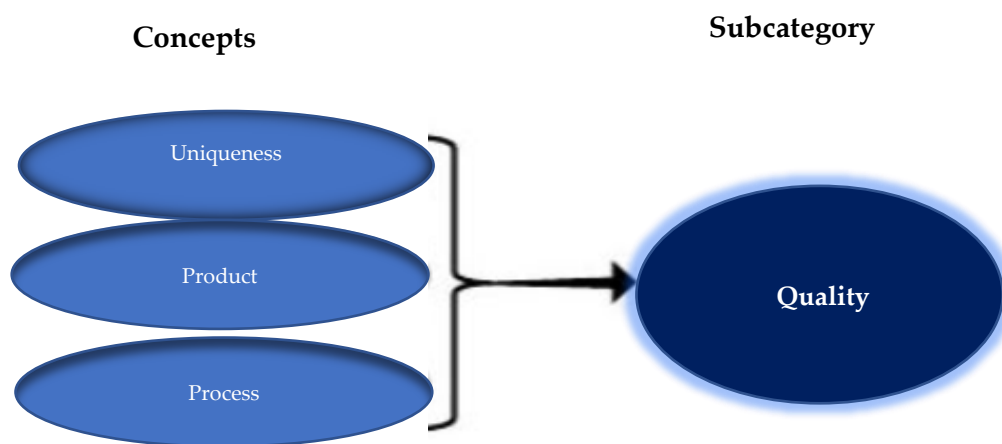
#### **4.4 Quality**

The discussion in this subsection provides a partial explanation to research question one. The second focus group discussion and part of the third focus group discussion give insight to participants 'perception about fruit quality and its determinants. Further exploration of the concept in the subsequent individual interviews exposed the relationship between the emerged concepts and product. The initial codes were reduced and categorised to three from twenty-two based on the similarity of ideas and

concepts (Table 4-2). The concepts of crop uniqueness, product quality and process quality give insights to the quality subcategory.

The product quality subcategory is the features of the fruit that participants considered as motivating factors enhancing the cultivation of pineapple. The quality of pineapple is a peculiar characteristic that farmers perceive to have motivated them and enhance the production of pineapple. The array of characteristics that have contributed to quality dimension overlap from similar constructs from the empirical data rather than grouping text of a similar response. However, empirical data varies according to the type of participants, and the factors considered relevant to enhance the quality of pineapple fruits production. [Figure 15](#) illustrates the relationship between the concepts and product quality subcategory. The following sections present the linkage of the contents of product quality in an array of uniqueness, product quality and process quality.

**Figure 15: Fruit quality as a subcategory of attributing**



Source: From the Research Study

#### *4.4.1.1 Uniqueness*

The discussion in this subsection reveals an understanding of the uniqueness of pineapple fruit. The findings provide evidence from the study that explains the relevance of uniqueness of pineapple fruit towards the enhancement of pineapple production. For further exploration and clarity on the quality of pineapple produced

in the community, the first focus group discussion on the resources that give an advantage to pineapple fruit production in Ejigbo community was extended as part of the question for the individual interview of participants. There was a shred of consistent evidence that the participants attest to the uniqueness of the fruit and unique location of the farm. Majority of the respondents gave credence to the output in terms of big fruit size. Table 17 shows a convergence of construct on the uniqueness of pineapple fruit from different participants and different data sources.

**Table 17: Theoretical Construct on Uniqueness**

Source of data	Interview question in the context	Empirical Observation	Theoretical Construct
IF Q4	What are the resources that give an advantage to pineapple fruit production in Ejigbo community	IF7 "Pineapple fruit in Ejigbo has always been known for its <b>outstanding quality fruits</b> based on the juicy content, big size and good soil and climatic conditions."	Uniqueness
		IF2 "The quality of our pineapple fruit from Ejigbo is <b>unique</b> . The flexibility of ideas in cultivation and unique location which is supported by natural and physical resources such as climate, weather, labour availability, nearness to the research centre, market road network serves as the advantages."	Uniqueness
		IF1 "Both physical and human resources have helped to give us an advantage over other farmers in the neighbourhood. The attitude of pineapple farmers towards adopting new technology has been a great advantage for Ejigbo farmers. <b>Ejigbo climate has been favourable for growing pineapple...</b> "	Uniqueness
		IEA2: "The strength in planting pineapple in this community is the natural endowment of good climate/weather suitable for the cultivation of pineapple. Also, the majority of the farmers are always ready to improve production by learning from the experience of other farmers."	Uniqueness
		IF5 "The quality of pineapple fruit in Ejigbo soil is <b>outstanding</b> . The output has a big size of a pineapple, the juicy part is more compared to the other variety, the sugar content is moderate and less of pines referred to as "alatike".	Uniqueness
		FFGF7; "Pineapples from our soil is always sweet and juicy with a lot of sugar content."	Uniqueness
		TFGF1: "Pineapples are used locally to treat some ailment including prevention of colds and coughs and lowers the risk of macular	Uniqueness



Source of data	Interview question in the context	Empirical Observation	Theoretical Construct
		<i>degeneration. For this reason, the juice in Ejigbo pineapple fruit is high in vitamins and ..... Thus, consumers prefer our pineapple fruits to others."</i>	

Source: From Research Survey

#### 4.4.1.2 Product Quality

The first focus group discussion on the importance of technology adoption practice in pineapple farming gives insight into the linkage between adoption practices and the quality of the fruit. Farmers understand that adjustment of pineapple sizes through adoption practices improves the quality of the matured fruit. Evidence from the discussion indicates that adoption of practices improves the quality of the fruit. The excerpt from FFGF8 justifies the perception of farmers regarding the link between adoption practices and quality.

*"Hmmmmmm.... Adoption of practices improves the quality of pineapple produced as well as adjustment of size to suit consumers' market requirement."* (FFGF8)

*"By good quality, I mean that Ejigbo pineapple is very juicy with a high level of vitamins, big size compared to other pineapples in other communities."* (TFG F2)

*"The technology transferred to farmers appeared to be unique as it is designed from the research Institute (NIHORT), creating value for the quality of pineapple produced."* (EA2)

The quotes suggest that the strategy of TAP differentiates and add value to improve the quality of pineapple produced in Ejigbo. It partly explains the research question one of how TAP enhances the production of pineapple. The finding conforms to the study by Reed et al. (2000) where they argue that differentiation strategy enhances the quality of products such that quality management leads the organisation towards competitive advantage. Also, Zhou et al. (2009) in their study on market orientation, competitive advantage, and performance found out that creation of value leads to

competitive advantage. These studies consider the achievement of competitive advantage through differentiation strategy as applied in the current study.

#### 4.4.1.3 Process Quality

TAP involves a process. Farmers understand that not incorporating all the necessary adoption practices leads to fruit production of varying sizes. One of the farmers confirms that not following the procedure and process of adoption leads to the production of poor-quality fruits.

*“If you do the right thing, you are likely going to get the right outcome. If I follow all the procedure and practices necessary for the adoption of Smooth Cayenne, then I will come up with pineapple fruits that are of good quality.” (IF1Q7)*

The process of achieving high-quality fruit through the production process conforms with the definition of Grant (1991) and Eisenhardt and Schoonhoven (1996) on resources as production process inputs (farming and management practices) that can be converted into final products to enhance the quality of the output (Pineapple).

The findings conform to the findings of Molina-Azorin et al. (2015) that quality permits the improvement of competitive advantage regarding both costs and differentiation. From the empirical data, it is evident that consumers have some level of expectation regarding pineapple fruits. Their expectation relates to the quality of the fruit. In the third focus group discussion, participants define what good quality of pineapple should be.

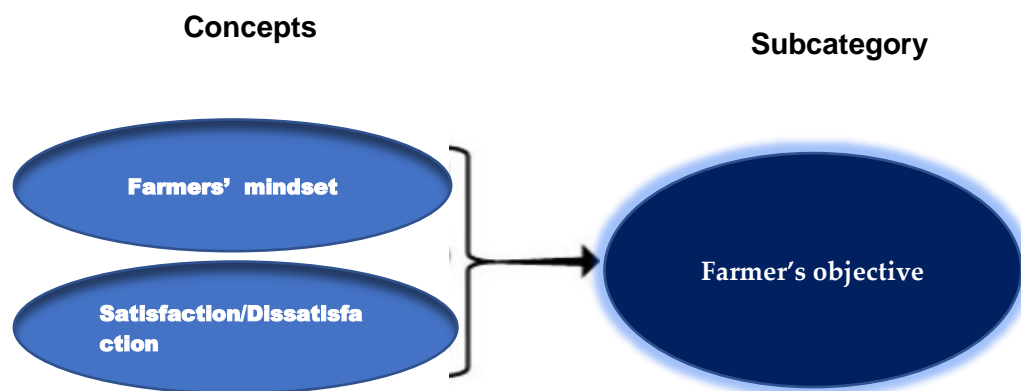
The emergent theme on quality confirms the finding by Hotegni et al., (2015) that the yield from pineapple in the Benin Republic is high but backed up with poor quality and heterogeneity. Furthermore, they asserted that the choice of right planting material with a follow up cultural practices affect the quality of pineapple fruits produced. They suggest that the type and weight of planting material determine average fruit quality and its uniformity of production in pineapple cultivation. The finding also affirms that the adoption of new variety or technology can lead to an

improvement in the quality of fruit as suggested by Cavatassi et al. (2010) on the adoption of a new variety of sorghum seeds leading to improved quality of sorghum in Ethiopia.

#### 4.4.1 Farmers' Objective

The discussion in this subsection provides a partial explanation to research question one. Every focus group discussion has its route from the objectives of the farmers. Participants give insights about their intention and motivation to produce pineapple. Further exploration of the concept in the subsequent individual interviews exposed the relationship between the emerged concepts and the reason why pineapple farmers cultivate the crop. Participants offer a variety of viewpoints from means of livelihood to the satisfaction of interest. The initial codes were reduced and categorised to two from twelve based on the similarity of ideas and concepts. The concepts of domestic production and satisfaction of farmers give insights to farmers' objective.

**Figure 16: Farmer's objective as a subcategory of attributing**



Source: From the Research Study

##### 4.4.2.1 Farmers' Mindset

Information on farmers' objectives of production from the participants indicates dual opinions. While some are interested in international pineapple business, the majority of the farmers show reluctance. The quote from IF6 is an indication of reluctance:

*"For me, I am not interested in the international market. There is a high demand for pineapple locally. You should understand that pineapple is a perishable crop." (IF6)*

*“Other farmers are looking out to go into the international market while farmers in Ejigbo communities are not showing interest. We prefer to serve the local demand for pineapples.” (IF5)*

The above excerpt indicates that some of the farmer's purposes for production is targeted at local consumers who have a flair for big-sized fruit. Pineapple farmers do not see an apparent reason why they should adopt the technology holistically with the associated farming practices. Response from IF5 suggests that the objective of most pineapple farmers in Ejigbo concentrates on satisfying the domestic demand. Thus the decision to cultivate pineapple lies on the farmer's mindset

According to the empirical data, each farmer has a purpose for producing pineapples. The finding from this study suggests that pineapple farmers are not keen on the export of the crop. This finding, therefore, explains why Nigeria, despite its position as the seventh-largest producer of pineapple in the world (FAOSTAT, 2017) does not export the crop. The implication of this finding is that Nigeria could not satisfy the domestic demand, or there is high wastage due to perishability of the crop or farmers do not bother to find out about the procedure for exportation. Against this background, some of the farmers as attested by IF5 and IF6 above could not see why they need to adopt the technology transferred to them. This empirical fact conforms to the submissions of past researchers (Robert et al., 2017; Frow et al. 2014) that the objective of the farmer influences the decision on technology adoption and practices. The finding also confirms the finding of O Leary et al. (2017) that the strategic decision taken by farmers at the farm level depends on the mindset of the farmers.

#### *4.4.2.2 Satisfaction*

Another dimension on farmers' objective that cut across all the participants is the level of satisfaction of pineapple farmers in the cultivation of the crop. According to the participants, most farmers are satisfied with the present economic profit from the cultivation of pineapple. Evidence from the research study indicates that pineapple farmers are satisfied with their level of production that is consistent with their objective for production. For instance, the quote from IF5 place its success on the

farming career on the achievement over the years and also consolidates the objective on mindset.

*“I have grown up to be a successful pineapple farmer in the community; I have learnt a lot of lessons along with my farming experience of thirty-nine years. Things are not always rosy. Production/yield is not steady. It has always been going up and down. I am happy as a pineapple farmer because I have been able to produce a graduate in Agriculture and even pharmacy, I have built a modern house as well from this business. In the near future, I cannot see sustainability in production as pineapple farmers from other communities are competing within our brand of pineapples. In fact, other farmers are looking out to go into the international market while farmers in Ejigbo communities are not showing interest. We prefer to serve the local demand for pineapples.” (IF5)*

Majority of the pineapple farmers within the community expressed satisfaction at the level of production by indicating that they are happy achievers. The evidence from the excerpt from IF7 validates the finding in this regard

*“So far, production and gain from production have been steadily increasing over five years, with about ten per cent increase in profit over the years. I now have a motorcycle against my bicycle. I am delighted producing at the local level”. (IF7)*

However, there is a misconception on why farmers should adopt the technology on pineapple suckers. Some of the farmers thought that the prescription of the technology is essential for adjustment of fruit size. Evidence from the FFG discussion on the need for the adoption of pineapple suckers as planting materials indicates that some pineapple farmers do not want to adopt the technology based on their mindset and objective of production. For instance, the quote from FFGF1 below reflects the general assumption of some of the farmers.

*“Our consumers and buyers of pineapple are **local**. Moreover, they prefer **big** sized pineapples, why then do I have to produce small size fruits for local consumers?” (FFGF1)*

From another point of view, research scientist clarifies that the technology is not to reduce the size of pineapple; rather, it helps to **adjust** the size depending on the requirement of the market. Evidence from the quote of the research officer gives an

explanation that the transferred technology and associated practices deal with both production and methodological process.

*“The farmers view about technology is different from their opinion to technology adoption. Most farmers perceive technology to be the modern method of improving farming activities to achieve an improved yield in pineapple production. They also feel that technology adoption is the routine agricultural activities involved in the production process. However, agricultural technology is viewed by researchers to be the methodological approach of farmers to the usage of various techniques in improving the old method of farming.” (IRS)*

The emphasis on the methodological approach allows for adjustment of fruit size rather than just size reduction or increase. The extension agent encourages the farmers to adopt the technology in order to stagger their production season to meet up with demand fluctuation in the market, reduce production time and uniformity in size of output crop.

#### *4.4.2.3 Dissatisfaction*

From a different perspective, some pineapple farmers highlight why they are reluctant to adopt TAP. The SFG discussion on why farmers may not want to implement adoption gives insights on how adoption could distort their cultural belief.

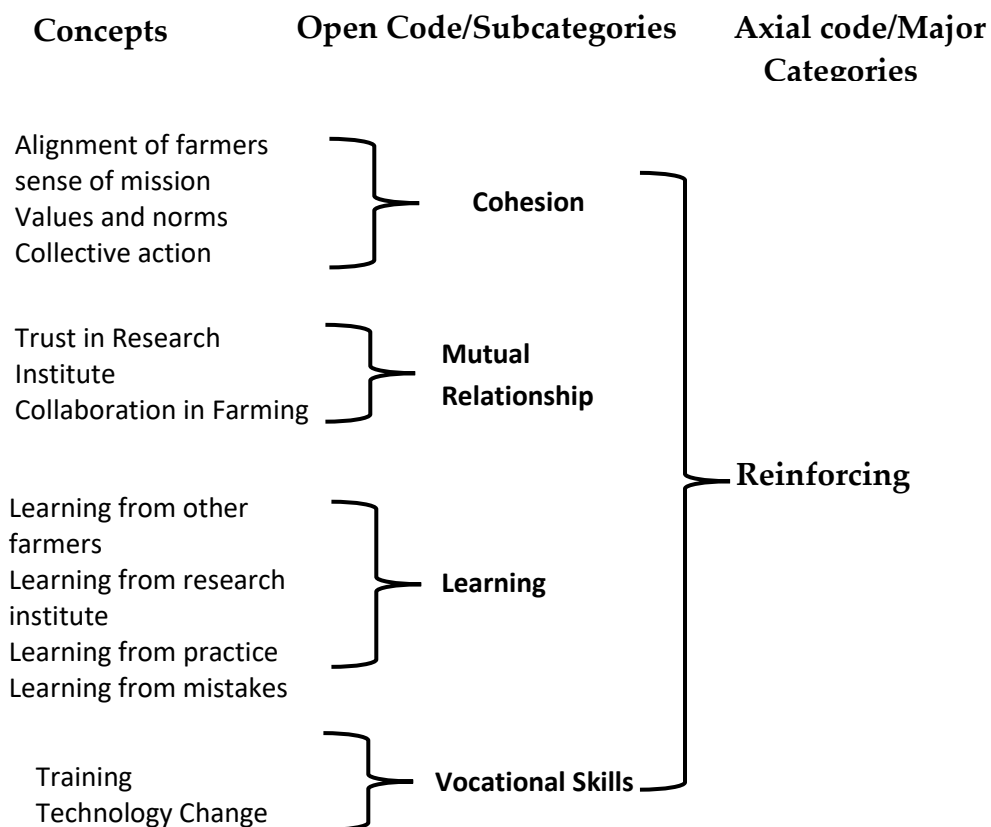
*“Some of our cultures may not support the required change due to adoption practices.” (F3)*

Some pineapple farmers attach their production activities to their belief and sense of belonging to the cultural norms and values. They embrace the production traditions as well as stick to taboos and norms. Farmers in this group strictly establish themselves as part of the community that follows the cultural norms and practices within the community. The excerpt from F3 is an indication of dissatisfaction tampering with their cultural belief. The finding has congruence with the conclusion of Inman et al. (2018) on the exploration of individual, social and material factors influencing water pollution mitigation behaviours within the farming community. They conclude that social norms could constitute a barrier to the adoption of practices in the farming community.

## 4.5 Storyline two – Reinforcing

The analysis of the second major category confirms the reinforcing elements of farmers engagement in technology adoption practices. The data validates the components links with reinforcing. At the same time, it explains answering the research question two on how technology adoption practices lead to competitive advantage. The study identifies four reinforcing subcategories which include cohesion, mutual understanding, learning and skills development. These subcategories grounded in the data contributes to explain the second storyline on reinforcing. Figure 17 depicts an architectural relationship of the subcategories with reinforcing.

**Figure 17: Architectural relationship of the subcategories with reinforcing.**



Source: From the Research Study

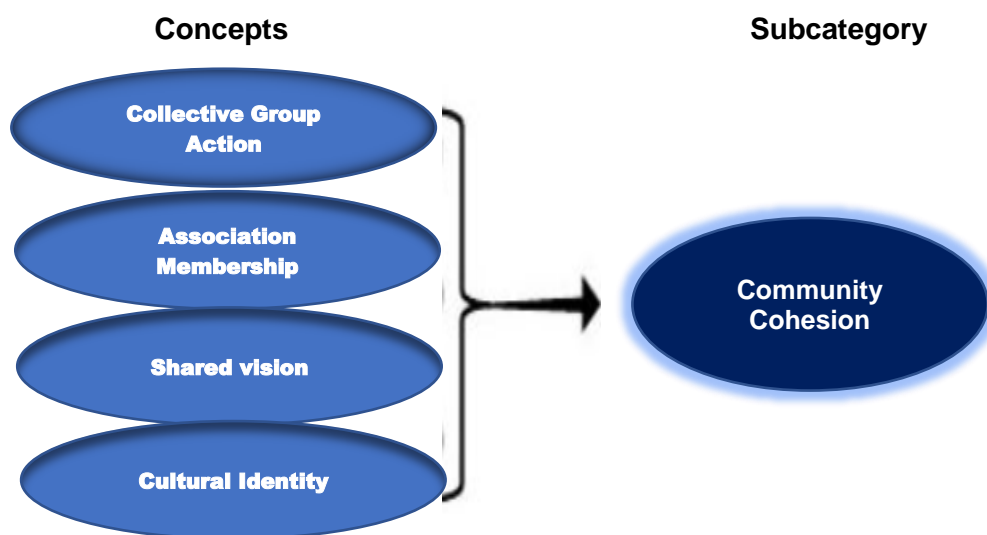
The study identifies cohesion from four concepts which include collective group action, membership of an association, trust among members, and Shared vision. The

second subcategory (mutual relationship) comprise of trust in the research institute and collaboration in farming techniques. Learning identified as a third subcategory of reinforcing comprise of four related concepts on learning and farmers' experience. The fourth subcategory consists of training and technological change. The following sections narrate the connections between the concepts and the subcategory.

#### 4.5.1 Cohesion

Oginowo and Eke (1999) defined cohesion as the feeling and sense of belonging developed by the members in a cooperative structure. In the current context, it is the extent to which an individual farmer desire to remain as a member among other members of the pineapple farmers association group. The seventeen identified concepts from the initial codes were reduced to four open codes (Appendix 15) The empirical evidence from the study indicates that four final open codes align to form the cohesion subcategory.

**Figure 18: Community Cohesion as a Subcategory of Reinforcing**



The capacity for collective action among the pineapple farmers in Ejigbo community dictates their level of commitment to pineapple production. The collective group action of supporting individual farmers in farming activities to boost production is



evident from the study. Farmers come together in rotation to carry out some activities such as land preparation and weeding on individual's plot. Evidence from the individual farmer's interview, focus group discussion, and research institute confirms that community cohesion serves as a contributory factor towards competitive advantage in the production of pineapple in Ejigbo community. Some of the empirical data from the interview indicate farmers' relationship with one another to achieve a common goal of improving production and productivity. For instance, the interview with the research scientist on farmers collaboration provides an insight towards farmers sense of collective action.

*"Pineapple farmers collaborate through the traditional method of "aaro" and "arokodoko" thereby working in a group or community to achieve an increase in production and productivity. The intervention of NIHORT in this regard is to carry out applied research to determine how yield can be improved within a competitive environment. Individual and collective (group) farmers are encouraged to adopt the technology transferred to them from NIHORT to achieve a better output and outcome." (IRS)*

"Aaro" and "arokodoko" is a native way of collusion of a group of farmers harnessing farm resources of several individual farmers or group of farmers working on the farm plot of a farmer such that it rotates among all individual farmers within the group on different days. The method allows group assistance of workforce labour to farmers to boost operational farming activities. The cooperation among pineapple farmers contributes to the reinforcement of the attributing factors that enhance pineapple production in Ejigbo community.

The finding conforms with the contribution and submission of Ofuoku (2020), Ofuoku and Agbamu, (2012) in their study on cohesiveness among farmers in the Delta State of Nigeria. The studies align that cohesiveness among farmers strengthens production outcome from the adoption of farm practices.

#### 4.5.1.2 Association Membership

One of the issues discussed at the second focus group meeting was how technology adoption practices strengthened competitive advantage in Ejigbo community? In dealing with this question, participants gave an insight that formation and membership of pineapple farmers' association support and built farmer's confidence in sustaining the trust among members. The study establishes that Pineapple Farmers Association (PFA) was formed to improve the livelihood of the members through the dissemination of relevant information on modern technology that boosts both production and productivity. According to IF6,

*"Our community has got a farmers union. The executives look for information relevant to pineapple production and pass it across to farmers." (IF6)*

Further probe on the excerpt from IF6 gave a more in-depth insight into the role of PFA, which also points to cohesiveness among pineapple farmers.

*"The role of the association is to coordinate all the pineapple farmers to **unite and come up with a collective voice** to achieve an improved profit in the business. (IF6).*

The relevance and positive impact of the PFA were described very clearly by IF2. According to the excerpt credited to IF2 in response to question 9 (Appendix 21)

*"The role of farmers association is to support farmers in terms of resources required for farming and make out a good livelihood. It is meant to be voluntary as farmers can decide on whether to be a member or not. I am happy to be a member of the farmers association because of the competitive advantages I derived from it as a result of technology adoption practices." (IF2)*

The implication from the excerpt indicates that farmers option to join PFA allows them to operationalise TAP, which subsequently translates to competitive advantage. This finding confirms the finding by Sachitra and Chong (2017) that farmers association enhance competitive advantage through the unity of purpose. The study also establishes the relationship between farmers association and community cohesion.

However, a cursory look at the data collected from TFG indicates that pineapple farmers are not entirely happy with how PFA operates at present. During the TFG discussion on why farmers may not want to implement change through adoption practices, one of the farmers pointed out the trust element.

*“Lack of trust in the leadership of pineapple farmers association.” (TFGF2)*

*“Lack of commitment to leadership is another reason. For me, it creates fear of the outcome of change and poses a high risk.” (TFGF8)*

Further exploration of a lack of trust in the leadership of PFA from other data sources establishes the genuineness of the allegation. At the level of individual interviews, I posed a question on the constraints faced by farmers and the association in the adoption of technology practices? (Appendix 21)

Two participants confirm that the PFA lacks good leadership and focus of objectives

*“For the association, I think there is a problem of incompetent leadership personnel. This has given rise to other problems that sprang up from greed and **corruption**.” (IF4Q10)*

*“The major constraint by the association is **inconsistent objectives**/opinion. They come up with different guidelines which in most cases are not achievable. The older experienced farmers should show interest in the leadership of the association.” (IF5Q10)*

*“For the association, there is a lack of proper coordination, as most experienced farmers are not ready to take up the leadership role. Furthermore, most of the time, communication with the extension agents from NIHORT is faulty (“0 mehe”).” (IF6Q10)*

The finding suggests that there is a problem with the trust in the leadership of PFA as reiterated in the excerpt below:

*“Lack of commitment to leadership is another reason. For me, it creates fear of the outcome of change and poses a high risk.” (TFGF8)*

*“Lack of trust in the leadership of pineapple farmers association.” (TFGF2)*

The lack of trust and transparency in the leadership of PFA might eventually lead to unfair treatment of members which could affect the linkage between collective action

and technology adoption practices. Consequently, rather than enhancing production, distrust might create a competitive disadvantage among farmers.

#### *4.5.1.3 Shared vision*

Trust, integrity and the capacity for collective action among the pineapple farmers in Ejigbo community dictates the level of commitment to pineapple production. The trust in value exchange and quality of farming support referred to as “aaro and arokodoko” is an indication of the integrity of individual pineapple farmer in the community. Evidence from the research scientist indicates that the shared vision of the farmers to produce pineapple fruits in large scale serves as a motivating factor as well as justification to strengthen the naturally endowed factors support pineapple cultivation in the study area. The interview with the research scientist reveals that pineapple farmers within the community have a common goal that serves as a binding principle towards a Shared vision

*“Since farmers in Ejigbo have a common goal of mass production of pineapples for their livelihood, The demonstration of new technology practices is encouraged to be carried out on the farmer’s plot to boost their confidence.” (IRS)*

The response from the research scientists also indicates that the shared vision of pineapple farmers towards a common goal improve their means of livelihood. The excerpt from IF5 confirms farmers’ satisfaction on pineapple cultivation as a means of livelihood.

*“I have grown up to be a successful pineapple farmer in the community; I am happy as a pineapple farmer because I have been able to produce graduate in Agriculture and even pharmacy, I have built a modern house as well from this business.” (IF5)*

This finding suggests that farmers have an alignment of a sense of mission through a shared vision. In the process of farming, pineapple farmers build an interdependent relationship with one another rather than pure necessity. The evidence indicates the existence of togetherness and bonding exhibited by farmers in the community.

#### 4.5.1.4 Cultural Identity

On observation, the pineapple farmers in the community work on the farm together without harassment among farmers of different ages, religious faith and lifestyles. It reflects mutual understanding and respect among farmers without affecting the cultural belief and shared values. For instance, the research scientist confirms in the following excerpt:

*“Historically, pineapple farmers in Ejigbo share values among themselves irrespective of age or gender classification. Some behaviour regarding production and associated practices are acceptable or otherwise. Thus, they possess a shared vision towards the production of pineapple for commercial purpose.” (IRS)*

From the farmers’ point of view, IF1 and IF5 respectfully confirm that pineapple farmers have a shared vision and collaborate to improve the quality of the product. The collaboration fosters cohesiveness and confidence among farmers through the pineapple farmers association, which is strengthened by the central farmers association.

*“We share the same vision. The farmers’ association procure and distribute farm inputs at an affordable cost to improve our livelihood as a community.” (IF1)*

In the focus group discussion, the importance of shared vision was strengthened by TFGF2 by confirming that:

*“Apart from what farmer 7 said, we also share our plans to adopt or not to adopt new technology on a friendly basis.” (TFGF2)*

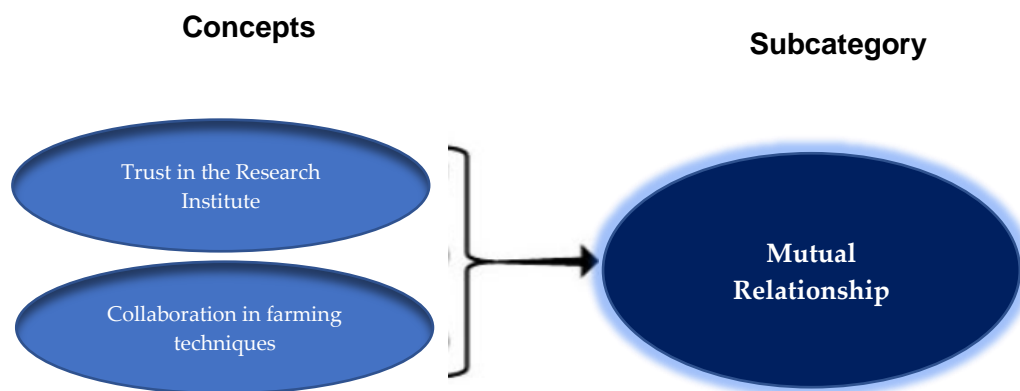
From the empirical data above, the current study shows supporting evidence that community cohesion and cultural identity has a linkage with technology adoption practices. Thus, community cohesion is one of the pointers towards reinforcing the core category. This finding suggests that farmers have an alignment of a sense of mission through cultural similarity. In the process of farming, pineapple farmers build a relationship with each other for interdependency between one another rather than necessity. There are an indication and existence of togetherness and bonding exhibited by farmers in the community. It also reflects that pineapple farmers are interested in

the quality of life rather than income from international business. The finding in this regard indicates that majority of pineapple farmers are interested in their happiness in the art of farming since the quality of life is about the pursuit of happiness. The submission regarding technology adoption practices in Ejigbo community agrees in practice with the submission by Ng et al., (2017) in the context of cultural identity and adoption of technology among farmers of Sekinchan community in Malaysia. The current study agrees with the study in Malaysia by demonstrating how farming community devise farming routines in the adoption of new technology.

#### 4.5.2 Mutual Relationship

Based on the outcome of the focus group discussion and participants' interview, the study establishes two factors contributing to the mutual relationship between the farmers and the change agent (NIHORT). The two concepts illustrated in figure 19 contribute and strengthen technology adoption practices in pineapple production.

**Figure 19: Mutual Relationship as a subcategory of reinforcing**



Source: From the Research Study

##### 4.5.2.1 Trust

Pineapple farmers in Ejigbo de-emphasise relying on the old method of planting local varieties of pineapple; farmers have trust in the research institute in charge of transferring proven technology to them. They also accept the technology transfer to them but with a high level of caution on risk. These practices demonstrate the highly

disciplined practices of farmers within the Ejigbo community compared to other communities. Data from the IRS interview informs the study that frequent interpersonal interactions among pineapple farmers build up trust.

*“The issue of trust has also helped pineapple farmers in Ejigbo community. Same varieties of pineapple (smooth cayenne) introduced to pineapple farmers in Ejigbo were also introduced to other communities in southwestern Nigeria. However, because of the commendable attitude and trust of the farmers in Ejigbo towards the research institute, they are the first to accept the holistic technology adoption practices by donating field for on-farm trial. They also believe in the hard work of the institute by trying the operations on their commercial farm plots. They carry out the routine farm and management practices and monitor their farm carefully every day. Unlike other communities where pineapple farmers only monitor their field without structure.” (IRS)*

From the third focus group meeting, the response of the proportions of farmers that have adopted technology transfer indicates that majority of the farmers in Ejigbo have adopted the practices transferred to them based on trust and confidence in the research institute.

Excerpt from the third focus group affirms the percentage of farmers that subscribes to adoption practices:

*“About 90% of pineapple farmers in Ejigbo adopt technology practices extended by NIHORT.” (TFGF5)*

*“YES!!! (In Chorus) that is true.” (TFGF (S) 1,3,2,7,4)*

The response was probed further to ascertain the level of trust in the technology transferred by NIHORT

Moderator - What is true?

*“90% of pineapple farmers in Ejigbo adopt technology adoption practices which have led to competitive advantage.” (TFGF2&7)*

*“ We have **confidence** in NIHORT regarding technology transfer. It is also “bunmi bun o” – mutual trust.” (TFGF6)*

The trust builds among farmer to farmer and farmer to research institute. While farmers trust one another on the transfer of knowledge and learning process, the trust on the research institute is equally laudable as farmers pay an upfront token for the supply of planting materials at a reduced rate. The spirit of loyalty is also relevant in this context, in which there is continuous engagement among the farmers and the research institute extension agents from land preparation until the harvesting season. The bond of trust among farmers and the research institute has made the arrangement possible. The finding conforms to the assertion made by Pirson et al. (2017) on the formation of stakeholder trust in business. To corroborate this; the RS pointed out that mutual trust translates to mutual benefit:

*“The benefits of research carried out by NIHORT is mutual. Farmers benefit by improving their financial gain and time saving while the nation benefits via the environmental performance of the farm and improvements in the livelihood of pineapple farmers.” (IRS)*

The fact remains that the success of technology adoption practices depends on collectiveness; farmers have developed a socially bonded system to realise its potential and maximum benefit. Farmers engage with NIHORT in a way that encourages ongoing cooperation and trust. There are constant interaction and open communication between farmers and NIHORT, which allows for expression and willingness to adopt practices leading to empowerment and transparency in the technology adoption of practices. The evidence complies with findings by Ingold (2002) that trust and belief in technology introduced by scientist influences technology adoption by farmers. For a mutual relationship to exist, openness and reliance are required from both farmers and the change agent; otherwise, it will be difficult to transfer or accept technology. Constant communication and dialogue can serve as an essential tool to keep the relationship alive (Faborode & Ajayi , 2014 ). However, to foster the relationship, a mutual relationship must be considered as reciprocal for both parties.



#### 4.5.2.2 Collaboration

Creating a mutual relationship and trust through collaboration among farmers reinforces how technology adoption practices lead to competitiveness. Evidence from the IRS excerpts indicates that pineapple farmers collaborate with one another and the research institute to achieve not just increase in production but also backed up with an improvement in the level of productivity.

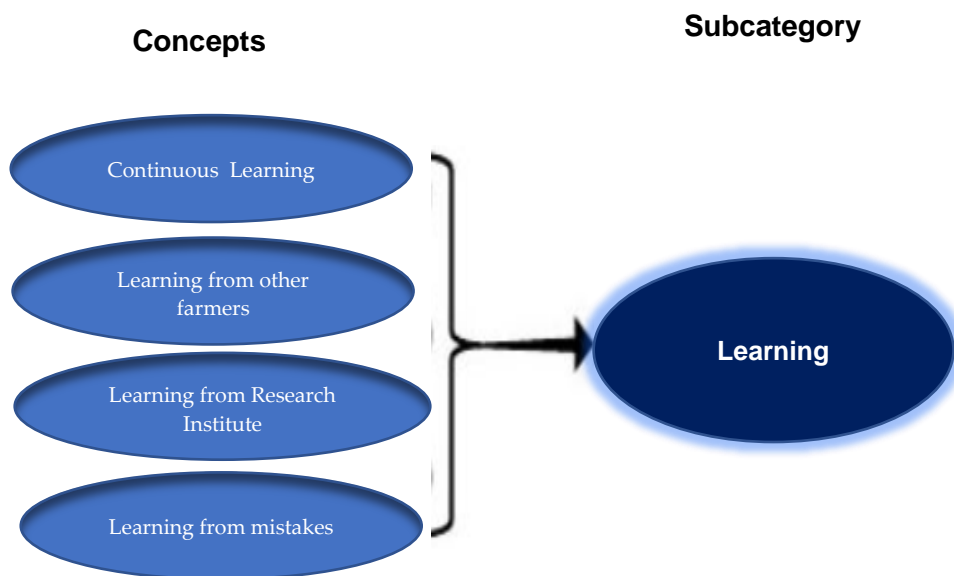
*"The role of pineapple farmers association is to liaise with the central farmer association which is the parent body to furnish us with information on training, market access and availabilities, linkage with research institutes, Pineapple farmers **collaborate to improve on quality** and so on." (IF5)*

*"Pineapple **farmers collaborate with one another** through the traditional method of "aaro" and "arokokodoko" thereby working in a group or community to achieve an increase in production and productivity. The intervention of NIHORT in this regard is to carry out applied research to determine how yield can be improved within a competitive environment. Individual and collective (group) farmers are encouraged to adopt the technology transferred to them from NIHORT to achieve a better output and outcome." (IRS)*

#### 4.5.3 Learning

The analysis of the focus group discussions and the individual interview of the participants provide a body of evidence that learning play in strengthening farmers 'engagement in the adoption of technology. The evidence from the data offers insights into the application of learning within the farming community. In the study, twelve initial codes on learning were identified and modified to four final open codes based on conceptual similarity. The final open codes include learning from other farmers, learning from a research institute, learning from practice and learning from mistakes. Figure 20 illustrates the linkage between the four concepts of learning and the subcategory.

**Figure 20: Learning as a Subcategory of Reinforcing**



Source: From the Research Study

The third focus group discussion generated some insight into the idea of dynamic capability. Participants unanimously agreed that learning is an additional capability that could reinforce their motivation in engaging with TAP. I, therefore, asked at this point that; “If you could add any feature to improving the production of pineapple apart from technology adoption practices, what would it be”? The response leads to an array of different types of learning:

*Farmer 6 - Learning from experience*

*Farmer 8 - Collective learning*

*Farmer 5 - Individual learning*

*Farmer 3 - Group learning and past experience*

*Farmer 4 - Individual and Collective learning*

Based on the response from the participants in group discussions, I decided to explore the area further by incorporating a related question in the individual interview that I conducted with the participants afterwards. Question 5 on an individual interview

(Appendix 21) generates an array of responses that is congruent to what obtains from the focus group discussion.

#### 4.5.3.1 Continuous Learning

Due to a constant change in the factors that contribute to farming operations and activities, participants were clear that TAP is only relevant if there is an update of knowledge through continuous learning. One of the farmers serving as an illustration to other farmers says:

*“I have been learning continuously. Farmers try to learn the effect of adopting technological practices on their output continuously. Farmers do not adopt all the practices at once. **Learning is considered a gradual but continuous process.** Learning influences the farmer’s choices on different practices, thereby changing the pineapple farmer’s subjective expectation regarding output/yield”. (IF3)*

From the excerpt, empirical evidence suggests that farmers need to learn continuously and update their knowledge in the process of production. It is essential for farmers to be able to apply the skills in farming practices in the daily farm operations.

#### 4.5.3.2 Learning from other farmers

Learning from other farmers evolved as a complement to the question on other capabilities of the farmer that could improve adoption practices. Pineapple farmers affirm that one of the ways of strengthening technology adoption practices is through learning from one another. Consequently, the linkage between learning from other farmers as a dynamic capability evolves from the study. A piece of empirical evidence from the study reveals that:

*“Learning has improved my understanding and production techniques. I am a graduate of Agriculture with two years’ experience in pineapple farming. **I have learnt a lot from the old experienced farmers as well as colleagues outside this community.** (IF8)*

The implication of learning from other farmers is that such learning can improve both profitability and productivity at the farm level. The confirmation that learning from other farmers improves the production techniques of the individual farmer is

evidence that learning from other farmers has an influence on the farm performance and operational activities.

#### *4.5.3.3 Learning from Research Institute*

Generally, farmers are reluctant to adopt transferred technologies (Rogers , 2003). The long history of uptake of technology from the change agent to the farmers is an indication of mutual benefit. However, linear transfer of technology to the farmers may not guarantee that farmers are learning as learning involves the transformation of transferred packages into action or practice. Evidence from the participants indicates that pineapple farmers are learning from NIHORT. This is because participants confirm that the majority (90%) of the pineapple farmers in Ejigbo has adopted the associated practices and planting of smooth cayenne suckers. In the course of third focus group discussion, one of the farmers serving as a proxy to other farmers acknowledge the expertise of the agricultural scientists and confirms the actual implementation of the associated practices attached to the transferred technology.

*“I am an early adopter of the adoption practices and feel it is a good adoption agricultural practices to adopt technology introduced by research Institute because the scientists have in-depth knowledge and they are constituted by Government to support farmers and improve our livelihood. It is, therefore, a good practice that I have learnt from them and increase my yield from pineapple production.”*  
(TFGF3)

From the excerpt above, learning from the research institute through the extension agent has led to an increase in the yield. Farmers, therefore, benefit from learning from research experts. While the discussion was still on, pineapple farmers exhibit their readiness to continuously learn from the research institute. A phrase from one of the farmers as transcribed below pledged their readiness because of their perception that such learning improves their livelihood.

*“Pineapple farmers are always ready to learn new ideas from friends, families, and the research Institute. The sole aim is to improve our livelihood.”* (TFGF8)

The above excerpt suggests the subscription of farmers towards continuous learning as well as the trust and confidence reposed in the research institute. The implication is that farmers affirm their confidence and learning support from the research agent.

#### 4.5.3.4 Learning from mistakes

Data from the study has shown that pineapple farmers learn from experience. Some of the farmers have indicated learning from good experience while some attest to a bad experience. Based on the discussion on how farmers could improve the risk of adopting technology as it emanated in the third focus group discussion and coined out as a separate question in the individual interview, IF6 and IF7 lay emphasis on learning from mistakes.

*“Learning from mistakes in the past as well as learning from other farmers based on good and bad practices have made to improve on my enthusiasm to adopt the new technology practices emphasised by NIHORT. I have been that some farmers that have incorporated the majority of the transferred practices have better yield and quality fruits during harvest compared to some of us that have taken fewer practices required.” (IF6)*

*“Learning has improved and given additional knowledge of my understanding of the ways and procedure of cultivating pineapple fruits, which eventually has helped me in the past to produce pineapple of high grades demanded by consumers. I have learnt from my mistakes as well as other farmers.” (IF7)*

The deduction from the excerpts above suggests that making a mistake is not out of place in farming, it is only vital that farmers should view a mistake in operational farm practice as an opportunity to improve in the subsequent farm operations/activities. The experience will always allow farmers to have an in-depth understanding of what went wrong and the corrective measures through an action plan.

The empirical data from the study is evidence that learning is multidimensional as affirmed by Pokharel & Choi (2015 ). Pineapple farmers learn in different ways as laid down in the literature relating to learning. The plethora of evidence validates most theories of learning, ranging from organisational learning to Experiential

learning. In the context of the current study, there is a demonstration of evidence of a plethora of learning.

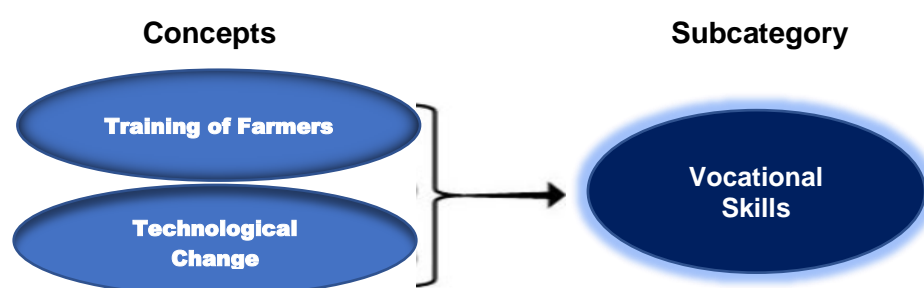
The emphasis on experiential and collective learning from the empirical evidence of different sources of data collection implies its significance in the competitive advantage enjoyed over other communities where collective learning is less prominent.

The study establishes a linkage between learning and technology adoption, which eventually turns to a competitive advantage over other producers. The evidence confirms that learning has a positive impact on technology adoption practices and a cumulative effect on the relationships between an experiential individual or collective learning by pineapple farmers.

#### 4.5.4 Skills Development

The participants in the research study firmly believe that training of pineapple farmers and collaboration with other farmers and research institute has been a source of advantage to the understanding of practices incorporated to technology adoption. Training of pineapple farmers is also an integral part of learning and vice versa. Figure 21 depicts how the skills subcategory links with the empirical data.

**Figure 21: Vocational Skills as a Subcategory of Reinforcing**



Source: From Research Survey

##### 4.5.4.4 Training

The study identifies training as an essential element of farmers' skills development. Although, participants unanimously agree in the third focus group discussion that the

Pineapple Farmers Association (PFA) support farmers through provision of relevant training, however, most of the training is designed and arranged to support inexperienced farmers. TFGF4 was happy about the development but raised a concern that the older farmers equally deserve training.

*“The pineapple farmers’ association do organise relevant training for young inexperienced pineapple farmers at the beginning of the planting season to either develop or improve our skills in farming operations. This has been quite helpful to the younger ones. What about the more experienced farmers?”*  
(TFGF4)

The deduction from the above excerpt indicates that the older farmers feel that PFA does not give them adequate consideration regarding an update of knowledge in farming practices.

On further exploration at the individual interview, farmers show their dissatisfaction about the selective training of farmers by the leadership of PFA. IF9 pointed out that the association has deviated from its primary role.

*“The ideal role of pineapple farmer association appears to be different from what they do now. For instance, the association is supposed to train all pineapple farmers in modern techniques and encourages farmers to practice the adoption of “alatike” (Smooth Cayenne). **In practice, training of farmers is selective; the leaders consider friends and relatives first, which makes it unfair.**”* (IF7)

Nevertheless, it is a consensus that training is relevant to the uptake of farm practices as confirmed unanimously in the group discussion and reflected in the excerpt from IF6

*“I feel education has no effect on technology adoption practice knowing fully well that..... most farmers or say the majority of us are not educated. Yet, we have been producing a large number of fruits to the market over many decades. **I think regular ad hoc training is more relevant** rather than going back to schools for formal education.”* (IF6)

From another source of data, IRS further emphasised that development in research and extension linkage must eventually translate to knowledge transfer through training of farmers. IRS quotation :

*“Pineapple farmers learnt from one another and as well from their previous mistakes. Education and training are vital elements. It helps to improve the understanding of farmers in the adoption process. It also guides farmers in deciding on a knowledge economy. Development in research and extension linkage is based on the training of farmers. Based on a field visit to pineapple plots in Ejigbo, there has been a great positive impact of training of farmers on translated output and level of advantage on competition of pineapple production.” (IRS)*

#### 4.5.5 Technological Change

Technology adoption practice dictates that the technological change process triggers competitive advantage among farmers. It implies that such farmers will be more technologically advanced than other contemporaries in the farming business. The empirical data in the current study indicates that technological change has a positive linkage with a competitive advantage. The excerpt from IRS reflects the relevance and advantage of the practices to technology adoption:

*“Majority of pineapple farmers are already adopting the technology. It has two major advantages. It reduces the gestation period from twenty-two months to sixteen months. Secondly, the size of matured pineapple fruits is adjusted to suit the international market required standard. The technology and technology practice is introduced by NIHORT, who has the custodian of expertise. However, researchers view agricultural technology as a methodological approach of farmers in the usage of various techniques in improving the old method of farming.” (IRS)*

The quote above explains the relevance of TAP in the production transformation process. It also indicates that the two factors (reduced time of production and uniform fruit size) identified by farmers have contributed to competitive advantage from the adoption of planting smooth cayenne variety. It implies that TAP creates process technological change and product technological change. These two factors affect the gestation period such that the production period is reduced which eventually reduce the cost of production and guarantees product uniformity. The process development emanates from the technological process change in the production of pineapple. It enhances product quality and features such as high tolerance of variety. Thus, both technological product change and technological process change translates to higher



competitiveness which Bowman and Ambrosini (2003) refer to as dynamic capability. Furthermore, extrapolating from the IRS interview:

*“If farmers adopt farming practices, one should, therefore, expect a technological shift in the long run. Technology change enhances competitiveness in pineapple trade.” (IRS)*

The above quote implies that technological change has a direct link with competitiveness, which motivates farmers to adopt farm practices. It further reinforces farmers engagement in technology adoption through farm practices.

#### **4.6 Core Category – Engaging technology adoption through farm practices**

In the context of this study, I consider engaging technology adoption through farm practices as the involvement of pineapple farmers that willingly accept the planting of suckers and its associated practices. My consideration of this definition conforms with the meaning of engagement in the Cambridge English Dictionary (2018) which serve as a guide towards understanding the meaning of engaging within the context of the study.

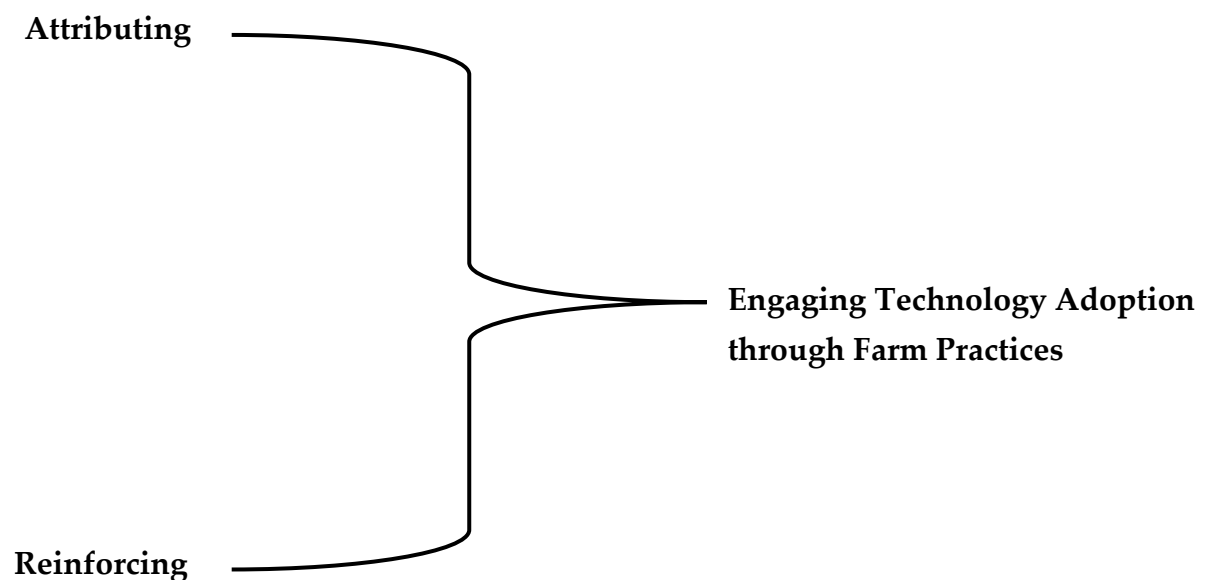
Within the context of the study, engaging technology adoption through farm practices is a willing adoption of associated farm practices based on the motivation of the attributes.

Figure 21 illustrates a graphical representation of major and core categories, while table 18 illustrates the properties of the two major categories.

**Table 18: Properties of the two major categories**

<b>Major Category</b>	<b>Properties</b>
Category 1- Attributing	Attributing is the phenomenon of the characteristics that aid and enhance the cultivation of pineapple. It explains how the farming system, fruit quality and farmers' objective contribute to the theory of engaging technology adoption through farm practices
Category 2 – Reinforcing	Reinforcing category is the phenomenon that explains how cohesion, mutual relationship, learning and vocational skills of farmers strengthen the process of adoption to establish the engagement of technology adoption through farm practices

**Figure 22: Alignment of the storylines**



The core category of engaging technology adoption through farm practices creates a framework that interprets the associated theoretical concepts (Charmaz , 2014 ). It gives insights into the two research questions that inform the explanation of how technology adoption enhances pineapple production and how TAP led to competitive advantage among pineapple producers.

The findings from the theory of engaging technology adoption through farm practices demonstrate how farm practices support the adoption of technology at the farm level. It argues that technology adoption without the adoption of the associated practices leads to farmers' effort in futility. The empirical evidence through field observation (see appendix 10) shows that pineapple farmers that fully engaged in the adoption of the technology and associated farm practices have an outcome of improved high-quality yield backed up with an increase in farm income.

Discussion on engagement from the literature on TAP indicates an active link between farmers and change agent. Categorically, Feola et al. (2015) pointed out the relevance of extension officers and research institutes in engaging farmers to willingly accept technology passed to them. Precisely, the level of trust of the farmers in the change agent determines the extent of engagement (Sutherland et al., 2013). An excerpt from one of the participants in the study confirms the element of trust of farmers in the research institute.

*"We have confidence in NIHORT regarding technology transfer. It is also "bunmi bun o" – mutual trust." (TFGF6)*

*"The issue of trust has also helped pineapple farmers in Ejigbo community. Same varieties of pineapple (smooth cayenne) introduced to pineapple farmers in Ejigbo were also introduced to other communities in southwestern Nigeria. However, because of the commendable attitude and trust of the farmers in Ejigbo towards the research institute, they are the first to accept the holistic technology adoption practices by donating field for on-farm trial. They also believe in the hard work of the institute by trying the operations on their commercial farm plots. They carry out the routine farm and management practices and monitor their farm carefully every day." (IRS)*

The willingness of the farmers to adopt technology and its associated farm practices depends on the level of motivation. Mills et al. (2018) identify both intrinsic and extrinsic factors as motivators for farmers. They regarded intrinsic as factors that gear the farmers to carry out farm activities based on inherent interest while extrinsic is purely deriving a positive outcome different from expectation. The derivation of a positive outcome different from expectation leads to product differentiation that leads to competitiveness. It, therefore, suffices to suggest that the interest of the farmers to cultivate pineapple lies in their passion for the crop supported by the attributing elements. The reinforcing elements are the dynamic capabilities that strengthen the competitive advantage among Ejigbo pineapple farmers. Both intrinsic and extrinsic motivations constitute an integrated whole of motivations towards establishing the theory of engaging technology adoption through farm practices.

#### **4.7 Summary of the findings**

The chapter considers the analysis of responses from the in-depth interview, focus group discussions, field observation, memo and related literature. The chapter links the emergence of the core category grounded in data with the storylines (attributes and reinforcers). The major findings based on perception and thoughts of the participants include production and product (pineapple) characteristics, farmers objective, cohesiveness among farmers, mutual relationship with the research institute (Change Agent), learning and skills development by farmers.

#### **4.8 Conclusion**

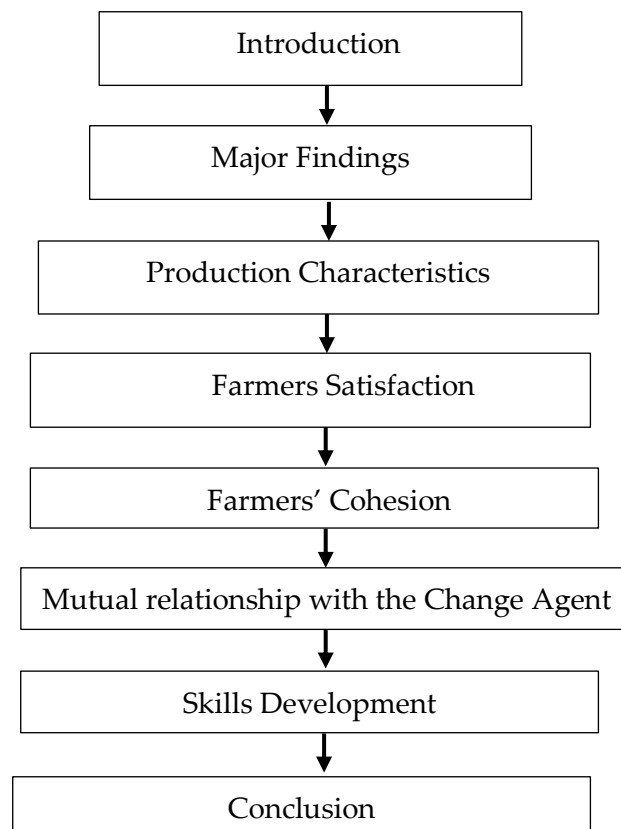
The chapter presents the data analysis and findings from the study as guided by the open, axial and selective coding processes of the Straussian grounded theory methodology. The analytical data reflects the perception of the participants from the triangulation process. It also depicts the emerging subcategories and describes the emerging storylines that explain the research questions. The data analysis extends the linkage of the major categories (storylines) with the core category of engaging technology adoption through farm practices. The chapter identifies the major findings from the study, which serves as a subject of discussion in the next chapter.

## CHAPTER FIVE – FINDINGS AND DISCUSSION

### 5.0 Introduction

Chapter five is structured as follows in Figure 23

**Figure 23: Structure of Chapter five**



This chapter discusses the findings from the output story through constant comparison with the literature review. It also draws on the interview and other triangulation methods to discuss the analysis of the empirical evidence of the participants. The discussion is organised according to the two storylines that explain the engagement of technology adoption through farm practices. Section one highlights the major findings from the study, which are later discussed in detail. Section two focuses on the first storyline by providing explanations to research question one through the findings from the study. In contrast, sections three discusses

the second storyline through the linkage of dynamic capability towards competitive advantage at the farm level. The last section of the chapter summarises the chapter.

## 5.1 Major Findings

Six major findings emerged from the study. Each of the findings reflects the major and subcategories as analysed in chapter four. The findings also address the research questions by providing explanations.

### 1. Production and product characteristics that enhance pineapple cultivation in Ejigbo farm community

- Natural endowment
- Good agricultural practices
- Approach to cultivation
- Product quality
- Process quality
- Uniqueness

### 2. Farmers' objective at the current level of production

- Mindset
- Satisfaction

### 3. The impact of cohesiveness of farmers on the technology adoption practices

- Collective group action
- Pineapple farmers association membership
- Cultural identity
- Alignment of sense of mission

### 4. Mutual relationship with the Change agent

- Trust
- Collaboration

### 5. Learning

- Learning from errors

- Learning from other farmers
- Learning from experts
- Learning from practice

## 6. Skills Development

- Training
- Technological change

The following subsections will discuss each of the six major findings with matches from pieces of literature supporting findings.

### 5.1.1 Production Characteristics

The study identifies production and pineapple fruit characteristics as one of the factors enhancing production in the study area. Pineapple farmers identify the natural endowment including good soil, topography, weather and climate as motivating factor to cultivate pineapple. The finding suggests that the location has a natural advantage which could transform to comparative advantage among farmers in neighbouring states. Eventually, comparative advantage leads to competitive advantage among the farmers. The finding aligns with the assertion by Mase and Prokopy (2014). They consider natural endowment as a strategic resource that supports the production of crops which serves a strategic opportunity to the farmers.

The study also identifies good agricultural practices as a key ingredient that supports the enhancement of pineapple production. Although, the findings on good agricultural practices deviate from the standard norm of good agricultural practice. The finding is still relevant because the study links the principle and concept of the enhancement of technology adoption practice. However, it should be clear that good agricultural practice entails a guideline for the operational management of farm produce from planting to harvesting stage and beyond. The finding in this category aligns with the conclusion of Lubis et al. (2014) on the improved level of productivity of pineapple in West Java, Indonesia. Although the study by Lubis et al. was based in

Indonesia, evidence from the current study aligns with their conclusion that good agricultural practices enhance crop production.

The study establishes routine farm activities as an integral portion of the farming system that supports farmers to achieve improved fruit production and yield. The finding suggests that sound output results from consistent operational farm activities and practices.

The finding on quality indicates that the physical features and attributes of pineapple are relevant to production pattern/techniques. Thus, the quality of fruit incorporates features and attributes of pineapple that responds to consumers' requirements and the ability of pineapple farmers to deliver the expected quality of pineapple fruits to consumers. In this context, the ability and suitability of technology and technology adoption practices become relevant to competitive advantage. The finding conforms with the assertion by Hernandez-Aguilera et al. (2018) that the physical features /attributes of products and consumer preferences for product quality can influence desired farmers' outcomes and encourage the adoption of farm practices that promote environmental sustainability.

The finding also affirms that the adoption of new variety or technology can lead to an improvement in the quality of fruit as suggested by Cavatassi et al. (2010) on the adoption of a new variety of sorghum seeds leading to improved quality of sorghum in Ethiopia and Baruwa (2013) on quality determining the profitability of pineapple production in Osun State, Nigeria.

The finding aligns with the suggestion of Hotegni et al. (2015) that the type and weight of planting material determine average fruit quality and its uniformity of production in pineapple cultivation. It is also congruent to the finding reported by Lee et al., (2013) that the success of the adoption of any technology transferred to farmers depends on the acceptance of the technology as well as accompanying the adoption of prescribed



associated practices. Adoption of improved agricultural technology practices is, therefore considered to be a pivot to improved production.

### **5.1.2 Farmers Objective**

Another finding from the research study indicates that pineapple farmers are satisfied with their level of production. The assertion is consistent with their objective for satisfying domestic demand. The finding suggests that pineapple farmers are satisfied with meeting up the domestic demand based on their economic sustainability and not keen on the exportation of the crop. This finding explains why Nigeria, despite its position as the seventh-largest producer of pineapple in the world (FAOSTAT, 2017), does not export the crop. The finding suggests that pineapple farmers are contented at the present level of pineapple production. This finding conforms to the submission of Robert et al. (2017) that the objective of the farmer influences the decision on technology adoption and practices. The finding also confirms that farmers mindset guide towards acceptance and adoption of technology as suggested by Mutune and Nunow (2018) in their study on the rural livelihoods and climate-smart farming technologies in the semi-arid lands of Kenya.

### **5.1.3 Farmers' Cohesion**

An investigation from the study establishes that pineapple farmers association was formed to improve the livelihood of the members through improved production and productivity. The association achieve the objectives by disseminating relevant information on modern technologies to the farmers. PFA also train and educate farmers through field demonstrations. The finding on farmers sense of collective action establishes farmers' cohesiveness as a source of competitive advantage. It indicates that farmers association enhance cohesiveness and subsequently, the competitive advantage gained through a unity of purpose. The continuous economic and social linkage with pineapple farmers association serves as a pivot towards achieving competitive advantage. The finding aligns with the study by Sachitra and Chong (2017b) through the establishment of linkage between dynamic capability

developed by collective action and competitive advantage. The study also confirms the contribution by Ofuoku and Agbamu (2012) and Ofuoku (2020) that farmers cohesiveness has a positive relationship with the adoption of technology by farmers' group in the Delta State of Nigeria.

The study identifies that farmers' membership of Pineapple Farmers' Association builds a strong bond among the farmers in the community, which automatically translates to a high level of cohesiveness and confidence among the farmers. Subsequently, farmers seize the opportunity of learning and training gained through the association to adopt the transferred technology and farming practices. It is worthy to note that the finding in Nigeria is consistent with the finding by Sidibe (2004) on-farm level adoption of soil and water conservation in Burkina Faso. Sidibe (2004) confirms that members of farmers association strengthen the tendency for farmers to adopt technology transferred by extension agents.

Another area of emphasis that was linked to cohesion is the farmers' cultural identity. Farmers attach their production activities towards their belief and sense of belonging to the cultural norms and values. Although the study establishes cohesion among farmers. However, evidence from the study indicates that pineapple farmers accept the adoption practices in principle. Some farmers perceive the adoption of practices as incompatible with their norms and values as a result of cultural limitation. It is, therefore, clear that extension agents need to consider farmers' situation and need rather than prescriptive technology adoption. The finding reinforces a similar finding by Warren et al. (2016) on the role of farmers socio-cultural identity in Scotland.

#### **5.1.4 Mutual relationship with the Change Agent**

Collaboration between farmers and research institute(Change Agent) empowers the farmers to gain direct access to modern farming techniques and practices to achieve improved results on pineapple production. This results in the synergy of modern farming practices with traditional cultural practices that requires trust and collaboration of the two parties serve as a synergy for improved yield in output. The

study establishes two factors contributing to a mutual relationship between the farmers and the change agent (NIHORT) as trust and collaboration in farming techniques.

The study establishes an element of trust among farmer to farmer and farmer to research institute. Although farmers trust one another on the transfer of knowledge and learning process, the trust on the research institute is equally laudable as farmers rely on the organisation for the supply of planting materials at a reduced rate. The mutual trust between the farmers and the research institute strengthens the relationship between the farmers and the change agent, which subsequently serve as a dynamic capability towards achieving competitive advantage. The finding supports similar studies by Masuku and Kirsten (2004); Milford (2002) Jayashankar, et al. (2018) and Tregurtha and Vink (1999).

The finding on the collaboration of farmers at the farm level in Ejigbo community suggests that farmers aim at improving the process and product quality through adoption practices and differentiation strategy. Evidence from the field observations shows that farmers collaborate by sharing resources to support the farm family within the farming community. Pineapple farmers also have a referenced demonstration plot and support activities such as inter farm visit and learning to improve the adoption practices. The finding suggests that collaboration reinforces the attributing factors of the farmers within the community. The finding in this regard supports the study on the development of collaboration in agribusiness by Perdana et al. (2018). They affirm that collaboration among farmers leads to the competitive advantage of agricultural products in Indonesia. Also, the finding from the current study aligns with the finding of Sachitra and Chong (2017) on their study on collective actions, dynamic capabilities and competitive advantage of export crop farms in Sri Lanka. They link collaboration of farmers directly with competitiveness which the current study reflects. The collaborative relationship among pineapple farmers in Ejigbo, therefore, strengthen the communal approach towards competitiveness

### **5.1.5 Learning**

Going by the description of Cohen and Levinthal (1990) that learning creates a competitive advantage through a learning mechanism and embedded in the description of Sachitra and Chong (2018) that learning capability is an intangible resource that could create competitive advantage. It is worth to reiterate that learning, routine farm activities and technology adoption practices advanced the theoretical understanding of dynamic capabilities (Teece et al.1997; Zollo and Winter 2002). The study identifies learning as a complementary resource to TAP, which eventually improves competitiveness. It also supports and builds on the assertion by Mc Elwee and Bosworth (2010) that farmers look for ways and strategies to create an advantage over competitors

Evidence from this study is consistent with the findings from (Ng , et al., 2017) that learning processes and gains from learning in a cluster occur mainly in an informal way that reinforces the effects of social cohesiveness, trust and connectedness among farm families. (Ng , et al., 2017). The finding on how farmers learn is consistent with the findings of Maertens al. (2018) indicating that farmers learn through participation and interaction in groups. The alignment in the finding occurs in the form of learning from other farmers, experts, experience or place when a farmer shares knowledge to enhance the quality of farming operations and practices in order to realise a change and achieve competitive advantage Consequently, reinforces the level of competitiveness of the crop produced

### **5.1.6 Skills Development**

The skills of the pineapple farmers in Ejigbo has gone a long way to improve their farm production and productivity. It has extended its performance and ability to achieve competitiveness among other producers. Pineapple farmers develop such skills which enhance their strategic skills in making decisions about production objective that creates value and also financially viable (Mc Elwee and Bosworth, 2010).

The study identifies that training of pineapple farmers make them develop competitive skills that improve the production and adoption processes. It suggests that training can help to improve the production and adoption processes. It also suggests that training helps to improve the value and quality of pineapple fruits produced with a positive effect on production performance. The finding in this regard supports the recommendation by Koori et al. (2017) on the role of training on the performance of farmers in central Kenya. Although Koori et al. (2017) carried out the study in a different country within the same continent; it is congruent to the finding among pineapple farmers in Nigeria.

In considering technological change as a capability, Lall (1998) perceived technological capabilities as technical, managerial and institutional skills that allow productive enterprises to utilise technical information efficiently. In line with this definition, the study found out that majority of the pineapple farmers possess technological capability demonstrated in various farm activities and processes through the adoption of technology and farm practices

## **5.2 Conclusion**

The chapter extends the theory of engaging farm practices in technology adoption by linking it to the existing theories and situating it in the existing literature. The key findings of the study were discussed in relation to the major subcategories referred to as storylines according to the guidelines of the Straussian school of thought. The findings suggest that production and product (pineapple) characteristics, farmers objective, cohesiveness among farmers, mutual relationship with the research institute (Change Agent), learning and skills development by farmers serve as a pivot towards achieving competitive advantage among pineapple farmers. The adoption of the farm practices in conjunction with the planting of smooth cayenne suckers contributes to the emerged storylines. The different line of story forms the two-part towards

explaining the relevance of attributes and reinforcers as embedding elements of farmers engagement in technology adoption practices.

The next chapter will integrate the conclusion and recommendations generated from the analysis of the data. It will also highlight the limitation of the study, coupled with the contribution of the study to knowledge in theory and practice.

## CHAPTER SIX – CONCLUSION

### 6.0 Introduction

Chapter six is structured as follows in Figure 24

**Figure 24: Structure of Chapter six**



This chapter revisits the objectives of the research as it relates to the literature and method. It makes the overall conclusion and recommendation from the study based on supportive arguments that guide the research process. The combination of the emerged storylines presents the outcome of the research and original contribution to knowledge. Section one and two highlights how the study achieved the research objectives and give relevant explanations to the research questions. The third section explains how the research objectives align with the evidence from the study. Section

four gives the full recommendation of the study based on the findings. The contribution of the research to knowledge comes up in section five, while section six highlights the limitations to the study. Pointing out the direction for future research concludes the chapter with an overall conclusion of the study.

### **6.1 Achieving the research objectives**

The study explores how successful pineapple farmers have been able to utilise the TAP to an advantage over other farmers. The study develops two research questions based on the identification of the research gap.

The two research questions formulated to achieve the research aim of this study are:

RQ1: How has farming practices enhance technology adoption in the production of pineapple fruits?

RQ2: How has the adoption of technology and farming practices in pineapple cultivation lead to a competitive advantage?

The above-stated research questions give insights to explain the objectives of the research study. The four primary objectives are:

1. To identify research gap through the exploration of ideas from stakeholders
2. To identify and explore pineapple farmers' competitive skills and associated capabilities that enhance technology adoption practices in pineapple cultivation.
3. To identify and explore emerging storylines from the data collection
4. To develop practical guidance and recommendations to pineapple farmers and the government based on findings from the research study.



Table 19 illustrates how the objectives link with the thesis and the research process.

**Table 19: Achievement of the research objectives**

Objectives	Chapter (s)	Research Process
To identify research gap through the exploration of ideas	1 and 2	Background Information Literature Review
To identify and explore pineapple farmers' competitive skills and associated capabilities that enhance technology adoption practices in pineapple cultivation	3 and 4	Methodology Data Analysis
To identify and explore emerging storylines from the data collection	4 and 5	Data Analysis Findings
To develop practical guidance and recommendations to pineapple farmers and the government based on findings from the research study.	6	Conclusion and Recommendation

The study achieved the first objective as extensively explored in chapters one and two. At the same time, the research gap was identified in chapter one, as depicted in figure 5. The study also achieved the second objective by analysing the empirical data to determine the competitive skills of the farmers, as discussed in chapter four. There are shreds of evidence from the data that explain the competitive skills and associated capabilities enhancing technology adoption practices (See appendices 18-22). The third objective was achieved in chapters four and five through the establishment of storylines that explain farmers engagement in adoption practices (see section 5.1). The

last objective of practical guidance and recommendation to pineapple farmers is discussed subsequently in this chapter. (see section 6.4)

The choice of grounded theory methodology in this study allows for different information-gathering methods (triangulation) suitable to determine an emergent theory that is grounded in the collected data rather than a reflection from the literature review. (see figures 13 and 17). The two storylines that explain the emerging theory of engaging technology adoption through farm practices are grounded in the empirical data collected to explain the phenomenon. Thus, the study achieved all the objectives earlier stated in chapter one.

## **6.2 Explanation to research questions**

Firms may pursue a differentiation strategy based on demand or supply to provide a product of improved quality. The demand involves understanding customers' needs and preferences. In contrast, supply involves being aware of the resources and capabilities that a firm can leverage to create uniqueness.

This thesis focuses on farm - level technology adoption practices as a farm strategy in Horticulture. It, therefore, views a competitive advantage from the supply side. The strategic resources at the farm level are numerous. However, technology adoption practices by pineapple farmers in Ejigbo community led to a competitive advantage in the production of pineapple in south-western Nigeria. Two thematic storylines explain the relevance of technology adoption practices (TAP) as a source of competitive advantage among farmers in Ejigbo community. The two storylines that have distinguished the identified strategic resource are categorised as the two dimensions towards engaging technology adoption through farm practices in pineapple production. These dimensions are identified as attributes and reinforcers. The characteristics of each aggregate dimension have been reflected throughout the empirical data collected and the discussion on findings. The research has addressed the purpose of the research identified in chapter one (See section 1.6).

For the stated purpose, the study has created a better understanding of how a strategic non-tangible resource can be used to explain competitiveness in agricultural production at the farm level. It, therefore, tries to look for a fit between strategic resource and competitive advantage by exploring the functional linkage of strategy and operations management from the resource-based view. These allow a gradual and consistent understanding of both strategy and operations management within the broader field of strategic management.

For the research to achieve its purpose, the thesis explores practice-based knowledge and extensive literature review on both competitive strategy and technology adoption with an emphasis on production in horticulture. The research study seeks to analyse the aggregate dimensions of competitive advantage that explain technology adoption practices through the storylines. These aggregate dimensions further seek to provide answers to the research questions raised at the beginning of the study.

The focus of the research relates to technology adoption practices in pineapple production processes and its linkage to competitive advantage in strategic management. The implications for the results and analysis go beyond the scope of the practice-based research. It extends to give recommendations to farmers and Government agency. The thematic analysis identified two direct linkages with TAP leading to the emergence of the theory. The storylines provide adequate answers to the research questions raised at the beginning of the research.

### **RQ1: How has farming practices enhance technology adoption in the production of pineapple fruits?**

The sub research question that emanates from this research question is: How do pineapple farmers view acceptance of technology adoption practices transfer from research institute?

Do the emerging storylines explain how farming practices enhance technology adoption in the production of pineapple fruits? The study gives insight and perception

of participants to the sub-question of how pineapple farmers view acceptance of technology adoption and practices transfer from research institute (NIHORT)

Three sub-categories emerged from the initial coding that led to the major category on attributes. The analysis gives a satisfactory answer to the first research question and its associated sub-question. The sub-categories of farming system, quality and farmers' objectives linked up to explain RQ1. Good agricultural practices and farm cultural practices coupled with routine farm practices are identified as motivating factors that contribute to TAP (Sec. 4.3). The characteristics of pineapple that contribute to its uniqueness and the intervention of NIHORT in the transfer of technology and practices also enhance TAP by pineapple farmers in Ejigbo (Sec. 5.1.1). The detailed analysis of major category on attributes explains the perception of the participants on technology adoption practices. (Sec.5.1).

Overall, the two storylines linked up to explain the perception of farmers on TAP in achieving a competitive advantage. The finding conforms to the study by Reed et al. (2000) where they argue that differentiation strategy enhances the quality of products such that quality management leads the organisation towards competitive advantage. Also, Zhou et al. (2009) in their study on market orientation, competitive advantage, and performance found out that creation of value leads to competitive advantage. These previous studies consider the achievement of competitive advantage through differentiation strategy as applied in the current study.

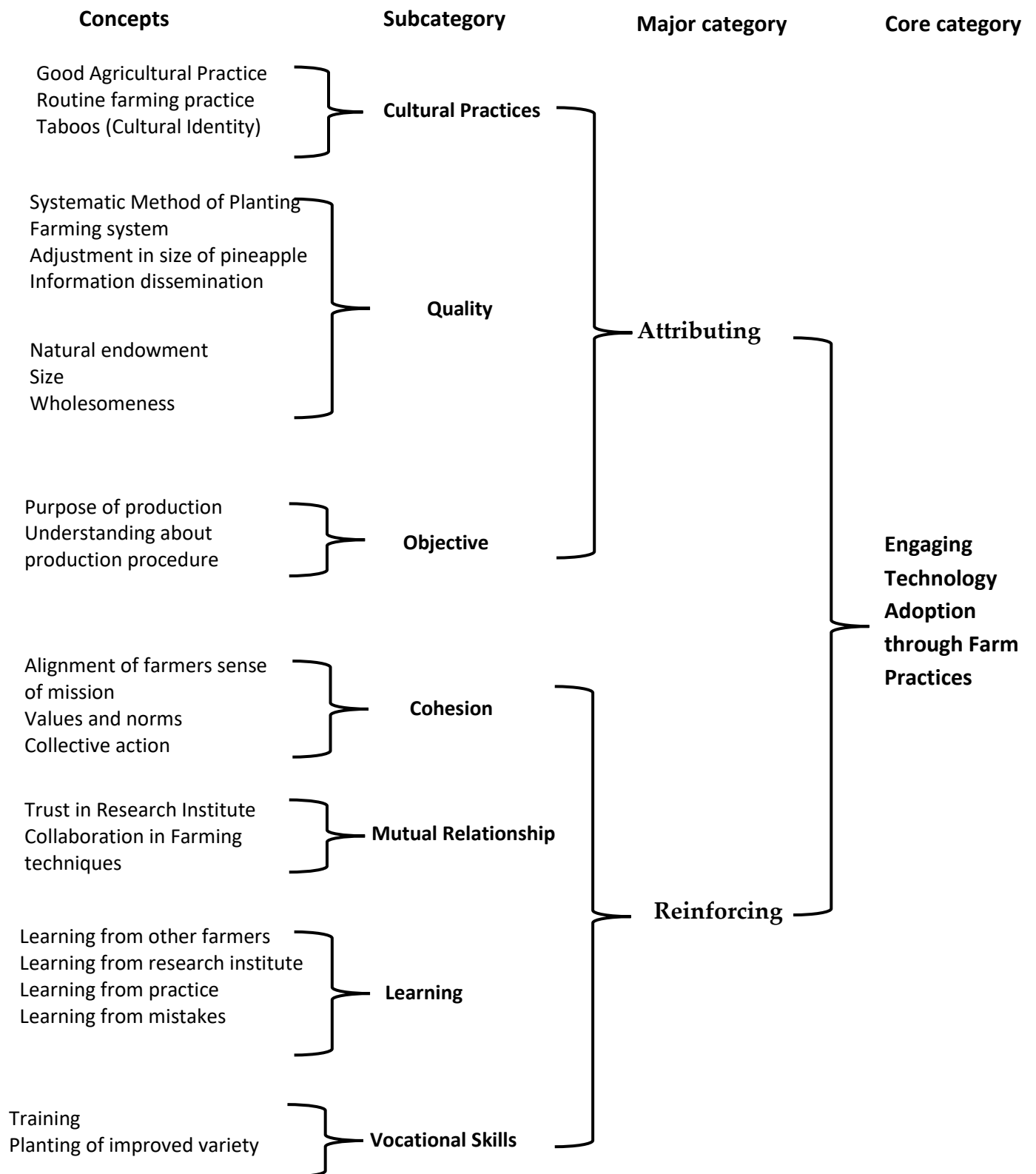
## **RQ2: How has the adoption of technology practices lead to a competitive advantage?**

In providing an answer to the second research question, the study considers the two criteria identified by previous research as aggregate dimensions to achieve competitive advantage. The combination of strategic resource with competitive skills of the farmers creates an advantage for farmers that adopt the planting of smooth

cayenne with associated practices. Thus, pineapple farmers develop reinforcing factors (see figure 17) to create a competitive edge.

From the analysis, the study finds out through the storylines (see chapter 5) that farmers could engage in technology adoption through farm practices to attain competitive advantage in horticultural farming. As an emphasis, previous studies indicate and confirm that firm-level resource can serve as a source of competitive advantage. However, they failed to provide an appropriate fit between TAP as a resource and competitive advantage. (see chapter 2) which serves as a complement to the recent study. The current study provides a linkage between TAP and dynamic capabilities of the farmers.

**Figure 25: Summary of factors leading to the emergence of the theory**



### 6.3 Alignment of objectives with evidence from the Research

The overarching subcategories cluster around the storyline to give a cross-analysis of sources of evidence through data triangulation. Table 20 presents a plethora of data sources and evidence from the study.

**Table 20: Overarching Subcategories and sources of evidence**

Overarching Subcategories	FFG SFG (10) TFG			IF (8)	IEA (2)	RS (1)	Total No of Sources (21)	Field Observation	Evidence
Cultural Practices	10			8	2	1	21	✓	FFGP1- FFGP10  IF1-IF8, IEA1- IEA2, RS
Quality	10			8	2	1	21	✓	FFGP1- FFGP10  IF1-IF8, IEA1- IEA2, IRS
Objective		10		8	2	1	21		SFGP1- SFGP10  IF1-IF8, IEA1- IEA2, RS
Cohesion			8	8	2	1	19	✓	TFGF1-TFGF8  IF1-IF8, IEA1- IEA2, RS
Mutual relationship		8		8	2	1	19		SFGF1-SFGF8, IF1-IF8,IEA1- IEA2, RS
Learning			10	8	2	1	21	✓	TFGP1- TFGP10,IF1-

Overarching Subcategories	FFG SFG (10) TFG			IF (8)	IEA (2)	RS (1)	Total No of Sources (21)	Field Observation	Evidence
									IF8, IEA1-IEA2, RS
Skills Development			10	8	2	1	21	✓	TFGP1-TFGP10, IF1-IF8, IEA1-IEA2, RS

Source: From the research study

FFG – First focus group; SFG – Second focus group; TFG – Third focus group; IF- Individual farmer interview; IEA – Individual Extension agent interview; RS - Research Scientist, P1 – Participant 1, P10 – Participant 10, F1 – Farmer 1, F8 – Farmer 8

The total number of sources of information is twenty-one. The focus group participants are considered as one. This is because the three foci groups are replicates that occur at different stages of production based on different subject of discussion (see section 3.7)

The thesis establishes the contribution to knowledge and practice by ascertaining that farmers make use of the technological resources in conjunction with competitive skills available to them on the farm to achieve competitive advantage. Table 21 illustrates how the research objectives align with the findings to achieve its contribution.



**Table 21: Alignment of research objectives and Findings**

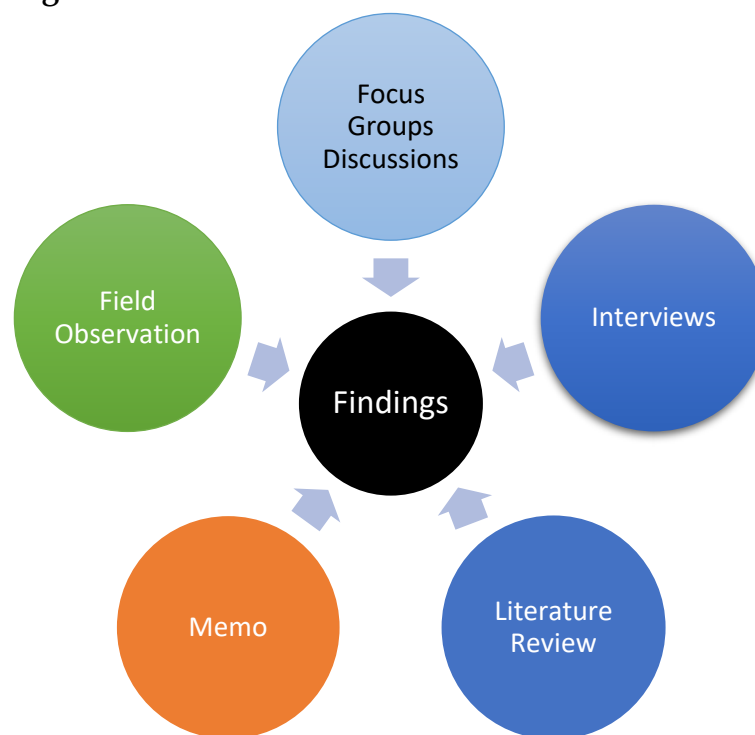
Research Question	Category	Storyline	Findings	Link with Research Objectives	Source of Evidence	Empirical Evidence	Reference Appendix
RQ1 - How has farming practices enhance technology adoption in the production of pineapple fruits?	Major category 1	Attributes	1. Production and product characteristics 2. Farmers Objective	1 and 2	FFG, SFG, TFG, FV, IF, IRS Photograph LR	FFGEA1, FFGF1, FFGF8, IEA1, IEA2, IF1, IF2, IF3, IF4, IF5, IF6, IF7, IF8, IRS, Frows et al. (2014), FAOSTAT (2017)  O Leary et al. (2017), Robert et al. (2017) Inman et al. (2018)	10,11, 15,18,19,20,21,22
RQ2 - How has the adoption of technology and farming practices in pineapple cultivation lead to a competitive advantage?	Major Category 2	Reinforcers	1. Farmers' Cohesion 2. Mutual relationship with the Change Agent 3. Learning 4. Skills Development	1 and 3	FFG, SFG, TFG, FV, IF, IRS Photograph LR	IF1, IF2, IF3, IF4, IF5, IF6, IF7, IRS, SFGF2, SFGF3, SFGF4, TFGF2, TFGF3, TFGF4, TFGF5, TFGF6, TFGF7, TFGF8, Mills et al. (2013), Pokharel & Choi (2015), Ng et al. (2017), Sachitra and Chong (2017),	10,20,21, 22

RQ1 and RQ2	Core Category	Engaging Technology Adoption through Farm Practices	Technological Resource and competitive skills constitute components of Competitive Advantage	1,2,3 and 4	FFG, SFG, TFG, FV, IF, IRS  Photograph  LR	FFGEA1, FFGF1, FFGF8, SFGF2, SGF6, IEA1, IEA2, IF1, IF2, IF3, IF4, IF5, IF6, IF7, IF8, IRS, McElwee (2006), Sommerville and McElwee, (2011), Mills et al. (2013), Pokharel & Choi (2015), Ng et al. (2017), Sachitra and Chong (2017), Ofuoku, (2020)	10,11,15,18,19, 20,21,22
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*FFG – First focus group; SFG – Second focus group; TFG – Third focus group; IF- Individual farmer interview; IEA – Individual Extension agent interview; IRS - Research Scientist, FV – Farm Visit; LR- Literature*

The contribution of the emerged theory of **engaging technology adoption through farm practices** (Figure 25) follows a rigorous grounded theory-methodological process and procedure (Strauss & Corbin , 1998 ). The robustness of the methodology was measured against Charmaz (2014) established criteria for grounded theory methodology. Figure 26 illustrates the convergence of evidence from data triangulation

**Figure 26: Convergence of Evidence**



**Credibility** – Evidence of credibility reflects the rigorous analytical procedure demonstrated in chapters 3 and 4 (see appendix 16). The research follows a constant comparison of data. It also follows an iterative method to achieve saturation. The connections between concepts and categories are grounded in the data with transparency in the emergence of the storylines. Also, there was adequate detail in the presentation of data. The evidence is supported in table 15 and appendix 15.

**Originality** – The emergence of sub and major categories give insights to what operates at the farm level. At the same time, the study addresses an identified gap in research (see sections 4.3 and 4.5). The findings provide evidence on how farmers engage in technology adoption through farm practices to achieve competitive advantage. In this regard, the study identifies an original contribution to knowledge and practice.

**Resonance** – The construction of meaning to codes were left for the participants. The analytical procedure leading to the emerging theory offered farmers and other

participants a deep insight into the research topic. The study achieves resonance through co-construction of meaning between focus group discussions, interviews, memo and field observation. Evidence of resonance is reflected in appendix 12.

**Usefulness** – The development of the major categories and its application to competitive advantage at farm level contributes to possible interpolations of data as well as practical insights. The abductive cycles of data analysis generate the two storylines. The study exposes pineapple farmers to how farming practices can enhance technology adoption in practice with an outcome of an increase in total production/output coupled with a decrease in the cost of production per hectare (see section 6.5).

**Methodological congruence** – The outcome of the analysis conforms with the aim of the study highlighted in chapter 2 (See Chapters 2, 4 and 5)

**Procedural precision** – The iterative procedure of the methodology ensures procedural precision. It also gives confidence to the participants to accept the findings and recommendations (see Chapter 3).

## **6.4 Recommendations**

The study identifies a knowledge gap between the procedure and process of farm practices at the farm level. It also ascertains the relevance of reinforcers as competitive skills that strengthen the adoption of farm practices.

- Producers of pineapple fruits should continuously be innovative to retain or improve their market share and economy of scale. Nigerian horticultural farmers must be proactive in the production of horticultural crops and product differentiation, which require an improved skill in horticultural production practices. However, such upgrading may not be automatic as farmers require adopting technology transferred from formal institution saddled with the responsibility to improve the livelihood of traditional farmers.

- Due to organisational barriers identified by participants, it is highly recommended to strengthen the flow of information between farmers and the research scientists through the pineapple farmers association. Furthermore, the agricultural development programme should provide adequate leadership training on the roles and responsibilities of leaders to executives of PFA.
- The element of trust in the leadership capabilities of PFA appears to be questionable. This, in no small extent, discourages farmers from forming a bond with the association. The study, therefore, recommends the need to have a trustworthy leadership team of the PFA. The study recommends the conduct of an appropriate leadership selection process.
- Although, the study reflects that pineapple farmers have trust in the change agent, however, the change agent needs to work collaboratively with farmers to boost the level of trusts reposed in it.

The change agent should encourage **informal training** of pineapple farmers through collaboration and field demonstrations. To complement the training of farmers, the study, therefore, recommends the establishment of a community learning group.

Community learning should:

- Be concerned with a thorough analysis of skills shortage and need of the farming community to have a learning set
- Encourage collective learning through community involvement, to incorporate farmers who are not usually involved in trying innovations.
- Create an appropriate synergy to strengthen community learning via the PFA, Extension workers and research institute
- Influence and align community learning towards the national objective on the development strategy for horticultural products.

#### **6.4.1 Implications for Strategic Management**

- Pineapple farmers should build their strategies on technology adoption and farm practices that improve both strategic resource and associated competitive skills.
- Pineapple farmers should continuously improve reinforcers that are essential to achieving a competitive advantage in a continually changing farming environment.
- Pineapple farmers should have a continual rethink of their scope and objective of production.

#### **6.5 Contributions to the knowledge**

The research study has taken a cursory look and in-depth thematic analysis through storylines from two dimensions to ascertain the relationship of TAP to attributes and reinforcers as contributors to achieving competitive advantage in the pineapple production process in Southwestern Nigeria. The study has demonstrated how farmers could engage in technology adoption through farm practices to achieve competitive advantage. It also serves as a guide to practising and potential pineapple farmers in strategic decision making.

A comparison of the empirically motivated technology adoption practices with existing literature on competitive advantage reveals the nuances of the link established between TAP and competitive advantage (See figure 5). The analysis in this current study reveals the synergies of the pineapple farmers and the research streams in agriculture.

The authenticity of this research and its contribution to knowledge is outstanding as it distinguishes the normative idea and approach towards production technology adoption among farmers, which hitherto has not been addressed in pineapple farming. Although some researchers looked at competitiveness in Agriculture, it has only been viewed from the positivist paradigm. The approach of grounded theory

methodology in this study gives insights to hidden qualitative information that was lacking in related research on technology adoption among farmers.

#### 6.5.1 Theory

The research offers insights into the realities of technology adoption in horticulture in a developing economy setting. The study sheds light on the link between attributes and the competitive skills within the farming community. The study further sheds light on the adoption practices that connect the production characteristics and competitive skills to the engagement of technology adoption through farm practices.

The research also contributes to knowledge by developing an in-depth qualitative methodological approach towards literature in strategic management. The paucity of research in this regard is filled by exploring the link between technology adoption practices and reinforcing competitive skills in horticulture, considering pineapple production as a case study. The study, through triangulation has provided a better understanding of linking farm differentiation strategy to operations management, thereby contributing to literature in strategy and operations management.

#### 6.5.2 Practice

The following deductions serve as a contribution of the study to knowledge in practice.

- The practical application of the research allows pineapple farmers and agricultural development programme (ADP) to design an appropriate process of planting suckers at the farm level. It also provides considerable evidence of a successful pineapple farmer and associated farmers' association in enhancing the production cycle of the crop.
- The findings from the study indicate that the cohesiveness of farmers and the mutual relationship of farmers with the research institute improves the

engagement of technology adoption practices as a farm strategy among pineapple farmers. It suggests that farmers could produce good quality pineapple fruits within a reduced time frame. The adoption of smooth cayenne and associated practices saves the farmer six months; which translates to a competitive advantage in practice

- The study exposes the importance of competitive skills of farmers as an enhancement to an increase in yield and output of matured pineapple fruits. In practice, pineapple farmers understand the relevance of developing the reinforcing elements in achieving competitive advantage.
- Furthermore, the study explores the relationship between research-extension linkage and pineapple farmers. It proffers a practical solution for an improved working relationship to achieve competitive advantage.

Overall, in practice, the current study considers practice-based farming activities to determine farm differentiation strategy guiding farm decisions. Thus, it makes a significant contribution to how well pineapple farmers manage technology adoption practices as a differentiation strategy to improve the production system.

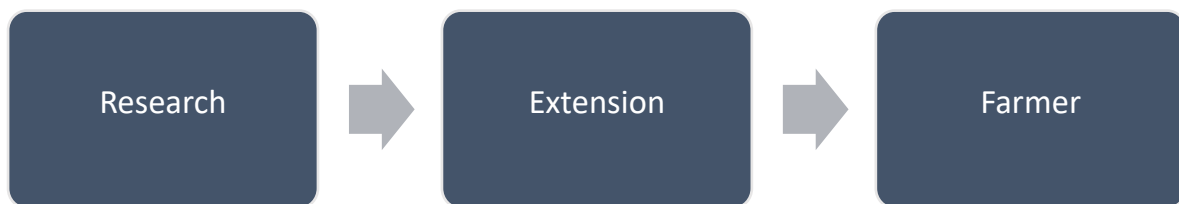
### 6.5.3 Policy Issues

The study seeks to advise the government on how the development of appropriate technology at the planting, weeding and harvesting stages of pineapple could improve the livelihood of pineapple farmers and farmers at large in Nigeria.

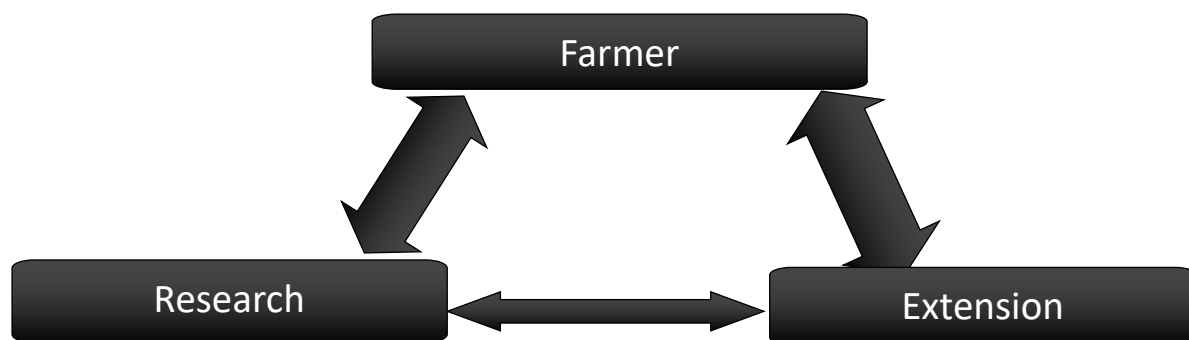
The policy message from this study is that the government should focus on the specific role of the research institute in skills development and training of farmers to promote an effective process for technology adoption practices in Nigeria. The policy could be implemented through the provision of adequate training facilities and infrastructures, establishment of effective and efficient communication channel and use of demonstration plots. The policy must also stipulate a mechanism to monitor the research institute for the effective delivery of purpose.



Government policy should ensure that the research institute conducts research and develop appropriate technology at different farming stages. Such technologies must be compatible with the needs of farmers. The finding from the study indicates that farmers recognise the need for a link between them and the researcher. However, the current level of relationship is linear, as illustrated below, where farmers relate with research scientist through extension agents.



The government, through policy intervention, should create appropriate synergy to incorporate and strengthen the working relationship among farmers, extension workers and the research institute (the custodian of the technology disseminated). In this regard, the Government should establish a policy that creates a triangular relationship between the farmers, the extension agents and the research scientists as illustrated below rather than the existing linear relationship.



Such a link will seek the active involvement of the farmers through the pineapple farmers association.

The government should establish a protocol that registers the farmers' association with Government institution who then validates and regulate the operations of the

association. The policy will safeguard the vulnerable farmers and put sanity into the abuse of power. The policy will also enhance the status of farmers as professionals.

The policy implication can be generalised to all technologies relating to the production of crops in any developing economy

## **6.6 Limitations of the Study**

The research study faces some limitation.

1. The first limitation arises from the grounded assumptions that the participants constructing their professional realities are knowledgeable in the art of farming and production of pineapples.
2. The research also makes fundamental assumptions about the knowledge of the researcher in carrying out qualitative studies. It assumes that the researcher can figure out patterns in the data to link up relationships between concepts and aggregate dimensions accurately thereby resulting to a limited demonstration of connections among data, the emerging concepts and resulting grounded theory
3. The third limitation arises from the method of coding the data. Initially, data coding was using the software NVivo 10. The researcher later resulted in manual coding for better understanding and identification of codes. The data were coded, and identification of the categories in the data was carried out by me. At the same time, the analysis was discussed with my research supervisor. Although, the process allowed for consistency in the operating method, however, it fails to give multiple dimensions from different expertise. When using this method for another study, the coding of data could involve several individuals to allow for different perspectives such that the categories will be developed with varying expertise experience including a panel of experts and participants.
4. Another limitation arises from the purposive sampling used by me, which has an inherent potential for bias. Purposive sampling strategies may produce a biased

sample (Bogdan & Biklen , 2006 ). The researcher is aware of this potential limitation of the study and shares the same with the readers (Collet-Klingenberg & Kolb , 2011).

5. Lastly, although, I tried not to allow my personal view and individual biases as contributing factors that may influence the study. However, such biases cannot be guaranteed to have complete elimination.

Although the inability to generalise findings is considered a limitation in qualitative research with particular reference to case study methodology, this is due to small sample size in a case study research with findings relating to a phenomenon within a specific context. However, the focus of the study is to generate an in-depth understanding of the storyline that explains the emerged theory. Therefore, it seeks to analytically generalise the findings at the farm level, which can be extrapolated to horticultural crops in general.

## **6.7 Future Research**

The research establishes that attributes such as farming system, fruit quality and mindset enhance the production of pineapple while community cohesion, mutual relationship with change agent, learning from errors and skills development through training foster and strengthen competitiveness at the farm level. The findings suggest that the passion of the farmers for pineapple cultivation lies in the passion for the crop supported by the attributing elements while the dynamic reinforcing capabilities strengthen the competitiveness. It will be interesting to extend the current research findings to find out how to penetrate the international market for pineapple. Thus, try to investigate how pineapple production in rural Nigeria may contribute to both food security and export in the agricultural supply chain. It could be carried out by exploring the possibility of the influence of the storylines on horticultural farming.

## **6.8 Overall Conclusion**

The study aims to investigate how farming practices enhance technology adoption within the horticultural farm setting. It also extends investigation to how the adoption of technology and farm practices support competitive strategy at the farm level.

The study considers a Straussian grounded methodological approach to explore the adoption of farm practices support for competitiveness. The storylines grounded in the data explain the phenomenon that emerged from the study.

Findings from the study generate two storylines and reveal that attributes such as farming system, fruit quality and mindset enhance the production of pineapple while community cohesion, mutual relationship with change agent, learning from errors and skills development through training foster and strengthen competitiveness at the farm level. The study argues that strategic resource such as technology adoption and farm practices as well as dynamic reinforcing capabilities combine to strengthen the level of competitiveness. The evidence suggests that the differentiation strategy employed through technology adoption practices supports competitiveness.

The research recommends that agricultural and rural development policy should focus on supporting farmers through reinforcing competitive skills.

Overall, the research contributes to the general body of knowledge in the field of strategic management and specifically makes a significant contribution to how well pineapple farmers can adopt differentiation strategy through technology adoption practices to manage their production system.

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## APPENDICES

### Appendix 1 First focus group discussion with probes

Moderator - What do you understand about technology adoption practices in pineapple farming?

Moderator - Can you explain what you mean by “when to do it”?

Moderator - What do you mean by good practices?

Moderator - Can you tell me about the importance of technology adoption practice in pineapple farming?

Moderator - Can you tell me what you mean by (us) and better gain?

Moderator - Kindly explain what you mean by change in method and belief.

Moderator - Can you give an example of such interference on belief.

Moderator - How will you assess your likelihood of effectively managing and considering technology adoption practices.

Moderator - How will you find out its impact on the final yield? Can you explain it better?

Moderator - What about if the extension agent informs you that the practices are good and efficient and thereby encourage you to try the practice.

Moderator - Can you tell us what you mean by management practice?

## **Appendix 2 Second focus group discussion with probes**

- Moderator - Which resources can you consider to be relevant in pineapple production?
- Moderator - Can you explain what you mean by physical and human resources?
- Moderator - Can you explain what you mean by those resources we can see and those we cannot see?
- Moderator - Can you explain further what you referred to as tangible and intangible resources?
- Moderator - What is your view about the effect of technology adoption practices on competitive advantage?
- Moderator - Why do you say that it may or may not?
- Moderator - What do you think can serve as motivation for the will to do it?
- Moderator - It appears you have a lot to talk about; do you want to go on?
- Moderator - Apart from technology adoption, what other resource do you think can lead to competitive advantage in pineapple production?

### **Appendix 3 Third focus group discussion with probes**

- Moderator - Why do you think consumers of pineapple prefer pineapples from Ejigbo
- Moderator - Can you please tell me what you mean by good quality?
- Moderator - You mentioned local consumers, what about international trade of pineapple.
- Moderator - Can you tell me how you view the adoption of technology practice in pineapple farming brought to you by Research Institute?
- Moderator - Can you tell me some of the practices with high risk?
- Moderator - Can you please give a proportion of what you mean by the majority of our farmers
- Moderator - What is true?
- Moderator - Can you tell me how competitive advantage in Ejigbo could be prolonged in Ejigbo community?
- Moderator - Can you re-mention the resources you are talking about?
- Moderator - How do you think technology adoption practices can be used to sustain competitive advantage in the production of pineapples
- Moderator - If you could add any feature to improving the production of pineapple apart from technology adoption practices, what would it be?
- Moderator - It appears most of us emphasise on learning either collective or individual plus experience. How do you access learning to improve the production of pineapple
- Moderator - How has the adoption of technology practices lead to a change of ideas in the production of pineapple
- Moderator - Can you explain what you mean by wasting resources?
- Moderator - Can you tell me why farmers may not want to implement change
- Moderator - How?



## **Appendix 4 Farmers/extension agents interview questions**

- Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?
- Q2. Can you tell me about the effect of education on technology adoption practice?
- Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?
- Q4. What are the resources that give an advantage to pineapple fruit production in Ejigbo community?
- Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?
- Q6. What are the farming practices associated with technology adoption in pineapples production?
- Q7. What will be your position and effort to sustain the advantage in the production pineapple within your community?
- Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?
- Q9. What is the role of the organised pineapple farmers' association?
- Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?
- Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?

## **Appendix 5 Interview questions for research scientist**

**Researcher** – How do you think farmers view technology adoption in pineapple practical farming?  
How can you relate this to pineapple farmers' activities in Ejigbo Community?

**Researcher** - How can technology adoption practices lead to increased production of pineapple fruits?

**Researcher** - How do farmers benefit from the research on technology adoption practices?

**Researcher** – How can the adoption of technology on suckers lead to competitive advantage among farmers?

**Researcher** – How can NIHORT encourage farmers to adopt technology adoption practices?

**Researcher** – Can you explain what you mean by prescriptive? *probe Question*

**Researcher** – Can you explain further what you mean by interrelated series? *Probe Question*

**Researcher**- What do you mean by economic factors? *Probe Question*

**Researcher** – How can the motivation of farmers to technology adoption practices lead to technological change?

**Researcher** – How do NIHORT view education and training as a tool for knowledge in technology adoption practices?

## Appendix 6 Information letter and consent form

The University of Huddersfield, UK (U0867598)

Date:

Dear *Participant*,

I am a doctoral research student in Business Administration in the Department of *People, Management and Organisation* at the University of Huddersfield, the UK researching under the supervision of Professor *David Bamford*. I am researching the “Empirical Investigation of Technology Adoption Practices as a source of competitive advantage among pineapple farmers in Ejigbo, Nigeria”.

Technology adoption research has shown that farmers do not adopt in totality the technology transferred to them from research institutes. Some farmers even reject some of the technology transfer. The study will look at these two sets of farmers identifying the impact of technology on a competitive advantage.

There are two stages to this project. The first stage consists of two phases. In the first phase, focus group interview method will be employed while the second phase involves an individual farmer’s interview.

The second phase of the study involves follow-up interviews with those who are willing from the focus group discussion. Participation in the interview would be entirely voluntary, and you may decline to answer any questions you prefer not to answer. Your involvement in the first phase of the study does not oblige you to participate in the second part. I shall contact you in about one week to determine if you would be willing to participate and to decide on a mutually convenient time and location. You may indicate your preference at this time. The second stage will involve the use of semi interview to explore into issues raised at the first stage of focus group discussion. Completion of the interview would take *fifteen minutes* of your time and maybe filled out by you or support from the research assistant.

Kindly note that all information provided in this study will be kept confidential. Furthermore, the thesis or any emanating report or publication will not reflect the identification of the participants. There are no known or anticipated risks to participation in this study.

If you have any questions about this study or would like additional information to assist you in deciding against participating, please feel free to contact Professor *David Bamford* at [d.r.bamford@hud.ac.uk](mailto:d.r.bamford@hud.ac.uk) or me, *Moshood Oladapo*, at [Moshood.Oladapo@hud.ac.uk](mailto:Moshood.Oladapo@hud.ac.uk).

Thank you for your co-operation in the research.

Yours sincerely,

Moshood Oladapo (Student Investigator)

## **Appendix 7 Dba research study**

DEPARTMENT OF PEOPLES, MANAGEMENT AND ORGANISATION

THE BUSINESS SCHOOL

THE UNIVERSITY OF HUDDERSFIELD, UNITED KINGDOM

### **CONSENT FORM ON “AN EMPIRICAL INVESTIGATION INTO TECHNOLOGY ADOPTION PRACTICES AS A SOURCE OF COMPETITIVE ADVANTAGE AMONG PINEAPPLE FARMERS IN EJIGBO, NIGERIA”**

**Focus Group Purpose:** Provision of in-depth knowledge and understanding of the adoption of technology as a source of competitive advantage among Pineapple farmers in Ejigbo, Nigeria.

I agree to take part in the research study: “An Empirical Investigation into Technology Adoption Practices as a source of Competitive advantage among Pineapple farmers in Ejigbo, Nigeria.”

The purpose of the research has been explained to me properly, and I confirm that I understand the purpose of the study as described. I understand that agreeing to take part means that I am willing to:

1. Agree to be involved in a focus group discussion
2. Agree to grant an individual interview if required
3. Agree to allow the focus group and individual interview to be audiotaped.

I understand that my participation is voluntary. I also understand that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I understand that any data that the researcher extracts from the focus group or the interview for use in reports or will not, under any circumstances, contain identifying characteristics.

**Participant’s Name:**

**Signature:**

**Date:**

## Appendix 8 Consent form for phase-two interview

Department of People, Management and Organisation

University of Huddersfield, UK

Date:

Dear *Participant*,

I would like to thank you for agreeing to participate in a follow-up interview. The interview is a fundamental component of my DBA research on technology adoption practices as a source of competitive advantage in pineapple production. The interview aims to explore further some of the responses that you have made in the focus group.

Completion of the interview is expected to take about *fifteen minutes*. You may decline to answer any question that you prefer not to answer, and you may stop the interview at any time. Kindly note that your participation is completely voluntary.

If there are any questions about this study or would like additional information to assist you in deciding against participating, please feel free to contact Professor *David Bamford* at [d.r.bamford@hud.ac.uk](mailto:d.r.bamford@hud.ac.uk) or me, *Moshood Oladapo*, at [Moshood.Oladapo@hud.ac.uk](mailto:Moshood.Oladapo@hud.ac.uk).

Yours sincerely,

*Moshood Oladapo*

## Appendix 9 Research institute consent



### NATIONAL HORTICULTURAL RESEARCH INSTITUTE

*Federal Ministry of Agriculture And Water Resources*

Tel.: 234(02)2412230, 2412501  
E-mail: nihortinfo@yahoo.com  
Web Site: www.nihort.org



Idi-Ishin,  
Jericho Reservation Area,  
P.M.B. 5432, Ibadan,  
Oyo State,  
Nigeria.

Our Ref.: FVC 56/111/2015 ...

Date:.. 16/4/2015 .....

Dr. Moshood Oladapo,  
Department of People, Management and Organisation,  
University of Huddersfield Business School,  
University of Huddersfield  
HD1 3DH

Dear Dr. Oladapo

#### CONSENT FOR INTERVIEW /AUDIO TAPING

Greetings from the National Horticultural Research Institute, Ibadan/Nigeria.  
On behalf of the Institute, as a support in the study on "Empirical Investigation of technology adoption practices as a source of competitive advantage among pineapple farmers in Ejigbo, Nigeria", I wish to confirm the Management's consent and approval for interview and audiotape of interview for the exclusive purpose of the research study as well as a means of verifying results from other data collected.

Kindly note that the Institute reserves the right to withdraw this consent at any time without penalty.

Best wishes on your research study.

Yours faithfully,

Dr B A Adelaja  
DIRECTOR, FRUITS & SPICES RESEARCH



## Appendix 10 Field visits

### FIELD OBSERVATION BEFORE THE FIRST FOCUS GROUP MEETING



Source: Field Visit

### FIELD OBSERVATION BEFORE THE SECOND FOCUS GROUP MEETING



Source: Field Visit



## FIELD OBSERVATION AFTER THE THIRD FOCUS GROUP MEETING



Source: Field Visit



## AN IMAGE OF PINEAPPLE PLOT AT PLANTING STAGE



Source: Field Visit



## AN IMAGE OF PINEAPPLE PLOT AT WEEDING STAGE



Source: Field Visit



## AN IMAGE OF PINEAPPLE PLOT AT HARVESTING STAGE



Source: Field Visit

## **Appendix 11: Samples of memo**

### **Memo after the initial meeting on 16/07/2015**

The farmers informed me of the necessity to fix my interview focus group discussion on a Thursday when the majority of the farmers will be available and possibly in a relaxed mood to offer answers to my research question.

The implication of the statement is that majority of the participants will be ready to offer their responses on the PFA meeting day.

### **Memo at the initial coding.**

I used a combination of different codes initially to arrive at a reduced number of codes as there were over one hundred and fifty codes generated at the first level of open coding. On my visit to farmers plot on ...., I found out that the non-adopters have adopted some of the farm principles at the planting/planning stage. This sensitised me to ask further questions relating to adaptation in the second focus group meeting to allow for theoretical sensitivity.

### **Memo on the axial code**

I realised that the farmers used the plural case of “we” to refer to individual response during the focus group meeting. This implies to me that the framers believe in collective actions in farm practices. It is also evident in the response relating to “aaro ad arokodoko” which interprets to mean joint efforts to support individual farmers and demonstrate farm principles. I also observe the sharing of actions in individual plots as farmers plot are a replica of one another.

### **Memo on open an axial code.**

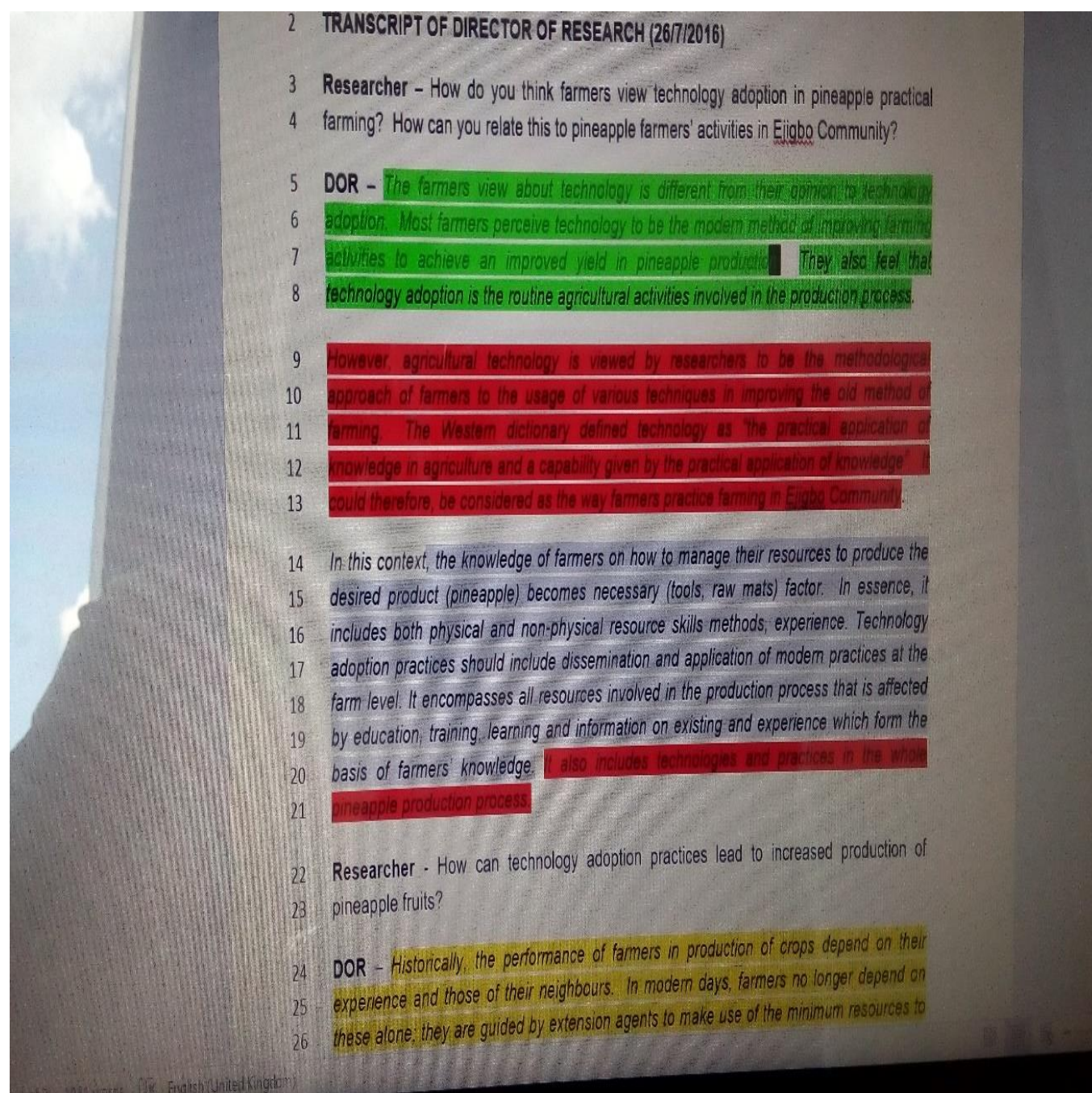
I got confused about the term open and first-order coding as there are different nomenclature about coding in GTM. I find it difficult to ascertain the relationship between different types of nomenclature. I, therefore, decided to stick to the nomenclature of Strauss and Corbin (1998).

### **Memo after the third focus group field visit**

Extant literature indicated that maturity of pineapple raised from suckers takes sixteen months. I found out that mature pineapple fruits could be harvested from the fifteenth month. The maturity depends on the time farmers induce the flowers. Early flower inducement shortens the maturity period.



## Appendix 12: Sample of the line by line data coding



## Appendix 13: Reduced initial data code

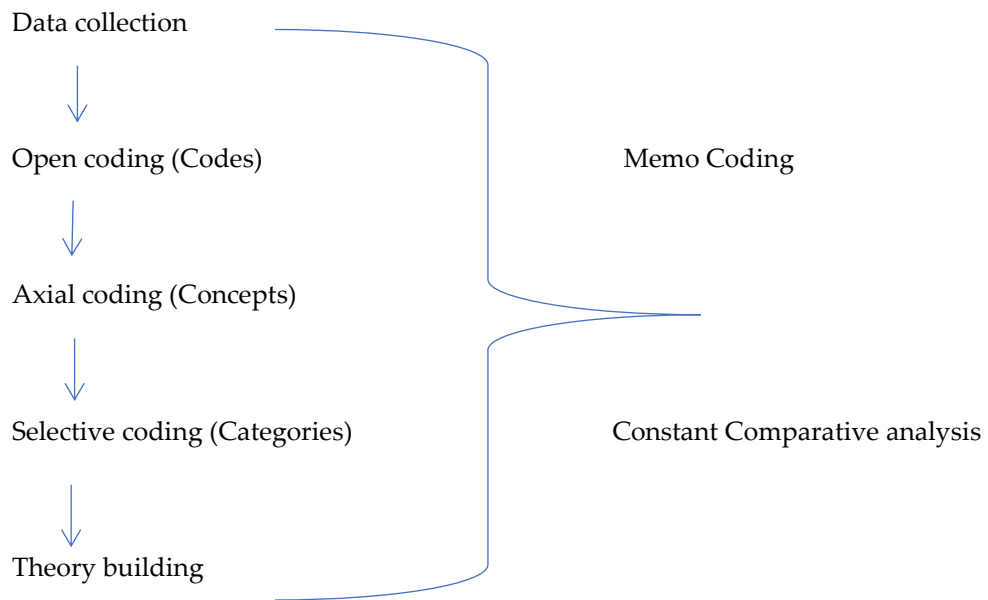
~~Reduced~~ Initial Codes

1. Farm management practices
2. Routine practices
3. Quality
4. Learning education
5. Government support
6. Natural resources as competitive advantage
7. Learning as negative impact
8. Non sustainability
9. Lack of information regarding institutional standard
10. Subsidy marketing credit
11. constraints
12. shortage of labour, shortage of planting material
13. organisational change
14. scientific mechanism
15. creativity
16. size
17. uniqueness
18. training experience
19. innovation
20. Ltd access to location
21. Physical location
22. Technology adoption practices
23. New skills
24. TAP
25. Marketing
26. Achievement
27. Incompetent leadership
28. Taboo
29. High cost of chemicals
30. Explorative learning
31. No government support
32. Cultural practices
33. Domestic production refund
34. Exploratory learning
35. Profit
36. Timing
37. International trade increases price
38. Domestic trade decreases trade
39. Motivation
40. Improved planting materials
41. Spacing
42. Knowledge generation
43. Insecurity of leaders

(44) Flexibility

(45) Competition

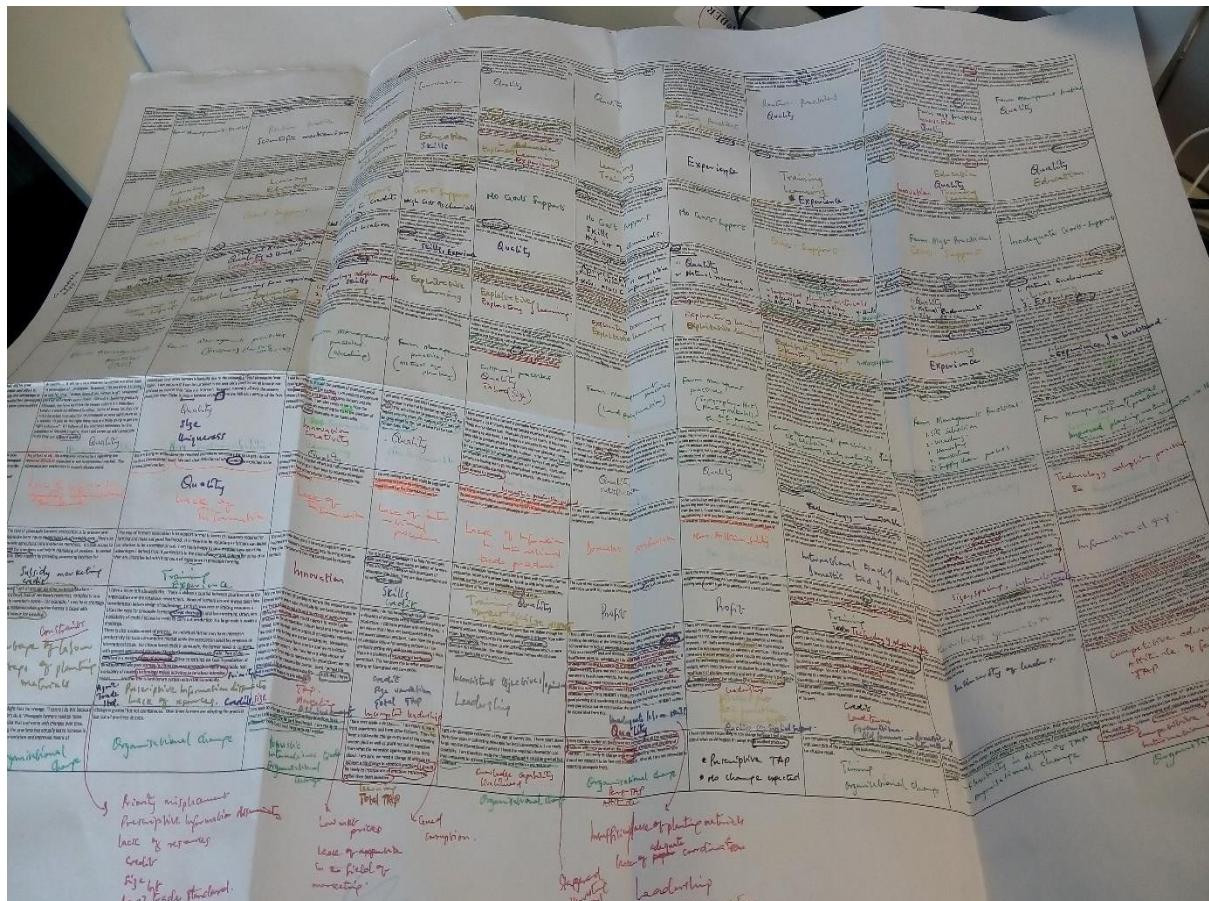
## Appendix 14: Visual representation of data analysis procedure



Source: Adapted from Charmaz (2014)



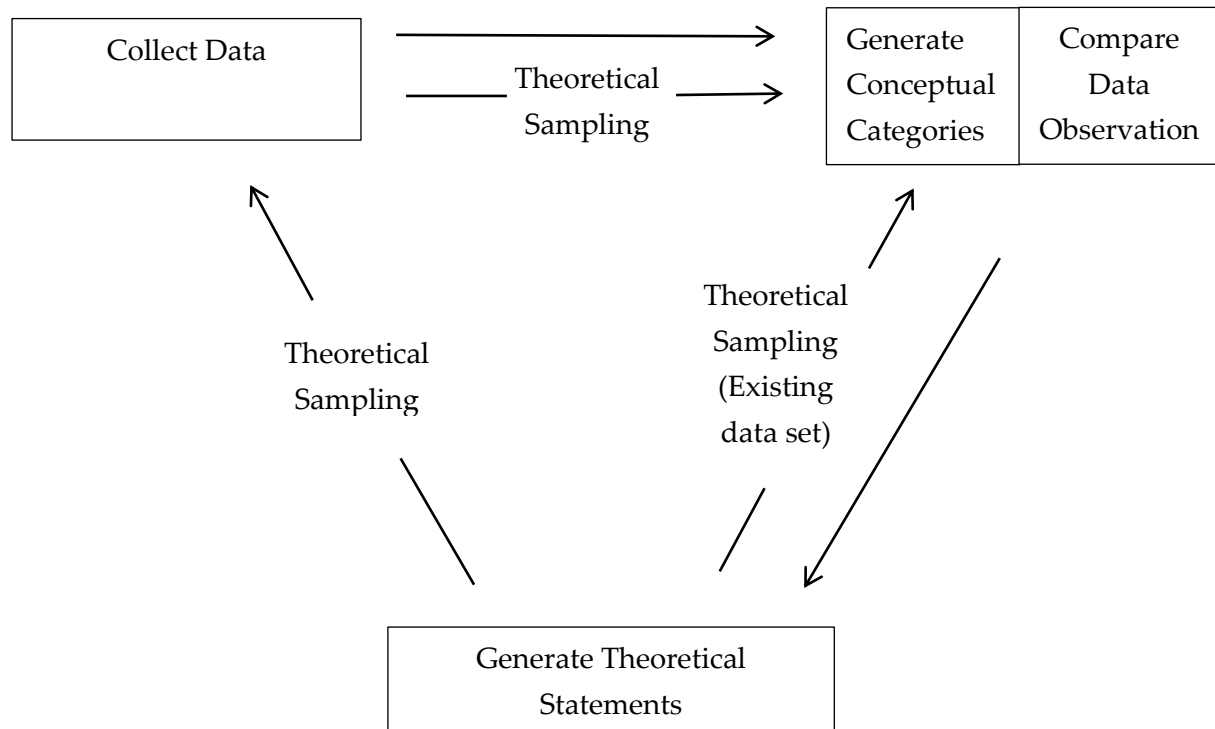
## Appendix 15: Data analysis





## Appendix 16 Straussian grounded theory process

Grounded Theory's Recursive Analytic Operations (Locke, 1996, p.240)



## Appendix 17 Abstraction from code

Category	Initial codes	Final Codes
Attributing	Routine Practices, cultural practices Farm Management Practices Planting materials. Quality Spacing	Cultural practices
Low Market Prices	Natural Resources Flexibility	Process Quality
Achievement Govt support	Scientific mech. Size competition <b>Uniqueness</b> Access to location physical location marketing	Product Quality
		Shared Vision
		Farmers' <b>objective</b>
		Mutual relations
Reinforcing	Creativity motivation Learning education Exploratory learning Experiment learning Exploitative learning Organisation learning Learning from mistake Achievement Incompetence Innovation Negative impact learning Insecurity of leaders Knowledge generation Training	Learning
		Skill

## Appendix 18 First focus group meeting (planting stage)

**Moderator - What do you understand about technology adoption practices in pineapple farming?**

Farmer 6 - Technology adoption is the incorporation of what is learnt from other farmers and extension agents to improve the production of pineapple production

Farmer 2 - Hmnnn..... Technology adoption practices are different from technology adoption. The practices involve what we do base on the advice of extension agents to improve production.

Farmer 1 - Technology adoption practices involve the routine practices carried out from the planting stage of pineapple to the harvesting stage. It incorporates weeding, application of fertilizers, herbicides and other routine practices.

Farmer 5 - Technology adoption practices basically understands what routine to be carried out to improve the production of pineapple and when to do it

**Moderator - Can you explain what you mean by “when to do it”?**

Farmer 5 -Period of pineapple production requires different cultural practices. There are different times in the gestation period requiring different practises boosting the production of pineapple. For instance, the weeding practice is different from fertilizer application time while there is time for carbide application to induce flowering. All these are practices that improve production and marketing of pineapple fruits.

*Extension agent 1 – Technology adoption is a process whereby farmers are encouraged to take up different technologies developed by Research Institute to improve both competitiveness of the product (pineapple) as well as improve means of livelihood of the farmers. However, the practices involved in the technology adoption process are numerous ranging from the selection of planting materials, planting of planting materials, spacing, weeding, application of herbicides, fertilizers and flower induction leading to harvesting and marketing. All these operations involve good practices that could enhance and improve the production of pineapple.*

**Moderator - What do you mean by good practices?**

*Extension agent 1 - Good practices include doing what the research institute recommends at each operational level, at the right time and in the right quantity. It includes both experience and learning from other farmers.*

*Extension Agent 2 - Anyway, to me, good practices incorporate what is expected as routine farm operations by the farmers from planting of suckers/planting materials till harvesting. It also includes post-harvest expected routine practices, including marketing or trade of the commodity. It is holistic – involving all aspects of the pineapple supply chain. A good practice is an integral of “good agricultural practice (GAP) identified and emphasised by food and agricultural organisation (FAO). In this context, GAP has different meanings – it could be used to refer to private, voluntary and non-regulatory applications that are being developed in different forms by the private sector and government researchers to meet farmers’ and consumer needs within the food production chain. In this context, it is holistic – involving all aspect of learning and transfer of knowledge on the pineapple supply chain.*

**Moderator - Can you tell me about the importance of technology adoption practice in pineapple farming?**

Farmer 8 - Learning and transfer of knowledge from one generation of farmers to another is part of good practice. A good practice is related to the age of farmers and the experience of the farmers.

Farmer 2 - Adoption of technology improves the quality, time-saving, reduction of cost of operations, improving yield, adjustment to required market requirement.

Farmer 7 - Adoption of technology practice makes us make a better gain (profit) from our business.

**Moderator - Can you tell me what you mean by (us) and better gain?**

Farmer 7 - By us, I am referring to the pineapple farmers. I mean the farmers that consider adoption practices to be relevant. Better gain is meant to be improved profit from a reduction in the cost of production.

Farmer 4 - Adopting technology practices is important because it allows pineapple farmers to participate and make an improved profit from a rapidly changing world of farming. Farmers that do not adapt will increasingly limit their ability on financial freedom to be gained from adoption.

Farmer 8 - Hmmmm... Adoption of practices improves the quality of pineapple produced as well as adjustment of size to suit consumers' market requirement

Farmer 3 - Adoption is relevant since it points to the area of knowledge acquisition and learning and can eventually lead to a change in method and belief.

**Moderator - Kindly explain what you mean by change in method and belief.**

Farmer 3 - By change, I mean that leaving the different method or approach at times lead to change in the art of our farming practices which may interfere with our belief on farming practice.

**Moderator - Can you give an example of such interference on belief.**

Farmer 3 - Yes, one of it is that reducing spacing to reduce the size of fruit may reduce the sugar content of the fruit, thereby making it less marketable.

*Extension Agent 2 - No. Reducing the spacing of pineapple suckers does not necessarily lead to a reduction in the sugar content of the pineapple fruit. It will only adjust the size of the matured pineapple fruit.*

Farmer 4 - The importance of adopting technology practices is not limited to farmer's view alone but as well makes pineapple farmers better learners and improve in the expertise expected from the farmers.

**Moderator - How will you assess your likelihood of effectively managing and considering technology adoption practices.**

Farmer 6 - Adoption practices depend on the usefulness and ease or difficulty of adoption. I will always consider "what practice are we encouraged to adopt"?

Farmer 4 - Apart from what farmer 6 said, I will want to find out how it works or its impact on the final output or yield.

**Moderator - How will you find out its impact on the final yield? Can you explain it better?**

Farmer 4 - I will find out by checking from other farmers that have tried the practice rather than me to take the risk of first to adopt the practice. If nobody has tried it before, then I will not take the risk.

**Moderator - What about if the extension agent informs you that the practices are good and efficient and thereby encourage you to try the practice.**

Farmer 4 - I will want to witness and see a practical demonstration and its effect on the research demonstration plot.

Farmer 7 - In my own case, I will want to find out if there is no better practice of adopting the technology. If there is none available, then there is highly likely for me to adopt the risk of being the first farmer to try the adoption practice introduced by extension agents.

Farmer 8 - The likelihood for me to consider technology adaption practice in the production of pineapple is assessing my ability to master and put into practice the skills expected to improve the production process.

Farmer 1 - I will want to try any practice introduced by extension agent but with the intention and practical learning on how other farmers do it.

Farmer 5 - As an experienced farmer, I will always consider the consequence of adopting the technology practice before adoption.

Farmer 3 - My skills in the area of the technology transferred by extension agent will, to a large extent, determine my likelihood of adopting the technology practice.

*Extension Agent 1 - Concerns of pineapple farmers in adopting technology ranges from the management practice to the effects of the consequences on the production.*

**Moderator - Can you tell us what you mean by management practice?**

*Extension Agent 1 - Management practice is the skills required by farmers to maintain their pineapple plots during the period of planting to harvesting. It is therefore related to training and learning of ideas based on older farmers experience and the residual knowledge of the farmer.*

## **Appendix 19 Second focus group meeting (farm management/weeding stage)**

**Moderator - Which resources can you consider to be relevant in pineapple production?**

Farmer 6 - There are a lot of resources necessary in the production of pineapple. Some of these resources include physical and human resources.

**Moderator - Can you explain what you mean by physical and human resources?**

Farmer 6 - Physical resource includes all the tools and materials needed for production while human resources are the resources such as labour required for different practices

Farmer 1 - The resources required for production are those mentioned by farmer 6, but I think it required financial resources as well, which involves money and required fund for different operations.

Farmer 8 - Resources can be categorised into two. Those resources that we can see and those resources that we can not see.

**Moderator - Can you explain what you mean by those resources we can see and those we cannot see?**

Farmer 8 - The resources we can see are physical, financial, and human as explained by farmer 1 and farmer 6. However, those we cannot see include the climate, weather, learning, knowledge and experience and technology adoption.

*Extension Agent 2: I think resources can be categorised into 2, namely tangible and intangible.*

**Moderator - Can you explain further what you referred to as tangible and intangible resources?**

*Extension Agent 2: Tangible resources are human, physical, organisational and financial resources while intangible resources are a social, cultural, reputational and positional resource which include technology adoption practices*

*Extension Agent 1: Organisational capability is another form of resource that can encourage a competitive advantage. I know you may ask me what I mean by organisational capability – (laugh). It is a resource from the perspective of knowledge, skill and ability. The main factors of these are experience and information referred to as knowledge transfer leading to learning.*

Farmer 2 - Adoption of new methods of practices in the farming of pineapple and marketing strategy is another resource that cannot be seen.

Farmer 6 - Experience can also be an unseen resource as it contributes to the expected output from the production of pineapple.

**Moderator - What is your view about the effect of technology adoption practices on competitive advantage?**

Farmer 5 - Technology adoption practices are expected to improve production output/yield. Personally, it may or may not depending on the knowledge, expertise and experience.

**Moderator - Why do you say that it may or may not?**

Farmer 5 - Farming processes involves timing. There is time for everything. If weeding is not done at the appropriate time, then the impact of the adoption practice could be negative to the overall expected output from the pineapple at the end of the season.

*Extension Agent 1 – Technology adoption practice assuming operations and activities are carried out at the right time, and right direction will lead to either cost advantage in production, or quality improvement, which leads to competitive advantage.*

Farmer 8 - Technology adoption will lead to an advantage in production

Farmer 3 -The reason why we are in the business of pineapple is to improve our livelihood. Adopting technology practices based on advice from experts give us an advantage over other pineapple producers in the country.

Farmer 1 - Technology adoption practices as encouraged by NIHORT is a positive tool towards achieving competitive advantage in the production of pineapple.

Farmer 4 - Technology adoption practices is a necessary condition but the will to do it is very important. Thus, it is the will to practice technology adoption practices that drives or leads to competitive advantage.

**Moderator - What do you think can serve as motivation for the will to do it?**

Farmer 4 - Government incentives, education, experience on the job, political stability, family pressure for cash.

**Moderator - It appears you have a lot to talk about; do you want to go on?**

Farmer 4 - Let me stop there.

**Moderator - Apart from technology adoption, what other resource do you think can lead to competitive advantage in pineapple production?**

Farmer 6 - Knowledge and experience

Farmer 2 - Education

Farmer 4 - Learning and quality of suckers

Farmer 5 - Environmental factors

Farmer 3 - Experience and continuous learning

Farmer 7 - Credit and availability of fund

Farmer 1 - Knowledge, learning, education and availability of labour

Farmer 8 - Collective learning and experience

## **Appendix 20 Third focus group meeting (flower induction/harvesting stage)**

**Moderator - Why do you think consumers of pineapple prefer pineapples from Ejigbo**

Farmer 7 - Pineapples from our soil is always sweet and juicy with a lot of sugar content.

Farmer 2 - Methinks ..... Our pineapple is always very sweet with good quality.

**Moderator - Can you please tell me what you mean by good quality?**

Farmer 2 - By good quality, I mean that Ejigbo pineapple is very juicy with a high level of vitamins, big compared to other pineapples in other communities.

Farmer 5 - We have a natural endowment of good climate, soil and planting suckers that gives us an edge over other producers of pineapples in the neighbouring communities. Thus, our yield is high; the size of pineapple is big; local consumers prefer big pineapple fruits.

**Moderator - You mentioned local consumers, what about international trade of pineapple.**

Farmer 5 - We do not know what the international consumers require; we do not even have any idea of how to go into international trade.

Farmer 8 - Back to our discussion on why consumers prefer pineapples from Ejigbo, I feel that experience and knowledge of our forefathers dated back to about eight decades has made us the offsprings to improve on production of pineapples thereby building on the strength our forefathers. Furthermore, pineapple farmers are always ready to learn new ideas from friends, families, and the research Institute. The sole aim is to improve our livelihood.

Adoption of technology practise from NIHORT also helps in improving the quality and yield of pineapple fruits from Ejigbo, which has grossly increase the quest for our pineapples.

Farmer 4 - Not everybody likes pineapple from Ejigbo. Majority loves our pineapple. Some prefer pineapples from other varieties as these set of consumers give complaint on “alatike” variety which has a lot of powdery flesh with fewer spines.

Farmer 1 - Pineapples are generally used locally to treat some ailment including prevention of colds and coughs and lowers the risk of macular degeneration. For this reason, the juice in Ejigbo pineapple fruit is so high with high vitamins and ..... Thus, consumers prefer our pineapple fruits to others.

*Extension Agent 1 - Generally pineapple contains beta carotene that is good for the sense of sight, also alleviates arthritis and improves digestion. Due to big family size, local consumers prefer big-sized pineapple from Ejigbo to satisfy the family demand for it.?*

**Moderator - Can you tell me how you view the adoption of technology practice in pineapple farming brought to you by Research Institute?**

Farmer 3 - I am an early adopter of the adoption practices and feel it is a good adoption agricultural practices to adopt technology in traduced by research Institute because the scientists have



in-depth knowledge and they are constituted by Government to support farmers and improve our livelihood. It is, therefore, a good practice to learn from them and increase our yield from pineapple production.

Farmer 1 - Noooo..... I have a different opinion. I have not adopted all the practices encouraged by the Research Institute because some of them involved a very high risk.

**Moderator - Can you tell me some of the practices with high risk?**

Farmer 1 - For instance, reducing the spacing between planting spots so as to have a small pineapple size which is required for international trade of pineapple. We do not know the procedure to get into the international trade of pineapple, we do not have information about the actual size, nor do we know the exact outcome of the size of the final fruit. How then do we produce for a market that does not exist? Our consumers and buyers of pineapple are local. And they prefer big sized pineapples, why then do I have to produce small size fruits for local consumers? You may have to eat your pineapples knowing fully well that they are a perishable product.

Farmer 8 - Adoption of practices are in stages. We hardly have a total adopter of all the packages. Some of the practices are adopted while some are not. This, to a large extent, affects the final yield as total adoption will increase yield.

Farmer 2 - Adoption of practices should be considered based on the objective of the farmer. Some of us are interested in the local market while some farmers are interested in the international market. For instance, if a farmer is interested in the local market; then, he doesn't need to produce small size fruits; definitely, there will be nobody to buy. However, if one is interested in the international market, then he needs to comply with the required international standard regarding the size of fruit exportable and other conditions which are part of the practices. For me, hmmm..... I am interested in the international market but have a problem with how to go about it and the required procedure to export pineapple.

Farmer 5 - I think the adoption of practices overall give us a competitive advantage over other pineapple farmers in other communities as the majority of our farmers adopt technology practices, and so improve quality and yield of our pineapple fruits.

**Moderator - Can you please give a proportion of what you mean by the majority of our farmers**

Farmer 5 - About 90% of pineapple farmers in Ejigbo adopt technology practices extended by NIHORT

Farmer (s) - 1, 3, 2, 7, 4 - YES!!! (In Chorus) that is true.

**Moderator - What is true?**

Farmers 2&7 - 90% of pineapple farmers in Ejigbo adopt technology adoption practices which have led to competitive advantage.

Farmer 6 - We have confidence in NIHORT regarding technology transfer. It is also "bunmi bun o" – mutual trust.

**Moderator - Can you tell me how competitive advantage in Ejigbo could be prolonged in Ejigbo community?**

Farmer 4 - Competitive advantage can be sustained if our resources earlier mentioned are only known to us, and no other community use it.

**Moderator - Can you re-mention the resources you are talking about?**

Farmer 4 - I mean the adoption of technology practices can lead to sustainable competitive advantage if the technology transferred to Ejigbo farmers is unique, and no other farming communities has the opportunity of the same technology practices.

Farmer 3 - Hmnnn..... I feel that the climate in this part of the country is unique and support the production of pineapple. It is such that pineapples produced in other parts of the country do not have the unique taste acceptable to the majority of the customers. Apart from this, adoption practices and learning have given us (the farmers) an advantage over others. Precisely, other communities planting pineapples do not want to adopt the practises based on reasons known to them. They also find it difficult to get access to available extension officers because of their farm location and settlements.

Our community has got a farmers union. The executives look for information relevant to pineapple production and pass it across to farmers. In some cases, they visit NIHORT to train the trainers' programme and monthly review meeting.

Farmer 1 -The value attached to the pineapple grown by farmers in Ejigbo community has made it command high prices In the market compared to pineapple from other communities because of the quality and size of our pineapple. It confers a competitive advantage in the market.

Farmer 6 - Methinks that our pineapple has got all it takes to give us an advantage over other pineapple farmers in neighbouring communities. This has really helped us as a means of livelihood and sustenance of our large family. My worry is that it may not continue forever. Our soil is depreciating gradually, some of the non-adopters in other communities may decide to adopt, and we do not have information regarding standard agricultural practices for pineapple production. Exportation should include some basic understanding of health and safety procedures. In total, I feel that we might not be able to sustain a competitive advantage.

Farmer 5 - Pineapple production in Ejigbo is supported by a frequent visit from NIHORT staff and dissemination of the latest information regarding production. However, there are other things constituting agricultural practices ranging from production, Harvesting, marketing and even processing. Most of us have the skills required. In view of this, I feel the competitive advantage may not be sustainable in the long run.

*Extension Agent 2 - The technology transferred to farmers appeared to be unique as it is designed from the research Institute (NIHORT), creating value for the quality of pineapple produced and potential for international trade. The technology adoption practice is imitable as other farmers in other communities can copy it and not restricted to farmers in Ejigbo alone. With this allowing other farmers to copy as at when they are ready to adopt may not give allowance for the sustainability of competitive advantage.*

**Moderator - How do you think technology adoption practices can be used to sustain competitive advantage in the production of pineapples**

Farmer 3 - We are enjoying a competitive advantage at the moment, but I do not know how we can sustain it. It is only God that sustains (Laugh)

Farmer 1 - I think it is sustainable if we decide to keep the secret of production within our community. *"O hun ti omode fi njeko, abe ewe lowa"*, it is, therefore, possible to sustain it, if we agree as an Institution among the pineapple farming union.

Farmer 7 - Nooo.... Ha ha ha!!!..... There is no way you can keep secret in the farming business. We all learn from one another. *"Ogbon ologbon ki je k ape agbalagba ni were"* (a proverb in the Yoruba language) No matter how you keep secret in farming, it will eventually leak out making it impossible to sustain the competitive advantage.

**Moderator - If you could add any feature to improving the production of pineapple apart from technology adoption practices, what would it be?**

Farmer 6 - Learning from experience

Farmer 8 - Collective learning

Farmer 5 - Individual learning

Farmer 1 - Selection of good planting material (suckers)

Farmer 3 - Group learning and past experience

Farmer 4 - Individual and Collective learning

**Moderator - It appears most of us emphasise on learning either collective or individual plus experience. How do you access learning to improve the production of pineapple**

Farmer 4 - The pineapple farmers' association do organise relevant training for young inexperienced pineapple farmers at the beginning of the planting season to either develop or improve our skills in farming operations. This has been quite helpful!

Farmer 1 - Establish linkage with other farmers within and outside the community (Ejigbo).

Farmer 6 - We hold reflection meeting at the end of the production season to assess results and see the gap or weaknesses to be improved.

Farmer 7 - We hold a monthly meeting of pineapple farmers forum to discuss individual or collective learning. At times we invite scientists from NIHORT.

Farmer 2 - Apart from what farmer 7 said, we also share our plans to adopt or not to adopt new technology on a friendly basis.

**Moderator - How has the adoption of technology practices lead to a change of ideas in the production of pineapple**

Farmer 3 - Change is very important in pineapple production business because, without change, pineapple farmers would likely lose their competitive edge and fail to meet the needs of their customers.

Farmer 1 - Without change, we (pineapple farmers) may still be in the realm of wasting resources to achieve less production

Moderator - Can you explain what you mean by wasting resources?

Farmer 1 - Yes, time is a resource, planting suckers saves the gestation period from 22months to 16months against planting the crowns or the slips which we have been planting before.

Farmer 6 - Spacing between and within rows is another one, the closer the planting space, the more the find yield with reduced fruit size good for exportation.

Farmer 5 - Adoption of technology practices increase productivity and production

Farmer 4 - Customers need change, and there is also a potential change in the market through diversification. There is a potential international or foreign market for pineapple as against the current local market. A change in the adjustment of fruit size would lead to an opening or route to the foreign market. Also, the economy can change, which can lead to a change in demand for pineapple fruits; this will also lead to a change in production practice.

Farmer 8 -c.

Extension Agent 1 - Farming communities benefit from change that results in new ways of looking at customer needs and how it is delivered, change is also required to strengthen the farmer: customer relationship without compromising the quality of the fruit.

**Moderator - Can you tell me why farmers may not want to implement change**

Farmer 1 - For me, I feel the change is not necessary

Moderator - How?

Farmer 1 - For instance, if my objective is to produce for local consumption, why do I need adjustment in fruit size? If crown planting will give me the desired yield, why do I need to plant suckers because of the reduction in gestation period?

Farmer 3- Some of our cultures may not support the required change due to adoption practices. Some farmers do deliberately resist change. Although it is not common in Ejigbo community, then we still have one or two farmers in this category.

Farmer 7 -The Research Institute behaviour and attitude towards the transfer of knowledge or motivation does not match with required change.

Farmer 8 - Lack of commitment to leadership is another reason. For me, it creates fear of the outcome of change and poses a high risk

Farmer 2 - Lack of trust in the leadership of pineapple farmers association

**Moderator - How?**

Farmer 7 - Take an example of plot demonstration without an adequate supply of planting materials. Do you think change can be implemented?

*Extension Agent 2 -The tendency for pineapple farmers in Ejigbo to adopt technologically advanced practice will actually create a difference between farmers in Ejigbo compared to other communities. Few of the farmers just decide to resist change while others do not even access or understand the difference between the current state and expected benefit from adoption.*

*Extension Agent 1 - In some cases, the fear of multiple releases of fruits to markets may not allow or encourage some of the farmers as glut is likely to set in within the period. Also, some farmers lack basic education and knowledge to tackle the requirement for change.*

## **Appendix 21 Transcripts of farmers/extension agents interview**

FARMER - 1

- Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

Hmmm..... To me, technology adoption practice includes all the management practices that should be carried out within the period of gestation of pineapple crops to produce healthy fruit. It also includes the skills to be acquired to perform better in order to improve the means of livelihood.

- Q2. Can you tell me about the effect of education on technology adoption practice?**

I can say that education has helped me to become a better pineapple farmer. I am a graduate in agriculture. I graduated six years ago and have since then been cultivating pineapple and considered it a business rather than more interest in farming. I have been able to practice farming better based on a background in agricultural training. I knew and realized the importance of timing in agricultural production.

- Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

The government has really been supportive in terms of allocating farmland for potential large scale farmers. Although, this benevolence has been extended to very few pineapple farmers in Ejigbo. Precisely two farmers have so far benefitted, but this can create a negative effect as soil factors, and climate conditions may not be favourable for production in an area where the land is allocated. Fertilizer is also subsidized and gets to farmers directly from the ministry of agriculture.

- Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

Both physical and human resources have helped to give us an advantage over other farmers in the neighbourhood. The attitude of pineapple farmers towards adopting new technology has been a great advantage for Ejigbo farmers. Ejigbo climate has been favourable for growing pineapple. We love our farm and so grateful to God for the advantage we have had. We hope to keep on farming.

- Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

I have always learnt from my father cultivating pineapple for over thirty years as well as from officials of the Ministry of Agriculture on television and radio programmes. I also have a demonstration plot in my farmland to try new "things".

Learning could also bring in negative impact mainly if it is learning from self- experience.

- Q6. What are the farming practices associated with technology adoption in pineapples production?**

I strive to produce pineapple in the most sustainable way possible. I try as much as possible to enrich the soil and build up fertility by applying farmyard manure; I also monitor the required soil elements through soil testing.

Nutrient management is very vital in promoting healthy soil. It extends further to all the activities involved to ensure and maintain a clean field right from planting to harvesting.

**Q7. What will be your position and effort to sustain the advantage in the production pineapple within your community?**

Hmmmm..... It will be a nice situation to sustain our advantage in the production of pineapple. However, I do not think it is going to last for long. "Kodun, Kopo, Kope, olorun lo ni". Whatever goes up will always come down. Our soil is depleting gradually. Although we have land, the tenure system is a limitation. The land is owned by different families. Some of these families are not interested in the production of pineapple or even agriculture as a whole!

"If you do the right thing, you are likely going to get the right outcome". If I follow all the procedure and practices necessary for the adoption of Smooth Cayenne, then I will come up with pineapple fruits that are of good quality.

**Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

I am not making any effort. No adequate information regarding the required standard expected at the international market. The administration of bottleneck is equally discouraging.

**Q9. What is the role of the organised pineapple farmers' association?**

The role of pineapple farmers' association is to procure and distribute farm inputs to members at an affordable cost. They also provide agricultural information to members, provide access to credit for members and help in the marketing of produce. In a period of glut, they support by providing processing facilities for farmers.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

Numerous! Lack of enough planting materials (Suckers – Smooth Cayenne), lack of necessary resources, complexity and variation in member's needs – for example, I may have a shortage of planting materials while another farmer is faced with a shortage of labour for weeding.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I think there is a slight fear of change. "I cannot do this because my forefather didn't do it". Pineapple farmers need to move away from issues like that and move with changes over time. Definitely, adopting the practices has actually led to an increase in income, change in orientation and improved means of livelihood.

## **FARMER - 2**

- 1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

Adoption of technology practices is the routine practices carried out by farmers to achieve optimum yield from cultivation. The technology could be considered as a new scientifically derived mechanism that is supplied by technical expertise such as NIHORT.

- 2. Can you tell me about the effect of education on technology adoption practice?**

Education has a great effect on production! For me, I have never attended formal education in my life. I am really suffering from it. For instance, when information is passed to me for necessary action to improve my production techniques, I cannot even read my local language even if it is written in my language, I have to wait for some of our children that are a bit educated to explain issues to me. At times, they interpret wrongly, which makes me commit a high level of mistakes! I think basic education at the primary school level should have helped me better. I have enrolled in adult education at the age of fifty-eight years (laugh).

- 3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

Government is trying her best to support farmers but then “omi lo po ju oka lo” NIHORT sells improved suckers at a subsidized rate with about 35% discount.

- 4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

The quality of our pineapple fruit from Ejigbo is unique. The flexibility of ideas in cultivation and unique location which is supported by natural and physical resources such as climate, weather, labour availability, nearness to a research centre, market road network serves as the advantages.

- 5. Can you tell me the effect of learning on technology adoption practice that could create an opportunity for production over other communities?**

Learning is very good to improve the quality and production of pineapple. Collective learning/group learning and learning from experience are what I considered to be relevant as I do cross-check from other farmers if there is a problem in the adoption procedure. Learning has always had an effect on my production if it is joint or collective learning—for instance, demonstration plots to be maintained by a group of pineapple farmers rather than an individual.

- 6. What are the farming practices associated with technology adoption practices in pineapple production?**



Farming practices are the production of pineapple include practices from the production stage to marketing. The practice starts from the selection of planting material, e.g. old method of planting material is the use of crown or slip, whereas the new method is the planting of suckers. Land preparation could be a single row, double row or triple row, the one recommended is a single row (60cm x 60cm), and selection of variety is another practice transferred by NIHORT. Smooth Cayenne is recommended rather than other variety that was being planted before now.

**7. What will be your position and effort to sustain the competitive advantage in the production of pineapple within Ejigbo community?**

The advantage over other farmers is basically due to the unique quality of pineapples from Ejigbo. I am not sure if it can be sustained in the next thirty years as we all know in our land and we believe that "igba o lo bi orere". However, currently, all over the country pineapple from Ejigbo is unique because of the size and the high juicy portion of the fruit.

**8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

We are trying to understand the required procedures necessary for us to get into the trade at the international level. We lack a clear definition of what quality is expected in the international market.

**9. What is the role of the organised pineapple farmers' association?**

The role of farmers association is to support farmers in terms of resources required for farming and make out a good livelihood. It is meant to be voluntary as farmers can decide on whether to be a member or not. I am really happy to be a member of the farmers association because of the competitive advantages I derived from it as a result of technology adoption practices.

**10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

I have a lot to talk about this. There is always a conflict between priorities set by the organisation and the extension researchers. Views of farmers are not always taken into consideration before the design of technology. Lack of resources or limiting resources is often the case for pineapple farmers. Credit shortage is another constraint. Often, non-availability of credit/access to credit to carry out production on a large scale is usually a challenge.

There is also misplacement of priority. An individual farmer may have interest in productivity for local consumption market while the association could lay emphasis on international trade. For international trade in pineapple, the farmer needs to conform with general agricultural practices (Standard) expected for such trade. Part of the standard is the maximum size of a pineapple. Other constraints we face in the production of pineapples include poor storage

facilities because pineapple is highly perishable. Non-availability of modern technology makes activities to be labour intensive.

Yessss, another one is the land tenure system within the community.

**11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

Change is gradual but not spontaneous. Over times (we) farmers are adopting the practices but not all practices at once. For me, I have not adopted all the practices because of the risk of uncertainty.

**Extension Agent 1**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

*Technology adoption practices are the associated activities and practices involved in the adoption of a particular technology that indicates the acceptance of the newly developed scientific process of innovation in agriculture. These practices are not incorporated by all the farmers at the same time. In a community like Ejigbo, we have the innovators, the early adopters, early majority, late majority and the laggards.*

*The practices involved in technology adoption of smooth Cayenne cuts across a selection of a suitable soil conducive for production, followed by the planting material which could be crown, slip or sucker. The sucker is highly recommended because of the gestation period of about sixteen months compared to a minimum of twenty-two months via other planting materials. The time element is very important.*

*The selection of the Smooth Cayenne variety is supported by its good taste, pleasant aroma, high juice content and flavour with less external spines. In all, the quality of the product is very good compared to other varieties. The yield is also high with a possibility in fruit size adjustment if the spacing is managed very well.*

*Other practices include use of growth regulator for flowering induction, management of pest and diseases via pesticide and fungicides. They are harvesting green or matured from the farm. Even land preparation is very important in pineapple production. This could be referred to as tillage practices.*

**Q2. Can you tell me about the effect of education on technology adoption practice?**

*Education has definitely contributed to efficient production in agriculture. It will, therefore, enhance farm productivity in terms of production time, space and quality. This could be achieved by improving the level of technology adoption and quality of labour.*

*I will want to view education in three ways. Formal, non-formal and informal. Formal is attending school for qualification to be achieved, Non-formal may be referred to as agricultural extension contracts as well as adult literacy training while informal could be regarded as experience in farming including by doing and other activities that lead to new ideas thereby facilitating learning.*

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

*Government do give support to farmers in general rather to exclusively pineapple farmers. Government give support through NIHORT and other agricultural agencies in the specific farming activities such as*

land preparation for planting. This is done at a subsidised rate; planting materials are equally supplied to farmers at a subsidized rate up to 35% of the actual cost of planting material.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

Ejigbo farmers are generally known to produce high-quality pineapple fruits. The high quality can be attributed to soil management practices such as planting a high to medium texture soils relatively acidic which is naturally endowed. Good juicy pineapple with big fruits is eventually produced which to local customers are the best. This has also made Ejigbo pineapple fruits to have advantage overproduction in other communities. Consumers are always ready to pay a premium price for Ejigbo pineapple fruits.

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

I have been learning continuously. Farmers try to learn the effect of adopting technological practices on their output on a continuous basis. Farmers do not adopt all the practices at once. Learning is considered as a gradual but a continuous process. The decision to adopt improved variety by pineapple farmers in Ejigbo influences the farmer's choices on different practices, procedures and procedures, thereby changing the pineapple farmer's subjective expectation in terms of output/yield. Farmers, therefore, learn from experience.

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

Farming practices associated to technology adoption starts from the selection of the site for pineapple production through a selection of the variety which is the actual technology transferred to farmers to the selection of the planning material, weeding/management practices to the harvesting and marketing practices cutting across the supply chain process.

**Q7. What will be your position and effort to sustain the advantage in the production of pineapple within Ejigbo community?**

To sustain the advantage over other pineapple growers within the state may not be achievable as NIHORT is the Government agency saddled with the responsibility of disseminating the adoption practices to all pineapple farmers in the Country and not only within Ejigbo community. NIHORT will only achieve her objective if every farmer is ready and able to implement the practices in conjunction with the technology transferred.

**Q8. What efforts are you making to get pineapple from your community pushed to the international market?**

NIHORT is making every effort to encourage farmers to produce and sell pineapple at international level by encouraging farmers to understand and aside with the standard expected for trade at the international level. One of the major constraining factors is the size of pineapple accepted for export trade. NIHORT encourages farmers to adjust the spacing interval during cultivation in conjunction with other farming practices to overcome the problem of size for the international market. It is sad to note that Nigeria is

*the seventh producer of pineapple in the whole world and yet none of Nigeria's pineapple is in the international market yet with a high level of post-harvest losses.*

*We are always ready to support the farmers. We want the poor pineapple farmers to take advantage of what they have to get what they want. We want them to be able to respond to economic challenges and send their kids to school. We want them to be very happy that cultivating pineapple is a good choice in farming/agriculture.*

**Q9. What is the role of the organised pineapple farmers' association?**

*The role of the farmers' association is expected to include knowledge generation and sharing among members, provision of information, learning opportunity and skills development, market creation, the building of network for members, access to limited resources and assistance in policy creation and implementation. To me, the association has actually failed in performing all the roles and have only concentrated on knowledge generation for members.*

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

*The association will be in the best position to tell you their constraints in adopting technology practices transferred to them. However, I can identify the insecurity of the farmer's representatives. At times, the representatives collect planting materials at a subsidized rate and re-sell at high rates, although below the actual price of the materials.*

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

*Change is a necessary condition to achieve excellence in pineapple cultivation. Both the farmers and we the extension agents need to change. Farmers should be ready to accept good technological practices transferred to them while we (researchers) should be ready to incorporate farmers' need in designing technology.*

**FARMER 3**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

*Technology is about the use of modern-day innovation to improve the practice of farming, whereas the adoption of these practices should be achieved if farmers are ready to accept. It is relevant to pineapple production because there are a lot of modern-day techniques to improve the yield in the production of pineapple fruits.*

**Q2. Can you tell me about the effect of education on technology adoption practice?**

*Education has an impact on technology adoption, the more educated you are, the better for you to be a successful farmer.*

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

I have been a beneficiary of support from the Government. Government through NIHORT has given a subsidy of 35% to the initial cost of planting material (Suckers) from Smooth Cayenne which is then promoted variety. I have been able to increase my scale of production from small to medium scale. I have to say that the Government still needs to support pineapple farmers in other areas such as access to credit to practice on a large scale.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

The slope and location of Ejigbo have made it possible for us to produce pineapple on a large scale, road network to other major cities have equally contributed.

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

Improvement in my skills in farming has definitely increased the output in production. I can then say that if I improve my learning of new skills through technology adoption practices, expected production (output) will increase. Although, I am gradually improving myself on learning of new skills from the farmers' association.

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

I adopt practices like a selection of good planting materials (Suckers) and management practices to increase both my income and output. Management practices include weeding and chemical application.

**Q7. What will be your position and effort to sustain the advantage in the production pineapple within your community?**

I will be happy to sustain the position of producing good quality pineapple to the market. I am ready to incorporate new innovations and ideas from other farmers and the research institute. I am also ready to learn from the association. I will do everything to make the situation of selling good quality pineapple to be sustainable.

**Q8. What efforts are you making to get pineapple from your Ejigbo pushed to the international market?**

I cannot make a singular effort, but I am aware that the association is trying all their best to educate pineapple farmers on how international trade on pineapple can enhance our livelihood.

**Q9. What is the role of the organised pineapple farmers association?**

The actual role they play is to encourage farmers to incorporate modern innovations into farming activities. They also complement training facilitated by a research institute.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

We are facing a lot of problems before the association was formed three years ago. Particularly, we have challenges in the marketing of our products and practices of agricultural technology adoption that could support to make Ejigbo pineapple to be competitive in both local and international market. Low market prices and lack of technical expertise in the field of marketing are major constraints. Nowadays, pineapple farmers now have a voice, and we can dictate price to a large extent. We now have a wide choice of where to buy farm inputs necessary for production; we can now negotiate for reasonable prices. Since I joined the association, I have made more profits such that I have built a modern house in the village.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I am ready to change to new technology practices in as much as I will make profit and livelihood. I am ready to produce for both local and international market.

**FARMER 4**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

Technology adoption practices are the practices we consider as a new method of planting pineapples to achieve the best result. It is also planting of pineapple by not giving much space in between so as to have more pineapple fruits.

**Q2. Can you tell me about the effect of education on technology adoption practice?**

“Wa la hi”, education is very important, I am not educated at all, but I am convinced that I would have done better in pineapple if I were to be educated. I am also considering attending more formal education within the community to improve my skills. (Laugh). Informal training and improvement of skills will be accepted by me to be more relevant.

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

Hmmm..... “, Oun se mi, oun gba mi, bawo lase dupe lowo eni to nseni to tun gba ni.....” Government give support in one hand and take it off in another hand. I do get subsidy for suckers, but the cost for chemicals for the weeding is high and overrides the gain from the suckers.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

My understanding of resources is in terms of those implements that we can see and those that we cannot see. Some of the resources we can see are the cutlass, hoes chemicals and even the land for cultivation, whereas those we cannot see is the experience of farmers and skills. Can you determine my attitude towards adoption of technology? Noo..... “Bo rowo mi, to rinnu mi.....”

**Q5. Can you tell me the effect of learning on technology adoption practice that could create an advantage for production over other communities?**

I visit other farms and demonstration plots to improve my knowledge of any practice necessary to improve pineapple production. I also learnt from the experience of old farmers by comparing production and yield.

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

I make sure that activities/practices like good planting calendar is maintained starting from the method of planting, weeding, ripening with the use of chemicals.

**Q7. What will be your position and effort to sustain the advantage in the production of pineapple within Ejigbo community?**

I will want to make sure that I make progressive income year in year out by producing high-quality fruits. This will allow me to maintain my share of the market over the years. For sustainability, it may not be determined by me. Let us leave that for God. "Kodun Kopo Kope....."

**Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

I am not making an effort that could be regarded as substantial as I am satisfied with my current production. Moreso, I have no information about the requirement for the international market.

**Q9. What is the role of the organised pineapple farmers association?**

The role of the association is to help farmers gain skills and find out information on behalf of farmers. They also help in linking us with processors of pineapples into juice. They are also expected to link us with credit agencies.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

Personally, I do not have enough cash to operate cultivation of pineapple to my expected scale/size of production. I still have a product with varying sizes. I am bearing in mind that the buyers of pineapple are interested in big sizes. I am aware that I have not incorporated all the necessary adoption practices. I also have the problem of adequate labour for weeding purpose as I am gradually getting very old!

For the association, I think there is a problem of incompetent leadership personnel. This has given rise to other problems that sprang up from greed and corruption.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

"Kere kere elede a de Oyo....." I am ready to learn from experience and from other farmers. There has been a noticeable change in my end of the cropping season yield as well as profit but not as expected from what the extension agents made us think about. I am sure; we need a

change of attitude to achieve a big change in adoption practices. I should be ready to incorporate all practices transferred rather than been selective.

#### **FARMER 5**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

Technology adoption practices are the interplay of activities required between the production and consumption stage of pineapples. It is the series of activities that compliments the technology transfer of planting Smooth Cayenne rather than the wild variety planted in the olden days. The modern pineapple production technology cannot be isolated without necessary back up of operational activities to achieve a good yield, good quality and good price for pineapples.

**Q2. Can you tell me about the effect of education on technology adoption practice?**

I think education is relevant to technology adoption practices, but I do not seem to identify the effect on practical farming of pineapples. Farmers learn from their past mistakes and correct for future occurrence. Most of us learn from other farmers in our own way. We understand our methods and can interpret suggestions from other farmers. To adopt or not to adopt is an individual decision of farmer and does not practically require education as experience can be considered in lieu of education.

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

No support at all, the Government only plays on our ignorance by telling us they give a subsidy to planting materials which I can get elsewhere even at a reduced price.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

The quality of pineapple fruit in Ejigbo soil is outstanding. The output has a big size of a pineapple, and the juicy part is more compared to other varieties. The sugar content is moderate and less of pines referred to as "alatike".

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

I learn from experience, from other farmers, from other communities and even from radio programmes which interestingly is transmitted in the language, I understand. (Yoruba). I have been told by my father before he died that learning and practising g what I have learnt and will never forget. In as much as I practice this, my farming practices will always be successful.

**Q7. What will be your position and effort to sustain the advantage in the production pineapple within your community?**



I have grown up to be a successful pineapple farmer in the community; I have learnt a lot of lessons along with my farming experience of thirty-nine years. Things are not always rosy. Production/yield is not steady. It has always been going up and down. I am happy as a pineapple farmer because I have been able to produce a graduate in Agriculture and even pharmacy, I have built a modern house as well from this business. In the near future, I cannot foresee sustainability in production as pineapple farmers from other communities are competing within our brand of pineapples. In fact, other farmers are looking out to go into the international market while farmers in Ejigbo communities are not really showing interest. We prefer to serve the local demand for pineapples.

**Q8. What efforts are you making to get pineapple from your community pushed to the international market?**

I am trying to find out details required and the standard requirement within the law and international community but still left in the darkness of the clear out requirements for exportation of pineapple fruits.

**Q9. What is the role of the organised pineapple farmers association?**

The role of pineapple farmers association is to liaise with the central farmer association which is the parent body to furnish us with information on training, market access and availabilities, linkage with research institutes, Pineapple farmers collaborate to improve on quality and so on.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

I have a major constrain of adequate labourers that are skilled enough for weeding purpose. Weeding procedure for pineapple is different from other crops.

The major constraint by the association is inconsistent objectives/opinion. They come up with different guidelines which in most cases are not achievable. The older experienced farmers should show interest in the leadership of the association.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I got into pineapple cultivation at the age of twenty-one. I have spent about thirty-nine years in cultivating pineapple for local consumption. I am ready to go into the international market if I have the required information and capability. I am therefore ready for a change although it could be gradual but then consistent with achieving improved yield and enhancing my means of livelihood. I have also adopted the technology transferred and the associated practices fully.

#### **FARMER 6**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

I think adoption of technology practices in the production of pineapple involves taking care of the pineapple plantation in order to have good quality pineapple fruit during harvest.

**Q2. Can you tell me about the effect of education on technology adoption practice?**

I feel education has no effect on technology adoption practice knowing fully well that most farmers or say the majority of us are not educated, and yet we have been producing a large number of fruits to the market over many decades. I think regular ad hoc training is more relevant rather than going back to schools for formal education.

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

I think the Government has not been very supportive. For instance, the Federal Government, through NIHORT has offered various training to pineapple farmers over the years to improve our skill. But there is also a high cost of chemical to kill the weeds and indirect tax by the local Government on the number of fruits taken to market for sale on market days. The total effect of all these situations brings a negative income impact to us.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

Natural endowment and location of Ejigbo within the geographical zone of Nigerians our major strength. Ejigbo is also close to a lot of Research Institutes in Ibadan. The farmers have access to information from research Institutes in Ibadan. The farmers have access to information from research Institutes and the media (radio and television). Adoption of technology practice on our farms makes the product sellable both in the domestic and international market

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

Learning from mistakes in the past as well as learning from other farmers based on good and bad practices has made to improve on my enthusiasm to adopt the new technology practices emphasised by NIHORT. I have been that some farmers that have incorporated the majority of the transferred practices have better yield and quality fruits during harvest compared to some of us that have taken fewer practices required.

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

The way we do our things day in day out within the period of production to final consumption involves certain activities that are specialised to farming. Personally, I consider land preparation to be very important if a benefit is expected from technology adoption. The change in the planting material to smooth cayenne made me want to explore further into the relevance of associated practices in the pineapple production process.

**Q7. What will be your position and effort to sustain the advantage in the production of pineapple within your community?**

I will be happy to continue to make more profit year in year out. I will also be happy if I can produce the quality of fruits that are expected by my customers or consumers. The satisfaction of my customers is very important to me. If this is achieved over a long period of time after the total adoption of all the activities associated with planting the alatike (Smooth Cayenne variety), I strongly believe that the opportunities could be sustained over a long period of time.

**Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

For me, I am not interested in the international market. We have not been able to meet up the local demand. You should understand that pineapple is a perishable crop.

**Q9. What is the role of the organised pineapple farmers association?**

The role of the association is to coordinate all the pineapple farmers to unite and come up with our voice to achieve an improved profit in the business.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

I find it difficult to adopt all the practices associated with the adoption of planting the suckers of the Smooth Cayenne.

First, the weeding task is not always achieved due to lack of adequate labour skill which may lead to poor quality fruits as a result of pest and diseases. Another problem is the problem of insufficient planting materials, so I do plant both suckers and slips during propagation leading to the variability of sizes of fruits and period to harvesting. If I plant suckers, it gets matured in sixteen months, if it is the slip, it gets matured in twenty-two months.

For the association, there is a lack of proper coordination, as most experienced farmers are not ready to take up the leadership role. Furthermore, most of the time, communication with the extension agents from NIHORT is faulty (“0 mehe”).

I am also worried about good planning and monitoring of activities by the association in most cases, they give advice but do not monitor the farmers. Yes..... NIHORT cannot be exonerated from this!

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I have told you earlier on that I have not incorporated all the associated practices with the planting of “alatike”. I am ready to change my attitude regarding this; however, you should not expect it to be fast and immediate. After all, I am not interested in exporting pineapple fruits.

**FARMER 7**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

I do not understand what technology adoption is all about. There is nothing new to me as a pineapple farmer with thirty years' experience. We are only being told a refined way of doing what we used to do. In the days of our forefathers, we know you can either propagate pineapple through the crown or slip. NIHORT came up with suckers which we have deliberately dodged before now because of the success rate that is low. What then is new?

The practices that are encouraged are the routine practices that are normal if you want to cultivate pineapple. I know that I need good planting material to produce a healthy pineapple fruit; I also know that spacing may have an effect on the size of the fruit. I know that I must weed my plot at least four times before maturity. What then do you think is new? I think the Government is just trying to sell their brand of suckers to us to promote their own business.

**Q2. Can you tell me about the effect of education on technology adoption practice?**

No effect. In fact, plots of the illiterate farmers produce a better yield than the educated pineapple farmers. I think experience is the best teacher in farming generally.

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

Ha ha ha ..... by exploiting us to buy their suckers at reduced/or subsidized price which you can also produce on your farm by propagating the suckers!

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

Pineapple fruit in Ejigbo has always been known for its outstanding quality fruits based on the juicy content, big size and good soil and climatic conditions.

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

Learning has improved and given additional knowledge of my understanding in the ways and procedure of cultivating pineapple fruits which eventually has helped me in the past to produce pineapple of high grades demanded by consumers. I have learnt from my mistakes as well from other farmers.

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

From the onset of planting pineapples, I consider the topography of the land, which is essential. A sloppy topographic is not always good for pineapple cultivation; rather a flat topography is better. Also, the variety to be planted is equally important; the old variety takes longer time to maturity. Weeding and application of pesticides are also important. This must be done at the right time.

**Q7. What will be your position and effort to sustain the advantage in the production pineapple within Ejigbo community?**

I have always tried to produce pineapples for the market on a timely basis. My pineapple fruit is always targeted for the market during the scarce period as against when others are producing during the glut. I used to produce and being controlled by natural rainfall between March to August, but to get good quality pineapple, you need a moderate level of rainfall and not excess, so I have tried to supplement my production nowadays with irrigation.

**Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

So far, production and gain from production have been steadily increasing over five years, with about ten per cent increase in profit over the years. I now have a motorcycle against my bicycle. I am really happy producing at the local level. For sustainability, I wish and hope that it continues because there could be weather failure, depletion of soil particles and natural hazard.

**Q9. What is the role of the organised pineapple farmers association?**

I think the role of pineapple farmers association is to give enlightenment campaign on how pineapple farmers could improve on making a better profit from its production as a means of livelihood.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

There are various areas which the research Institute will have to address in addition to the prescription of smooth cayenne. Pineapple rot disease has not been improved despite the adoption of smooth cayenne. I am really concerned with a disease if we might need to sustain the advantage based on the adoption of practices

I think another constraint is misinformation of what exactly the extension agents mean by technology adoption. Another problem is the land tenure system, which limits the level of production by individual farmers. Insufficient of planting materials and lack of uniformity in the quality of "supplied suckers" for adoption.

The association lacks good leadership and focus.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I have not been responding to any change because I feel sceptical about what could happen if I adopt the prescribed practices.

**FARMER 8**

**Q1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**

My understanding of technology adoption practices are the routine activities expected to be carried out by the farmers in the production of good quality fruits of pineapple.

Pineapple is a special crop because of its special requirements in terms of water, sunlight and even labour/skill requirement.

**Q2. Can you tell me about the effect of education on technology adoption practice?**

I strongly believe that education is very relevant to the production of an improved high yielding variety of pineapple. However, I think that informal education is more relevant as farmers could learn from experience and demonstration plots.

**Q3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

The Government has been supportive. The road leading to our farms are graded by the local government. Farmers can transport fruits and even inputs in and out of the farm easily. The State Government allocated inspection officers to talk to local farmers on health and related issues. The Federal Government intensified continued efforts on how livelihood could be made from the production of pineapples by continuous research and extension services.

NIHORT gives a periodic lecture on the radio in the local language to inform us about the latest technology and practices associated with it. The Federal Government, through NIHORT, sells planting materials (Suckers) at a subsidized price to farmers.

**Q4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

What has given an advantage to Ejigbo pineapple also improve the quality and value of the fruits. These resources are:

- Access to improved planting materials (Suckers) from NIHORT
- Access to information necessary to improve yield
- Natural/geographical location of Ejigbo
- Availability of skilled labour although not sufficient
- Road network to the farm
- The interest of young educated farmers in the production and marketing of pineapple.

**Q5. Can you tell me the effect of learning on technology adoption practice that could create for production over other communities?**

*Learning has improved my understanding and production techniques. I am a graduate of Agriculture with two years' experience in pineapple farming. I have learnt a lot from the old experienced farmers as well as colleagues outside this community. I have also tried to find out a way how I can export pineapples outside Nigeria. It is worth it though ..... Nigeria is one of the largest producers in the*

*world yet has not exported any fruit. Part of learning is finding out the procedure and protocol/required standards for exportation of pineapples. I believe learning has contributed positively to creating an advantage over other communities that produce pineapples but not ready for a change in their mode of production.*

**Q6. What are the farming practices associated with technology adoption in pineapples production?**

Farming practices that are involved in pineapple cultivation starts from the selection of the site for cultivation, the variety considered very important. NIHORT has educated us (The pineapple farmers) on why we should plant the Smooth Cayenne variety because of its adaptability to different soil condition, early maturity, reduced spines, and improved quality of fruits and adjustable variation in size for the purpose of exportation.

I also consider the planting material from the variety as a good practice. The older farmers that are conservative has always maintained to plant the crown. Nowadays, planting suckers leads to early maturity and saves time.

Adopting the variety of Smooth Cayenne is not a problem. Adoption of the variety should necessarily be backed up with adopting the associated practices such as weeding, application of herbicides and pesticides, maintenance activities and even marketing practices. I am confident that yield and profit will improve if these practices are imbibed. I have tried all associated practices transferred to us by NIHORT, I have failed in some area. The lesson I have learnt in the least cropping season is that timing is very important as there is always a time to carry out different activities referred to as practices.

**Q7. What will be your position and effort to sustain the advantage in the production pineapple within your community?**

I strongly believe in my self-esteem and confidence that more income can be earned from pineapple production as a local fruit as well as an international crop for business and trade.

I think sustainability can be viewed in three ways. In terms of economic sustainability, this is feasible in as much as we follow the procedures for the purpose of domestic and report. In terms of social sustainability, it may not be possible as some of the older but yet experienced farmers are still conservative and not ready for a total change, in terms of environmental sustainability, it appears to be freaky as well. Nowadays, there is pressure that affects the production of pineapples.

In total, the sustainability of this competitive advantage may be a bit difficult. Technology transferred is not only for Ejigbo farmers; we only happened to be the forefronts; thus, it is imitable.

**Q8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

I have considered a lot of options by producing both for the domestic market as well as an export market. I have tried to find out the procedures and protocol necessary for exportation. For domestic trades, the market is ever ready but commands a low price. For exportation of pineapple fruits, I will need to follow what is referred to as general agricultural practices which involve required standard and other administrative and sanitary protocol necessary. It may be difficult to achieve, but then it is achievable if I can meet all the conditions. Hopefully, I wish to sell at the international market for pineapple very soon.

**Q9. What is the role of the organised pineapple farmers association?**

The ideal role of pineapple farmer association appears to be different from what they do at the moment. For instance, the association is supposed to train all pineapple farmers in modern techniques and encourages farmers to practice the adoption of “alatike” (Smooth Cayenne). In practice, training of farmers is selective, the leaders consider friends and relatives first, which makes it unfair.

**Q10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

Personally, to finance a large scale production of pineapple will require a large amount of money which I do not have. Banks are not ready to take the risk on loan for agricultural projects. For some banks that are ready to give loans, they still give a limit which is far below the required fund for large scale production.

I am a graduate and a native of the community but still constrained with land availabilities as land are owned by various families. Some of these families are not ready to release it for agricultural purpose.

The element of the godfather is another challenge. Some of the older farmers that are supposed to be good members are appearing as a positive danger to progress. Most of them are not interested in international or exportation of pineapple. They do everything to discourage me!

Regarding the association, the linkage or bond between the research and the association is weak—no proper coordination of farming activities. Most technology is designed without considering the need or requirements of farmers.

**Q11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

I am completely responding to change in practices as transferred by NIHORT. I have complied with about 95% of the practices. My bottleneck is carrying out the practices at the right time for effective result.

**EXTENSION AGENT 2**

- 1. What do you understand by technology adoption practices in agriculture and its relevance to horticulture with specific reference to pineapple production?**



*I think technology adoption practices are the necessary activities required by farmers, particularly the pineapple farmers, from adopting a particular technology to achieve the desired goal. It is very relevant to horticulture with reference to pineapple production because it improves the quality of pineapple fruit, thereby increasing the premium attached to the sales from the fruit.*

**2. Can you tell me about the effect of education on technology adoption practice?**

*The importance of education on the production of pineapple is expected to give a positive result. I feel farmers that can read and write are in a better position to interpret instructions and carry out the guidelines given by researchers/extension agents on various practices that could improve the quality of pineapple fruits.*

**3. To what extent does Government support the efforts of pineapple farmers in Ejigbo?**

*Hmmmm..... This is a dicey one. The government gives support to farmers in general and little or no support to pineapple farmers. Pineapple farmers face the problem of getting adequate planting materials. The government subsidises the cost of planting materials through NIHORT, but we do not get the required quantity for the planting season at any point in time.*

**4. What are the resources that give advantage to pineapple fruit production in Ejigbo community?**

*The strength in planting pineapple in this community is the natural endowment of good climate/weather suitable for the cultivation of pineapple. Also, the majority of our farmers are always ready to improve production by learning from the experience of other farmers.*

**5. Can you tell me the effect of learning on technology adoption practice that could create an opportunity for production over other communities?**

*I believe learning from experience has brought the scale of production on pineapple in Ejigbo community to where we are today. Farmers have moved over five decades from subsistence to commercial farming in pineapple production. Farmers have learnt a lot from the adoption of modern technology practices to improving the scale of production from the small scale of an average of two plots thirty years ago to five hectares production as at today. This has improved the livelihood of pineapple farmers and cash to farm family to be able to afford other necessities like health, education for their children.*

*Pineapple farmers have also benefitted from learning and practical demonstration of extension workers which has proved to be beneficial to production techniques.*

**6. What would you consider as the farming practices associated with technology adoption in pineapples production?**

*Before we were born, our forefathers have always maintained practices for the cultivation of pineapple. Some of these practices include planting period, weeding style, and ripping method to achieve an optimum yield of pineapple fruits per hectare.*

*Nowadays, pineapple farmers have learnt from other farmers and friends on improved land preparation methods and use of chemicals to weed rather than mechanical. NIHORT also came up with a selection of improved planting material through suckers as against the old method of propagation through slips and crowns. The advantage is that time of gestation is reduced from twenty-two months to sixteen months, and*

quality is improved, the yield is improved provided other management practices such as weeding, de-suckering are carried out as at when due.

**7. What will be your position and effort to sustain the advantage in the production of pineapple within Ejigbo community?**

*An ordinary farmer will always want to lead in terms of production and profit. My effort is to continue to encourage pineapple farmers to improve on the farming practices for the adoption of Smooth Cayenne to achieve a better result that will be sustainable over a long period of time.*

**8. What efforts are you making to get pineapple from Ejigbo community pushed to the international market?**

*Farmers are being encouraged to adopt all the practices associated with the adoption of smooth cayenne to achieve an internationally accepted standard and size for exportation.*

**9. What is the role of the organised pineapple farmers' association?**

*To me, the role of pineapple farmers' association should be to play a significant role in agricultural technology by supporting members to increase their exposures to new technologies and as well support other less experienced farmers into trials and demonstration so as to be involved and create interest/motivation to continue with farming. They should focus on capturing not only the domestic market only. Rather efforts should be made to break into the international market.*

*Also, the farmers' association is expected to act as channels for learning and information sharing between different strata of a farmer with different socio-economic characteristics. This is far from what is operating. The association only give support when members are in the problem not in terms of finance but marketing problem. The association is concerned with where to sell for higher profits within the domestic market.*

**10. What are the constraints faced by farmers and the association in the adoption of technology practices?**

*It is really difficult to lay emphasis on farmers' problem. It has been difficult to get the appropriate technology adoption practices workable. I believe we need to look backwards and see how our soil can be improved in conjunction with the technology introduction. I strongly believe that profitability and competitive advantage can be driven by both science and art of science which is the attitude of farmers towards adoption.*

**11. How are you responding to change in practices on the adoption of technology in the production of pineapple?**

*There is a definite response to change in practices relating to the adoption of technology of smooth cayenne, but we need to understand that change is a gradual process.*

## Appendix 22 Transcript of research scientist (DOR – Director of Research)

**Researcher** – How do you think farmers view technology adoption in pineapple practical farming? How can you relate this to pineapple farmers' activities in Ejigbo Community?

**DOR** – *The Western dictionary defined technology as “the practical application of knowledge in agriculture and a capability given by the practical application of knowledge” It could, therefore, be considered as the way farmers practice farming in Ejigbo Community.*

*In this context, the knowledge of farmers on how to manage their resources to produce the desired product (pineapple) becomes necessary (tools, raw mats) factor. In essence, it includes both physical and non-physical resource skills methods, experience. Technology adoption practices should include dissemination and application of modern practices at the farm level. It encompasses all resources involved in the production process that is affected by education, training, learning and information on existing and experience which form the basis of farmers' knowledge. It also includes technologies and practices in the whole pineapple production process.*

**Researcher** - How can technology adoption practices lead to increased production of pineapple fruits?

**DOR** – *Historically, pineapple farmers in Ejigbo shares values between irrespective of age or gender classification. Some behaviour regarding production and associated practices are acceptable or otherwise. Thus, they possess a common vision towards the production of pineapple for commercial purpose. The performance of farmers in the production of crops depends on their experience and those of their neighbours. In modern days, farmers no longer depend on these alone; they are guided by extension agents to make use of the minimum resources to achieve the maximum results. The results can be regarding improved crop productivity and subsequent reduction in the impact on the environment. Pineapple farmers collaborate with one another through the traditional method of “aaro” and “arokokodoko” thereby working in a group or community to achieve an increase in production and productivity. The intervention of NIHORT in this regard is to carry out applied research to determine how yield can be improved within a competitive environment. Individual and collective (group) farmers are encouraged to adopt the technology transferred to them from NIHORT to achieve a better output and outcome.*

*In my opinion, technology adoption practices can be loosely defined to include both routine and non-routine farm manage*

*ment practices that are supported by the institute to achieve improved production level in terms of quality and competitive nature.*

**Researcher** – How do farmers benefit from the research on technology adoption practices?

**DOR** – *The benefits of research carried out by NIHORT is mutual. Farmers benefit by improving their financial gain and time saving while the nation benefits via the environmental performance of the farm and improvements in the livelihood of pineapple farmers.*

**Researcher** – How can the adoption of technology on suckers lead to competitive advantage among farmers?

**DOR** – Majority of pineapple farmers are already adopting the technology. It has two major advantages. It reduces the gestation period from twenty- two months to sixteen months. Secondly, the size of matured pineapple fruits is adjusted to suit the international market required standard. The technology and technology practice is introduced by NIHORT, who has the custodian of expertise. This technology is rare as NIHORT is the custodian of the technology transferred to pineapple farmers in Ejigbo community. : The issue of trust has also helped pineapple farmers in Ejigbo community. Same varieties of pineapple (smooth cayenne) introduced to pineapple farmers in Ejigbo were also introduced to other communities in southwestern Nigeria. However, because of the commendable attitude and trust of the farmers in Ejigbo towards the research institute, they are the first to accept the holistic technology adoption practices by donating field for on-farm trial. They also believe in the hard work of the institute by trying the operations on their commercial farm plots. They carry out the routine farm and management practices and monitor their farm carefully every day, unlike other communities where pineapple farmers only monitor their field without structure.

**Researcher** – How can NIHORT encourage farmers to adopt technology adoption practices?

**DOR** – *Pineapple farmers are usually invited to adopt the practices if they think that it is profitable for them to do so. They can also adopt if the method of information transfer is efficient. However, it may be inefficient if the technology transferred is too prescriptive.*

**Moderator** – Can you explain what you mean by prescriptive?

**DOR** – *Putting pressure on farmers to adopt technology adoption practices should be discouraged. Since farmers in Ejigbo have a common goal of mass production of pineapples for their livelihood, the demonstration of new technology practices is encouraged to be carried out on the farmer's plot to boost their confidence. One should also understand that the adoption of technology by farmers follow a process. The process also follows an interrelated series; in this case, the farmer – research/extensive capability/linkage is strengthened.*

**Researcher** – Can you explain further what you mean by interrelated series?

**DOR** – Yes, interrelated series are the factors considered by farmers in the process of adoption. These factors include economic, social, cultural, personal and institutional. Such institutional factors include stages of adoption: awareness, further information, evaluation, trial and approval.

**Researcher- What do you mean by economic factors?**

**DOR** – “By economic factor, I mean the cost of adoption and benefits from adoption is expected to align with the objective of the farmer – **the purpose for choosing** pineapple production as a means of livelihood. Some farmers are reluctant to adopt transferred technology due to the contentment in their current state of production while others are quite inquisitive about improving their future benefits through total adoption of technology and practices.”

Hmnnn... Let me add that the motivational factors for technological change in the adoption process can be from both supply and demand side. Sustenance of economic growth from the supply side while meeting human needs and aspirations from the demand side.

**Researcher** – How can the motivation of farmers to technology adoption practices lead to technological change?

**DOR** – If farmers adopt farming practices, one should, therefore, expect a technological shift in the long run. Technology change enhances international competitiveness in pineapple world trade based on CODEX standard. Farmers are motivated to learn more about production and practices.

The change in relationship dynamics between farmers and pineapple production output is an indication of changes in technology adoption practices by farmers. Pineapple farmers operate in a competitive environment; they adopt new knowledge to maintain and be competitive in the both domestic and global market. Pineapple farmers in Ejigbo community are inquisitive to learn about what can improve the current production situation. However, one of the mandates of NIHORT is technology and knowledge transfer to horticulture. NIHORT is responsible for all horticultural farmers.

**Researcher** – How do NIHORT view education and training as a tool for knowledge in technology adoption practices?

**DOR** – Pineapple farmers learnt from one another and as well from their previous mistakes. Education and training are vital elements. It helps to improve the understanding of farmers in the adoption process. It also guides farmers in deciding in a knowledge economy. Development in research and extension linkage is based on the training of farmers. Based on a field visit to pineapple plots in Ejigbo, there has been a great positive impact of training of farmers on translated output and level of advantage on competition of pineapple production. In this regard, NIHORT is struggling hard to achieve this as funding is inadequate to do training for the farmers involved

# Doctor of Business Administration Impact Statement

**UNIVERSITY OF HUDDERSFIELD**

## **IMPACT OF THE DBA ON MY PERSONAL AND PROFESSIONAL DEVELOPMENT**

Impact statement submitted in accordance with the requirements of the University of Huddersfield for the degree of Doctor of Business Administration

**By**

**MOSHOOD OLATUNDE OLADAPO (U0867598)**

Date: April 2020

**DBA Course Leader: Dr Annie Yeadon-Lee**

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## **1.0 Introduction**

This impact statement is submitted in partial fulfilment of the requirements for the degree of Doctor of Business Administration (DBA) of the University of Huddersfield, United Kingdom.

The statement examines my personal and professional development with regards to the relevance of a DBA programme in my career development. The personal development relates to the set of activities that I have engaged in acquiring and improving on self-knowledge acquisition. It includes the building of natural talent (having grown up in an agrarian environment with a flair for agricultural production) in me and as well as achieving potential development within my capability. Furthermore, it involves my development as it relates to my positional level of employability, thereby improving my quality of life and realisation of future aspirations and goals. The other aspect of my personal development includes involvement in both the formal and informal activities that could help in developing other colleagues. Such activities include teaching modules related to agricultural management and agribusiness at undergraduate and postgraduate levels, coaching the younger graduates of agriculture and rural economics, counselling the farmers and the potential farmers, as well as mentoring future successors and practitioners in the area of agricultural production and farming knowledge transfer. On the other hand, my perception of professional development is both formal and informal, with a broader application of my knowledge and experience to achieve professional outcomes relating to my capability and competence. It involves widening my range of transferable skills such as leadership, team management, planning and organisation to improve my strategic management skills as an academic as well as a professional agriculturist.

This impact statement starts with a little personal background, followed by an overview of the entire DBA programme. The second part discusses the general methodology of learning and my motivation for the DBA programme. The latter part discusses the practical application and the impact of the skills developed in my DBA research study. Reflexivity on the DBA programme concludes the statement.

## **2.0 Background of the Researcher**

As a child, I have always had a desire to lead others. Despite not having a commensurate physical appearance in terms of height, I held leadership positions such as class captain in primary and secondary school and school prefect at high school. I was also a house leader in the Boys Scout movement. At the University, during my undergraduate programme, I was a member and majority leader of my constituency in the Student Union Council. The responsibilities associated with these roles further shaped my self-confidence, intelligence and integrity, values, all of which associate with essential leadership traits (Northouse, 2016).

On the other hand, organisational skills, knowledge and general self-efficacy gained from my assigned leadership duties coupled with personality traits and values have contributed to my identification as an influential member of the farming community outside work. Hence over the years, I attained



leadership by emergence within the agrarian community. In this role, the leader-member relationship is a substantial factor in achieving success (Northouse, 2016)

My background was in agriculture, having grown up in an agrarian community. This background and interest motivated me to study a course relating to farming and agriculture. My undergraduate and postgraduate degrees was in Agricultural Economics which influence my choice of career and philosophical thinking regarding integrating management and leadership skills into agriculture and rural farming.

I have seen myself to be incredibly lucky to have enrolled in the DBA programme at the University of Huddersfield. My career path to date has been incredibly varied, but within teaching and research subset of education. I have served as a research officer in a public organisation for ten years with a significant focus on socio-economic research within a multidisciplinary research team. I have also served as a tutor and Lecturer for ten years after graduation as an Agricultural Economist. My job role includes teaching and research within the higher education environment. As a training staff, I have worked as a training professional in a training consulting firm in the United Kingdom for three years.

Based on these experiences, my career path has been quite stimulating and challenging with diverse expertise in the United Kingdom and Africa in a variety of jobs with different cultural setting and mindset. However, despite the diversity of the job roles and levels of leadership management involvement, I have always had a vision of performing a leadership role which has placed me on thinking about achieving the skill through, a practical application of the principles of leadership within an academic set up. Reflecting on my experience in agricultural economics, I was able to identify the gap which I felt could be filled up with action learning to serve as a guide for the leadership role and action research to support me in the participatory action research which also was an identified gap before enrolling for the DBA programme.

With a PhD in Agricultural Economics, my experience in farm management practice dictates that farm potential future leaders may work in environments that are continuously changing due to increasing complexity of farm operations, ambiguity, and evolution. It, therefore, occurs to me that the way forward is to develop my leadership skills coupled with a higher order of capacities based on self-awareness, reflection, learning, empathy, courage, and collaboration. I also need to establish a network of relationships that are rich in a common language where experiences of the different workplace are shared to improve my applicability as it suits the operational requirements.

The DBA programme gave me an opportunity to reflect on my past research work for significant personal development in agribusiness, such that the study achieves a higher level of effectiveness and efficiency as a professional practitioner in agribusiness. The training also is packaged to allow for flexibility and a range of opportunities in every sector of the economy.

### **3.0 The University of Huddersfield's Doctorate Professional Programme in Business Administration**

Huisman and Naidoo (2006) define a professional doctorate as a programme that focuses on applying programme content to the candidates' work situation. Thus, Mellors-Bourne et al. (2016) emphasised the importance of DBA as a research degree that contributes to both theoretical knowledge and professional practice.

The DBA programme is designed to encourage and support practising managers in all fields to develop and improve both critical thinking and research skills at a doctoral level to solve problems at the strategic management level. The structure of the programme entails a pedagogy that follows an action learning approach at the University of Huddersfield. Overall, this approach improves and increase learners' active engagement and acquisition of knowledge. It is exclusively designed to carry out leadership study, implement and evaluate practical solutions to real organisational challenges through action learning approach.

It is interesting to note that action learning has different perceptions. However, its central theme relates to a process that involves a small group working on real problems, with the actions of implementation guided by learning as individuals, a team, and as well as an organisation. It helps organisations develop creative, flexible and successful strategies to practical problems which involve both insightful questioning and reflexivity. In the current context, it is within the construct of actionable knowledge since it tackles problems through a process of the query (asking questions) to clarify the exact nature of the problem, reflecting and identifying possible solutions, after that taking action. The questions build group dialogue and cohesiveness, it also generates innovative and systems thinking, which enhance learning results.

Thus, action learning allows practitioners to investigate the work-based problem to achieve economic, societal or organisational change (Costley and Lester, 2012; Wildly et al., 2015). I considered this to be relevant to my DBA research. The structure of the programme entails a pedagogy that follows an action learning approach. The rationale for engaged action learning allows learners engagement to be highly influential in the research process and success. Such influence is improved by members of the learning set and learning facilitators. Overall, this approach improves and increase my active engagement and acquisition of knowledge.

The unique approach of the DBA learning set at the University of Huddersfield involves professionals/leaders in various organisations meet for three hours per months in four years in a facilitated group to ask questions and discover potential solutions to the challenges posed by an individual. There is also a concurrent theoretical study on research methodology, analysis, and reflexivity in the first two years. Although, the researcher starts to meet with the research supervisors at the beginning of the third year until the completion of the programme. Each member can speak and interact with other members by giving feedback on various tasks. The learning set also provides different ways of achieving the desired solution to a problem. Every member of the learning set feels fully involved and empowered to bring change — This can be evidenced through group inquiry. The approach does not always seek one right solution. Participant learning is strengthened by the diverse experiences of other members of the learning set and the facilitators. Thus, participants can identify individual blind spots to broaden perspectives.

In my learning set, we had some members of the same organisation. However, the background of members of the set cut across professionals from education, marketing, agriculture, architecture, police affairs, computer technology and law. Apart from the meeting of the learning sets on a monthly basis, lectures and seminars on research skills and reflection practice were scheduled for the first two years in a conducive academic environment. Professionals and practising managers complete their studies and research work within a period of four to seven years on a part-time basis. It should be noted that the monthly meeting of the participants of the learning set aims to improve the interpersonal

relationship of the members (Yeadon-lee, 2013). This, I believe, was achieved along the DBA journey as evident in the increasing level of interaction among the learning set.

It is worthy to note that the University of Huddersfield with the support of Santander bank-sponsored my trip to Chalmers University to showcase my research work and as well to network with other researchers and professionals in Sweden. Thus, the DBA programme has provided me with a useful role in developing, enduring, and informing relationships between academic and professional practice.

In conclusion, the design of the DBA programme at the University of Huddersfield enables me to accommodate lifestyle balance as an integral part of the research process which goes a long way in the application of research in solving practical problems on the farm. In practice, my current research study on the empirical investigation on technology adoption practice as a source of competitive advantage tends to be outcome-driven rather than process-driven, collaborative rather than individual (Fink, 2006).

#### **4.0 The Motivation for Enrolment on the DBA Programme**

Scott et al. (2004) categorised motivations to be either intrinsic or extrinsic. In my circumstance, my background in Agriculture requires a compliment in leadership and management study to identify, analyse, articulate and solve the complex practical problem in the field of practice. My motivation for enrolling in the programme is, therefore, both intrinsic and extrinsic. It is intrinsic because it allows me to intellectually challenge myself to enrich me intellectually leading to personal transformation. It is also extrinsic because it serves as a professional advancement that can lead me to a mainstream academic/research role in the United Kingdom. My expected outcome based on my motivation is to achieve personal satisfaction regarding the understanding of farmers compared to other stakeholders' view in the farming community coupled with personal growth and transformation from knowledge exchange researcher into a practised based agribusiness lecturer (Mezirow, 2000; Mezirow and Taylor, 2009).

Specifically, I am interested in solving complex problems that can be translated directly to the agricultural industry for change management. As a professional agriculturist, I want to stay abreast of new development in my field and use the knowledge in business and skills learned in both programmes every day. My expectation with regards to how I can perform better in this capacity is provided by the action learning approach, which appears to me to be a fantastic approach to my personal and professional development.

So far, I have been able to apply the skills developed from action learning approach of the programme to improve my personal and professional development. An improved level of decision making and planning was demonstrated in my approach to the choice of methodology and effective management of participants in the DBA research process. The uniqueness of action learning approach through discussion and contributions of members and facilitators is indeed a kudos to my personal and professional development.

#### **5.0 My Progression through Action Learning Method**

Action learning was a constant feature throughout the DBA programme. Therefore action learning is an integral part of the programme. Thus, I simulate my learning strategy as a professional farm manager with field practice.

*'There is no learning without action and no (sober and deliberate) action without learning'*  
(R.W. Revans 1907–2003)

Learning as a continuous process is an indication that it could best be achieved with an open probing mind backed up with an ability to listen, question and explore new ideas through creativity and innovations. Thus, Revans' change equation holds that:  $L \geq C$  where L is learning, and C is environmental change. The equation implies that individual farmer and farming community flourish when their learning (L) is at least equal to, or higher than, the rate of environmental change (C). This is found to conform to the findings in my DBA research study on technology adoption by farmers in Ejigbo community. It further suggests that farmers learn by combining what they know based on experience with inquisition to what they do not know. Revan's learning equation, therefore, holds in my research study that  $L = P + Q$  such that learning is a combination of P (programmed knowledge), or what farmers already know; and Q (questioning insight), which is inspired by fresh questions about the challenges of adopting technology adoption practices.

It is pertinent to note that the DBA programme exposed me to the first encounter with action learning. Through reflection, I have gained a deeper understanding of various issues faced by farmers and other stakeholders in agribusiness. Furthermore, it has enabled me to manage change more effectively and meet the challenges encountered in the research field (workplace). Currently, I have confidence in my action planning within a research team environment and understand my role better than it used to be. I have also implemented a change in this direction.

In practice to my profession, action learning suggests that farmers can address the most difficult challenges and problems through their experiences and learning. Thus, Revans' idea is a practical methodology for dealing with difficult challenges. It is also a moral philosophy based on an optimistic view of human potential. Therefore, action learning method is a continuous and dynamic process. In the context of my learning and progression in the DBA programme, the approach integrates a group of initial eight practitioners from different disciplines, facilitated by the programme coordinator and module instructors. Our objective is to solve practical problems that are real as well as, focus on learning from one another with the intention of practical application in our different areas of expertise (McCormack et al. 2004).

As a leadership development method, action learning creates a forum and provides a structure for my continuous learning and change. It is related, highly recommended and acceptable approach based on the view that my organisation has a complex adaptive system such that change co-occurs at individual, team and organisation levels.

Along the course of the DBA programme, it is interesting to note that I have imbibed and developed leadership, teamwork, facilitation and interpersonal skills that are valuable to me and my organisation as demonstrated in my ability to effect change in the planning and management of research process at National Horticultural Research Institute (NIHORT). I have developed and improved my leadership and interpersonal skills in the process.

Interestingly, some of the questions raised in year one are still relevant to date. The issues posed in the first session were:

- A. What kind of picture can I give to leadership where I am working presently?
- B. What kind of leadership do I think is required in that organisation?
- C. What sort of leader do I want to be?

My answers to these questions created a lot to the identification of a gap in the leadership role expected in my organisation which then turned to be what I wish to have achieved before the end of the DBA programme. Reflecting on these questions for me to achieve a positive expected result, I realised that I have to be more adaptable, flexible and willing to learn in a dynamic environment. The qualities that I must develop/improve upon include openness, curious and capable of reinvention when required at a personal and organisational level. Development of these attributes along the line has contributed to my ability to examine the problems encounter as a team leader and looking for new ways of moving the team forward. (Credit to the University of Huddersfield DBA delivery approach).

The simultaneous combination of my action and inquiry has enabled me to analyse the effectiveness of my actions that could fill the gap backed up with a better understanding of how to analyse the effectiveness of a various course of actions and possible outcomes achievable through making different choices. The focus is mainly on a practical application of what I learned from others to implement leadership new skills with ease and confidence to manage present and future challenges.

The action learning methodology gives me a positive approach to the exploration of concerns and challenges in a thoughtful manner. With the support of different practitioners, and open questioning approach allows for changes to my action delivery plans while encouraging my leadership and team management skills coupled with a positive mindset. Thus, during my first year, I learn to ask questions that challenge my limiting assumptions, broaden perspectives, and see opportunities in ways that lead to more strategic and sustainable results for my organisation. I was able to create change in the farming community by advocating for farming practices as a complement to the adoption of technology which creates a competitive advantage to rural farmers in southwestern Nigeria.

The benefit of action learning is a function of the specific matters brought to the process. For instance, with my background in Agricultural Economics, my objective was to:

- (1) Acquire long-lasting problem-solving skills
- (2) Promote my leadership skills
- (3) Accept being challenged by the research team
- (4) Learning from the past practice of my profession
- (5) Evolving fresh ideas
- (6) Designing practicable plans for instant execution
- (7) Effectuate the intended results in a constructive way that supports local farmers and other research team stakeholders

After going through the DBA programme at the University of Huddersfield, I have come to realise that challenging methods and ideas constructively through a thought process is a right approach of creating new ideas (creativity/motivation) that can guide to practical application to real change and progress within an organisation.

Action learning method at the University of Huddersfield, therefore, instils lifelong problem-solving skills and explores real issues by sharing problem-solving ideas. It also allows reflections on solutions to problems in the past and prescribes how practices can improve by demonstration. Insightful questions from group members build up group discussions that generate creative and innovative thought process. Such innovative ideas from the group members enhance learning results.

In summary, the action learning approach has made pending, and potential farming problems ease out by the practical application of farm practice. It has also improved my problem-solving skills in practice.

## **6.0 Practical Application of My DBA Research Work**

In my journey to understanding how to use the research process in solving practical problems within a rural agricultural setting, I considered a case study of an agrarian community.

Yin (2012) highlighted case study methods to be an in-depth, longitudinal examination of a single instance or event. It also provides a systematic way of looking at events, collecting/analysing data and reporting the results. Thus, expose the researcher to a clear understanding of a particular enquiry and identification of future research study.

The choice of grounded theory methodology within a case study research strategy in my study on how farmers can use technological adoption practices as a source of competitive advantage was based on the exploratory nature of my research study. My DBA research work empirically investigates farm-level technology adoption practices as a source of competitive advantage in the production of pineapple. The grounded empirical research provides me with the opportunity for an in-depth understanding of how technology adoption practices by farmers led to a competitive advantage. Thus, my research has contributed to the gap in the literature on the principle of competitive advantage by proffering solution to the three research questions:

1. How could technology adoption practices lead to a sustainable competitive advantage in the production of pineapple fruits?
2. Why has pineapple fruits produced in Nigeria not listed as foreign income earner despite its position as one of the major producers in the world?
3. How could farmers' experience and learning influence the adoption of farming practices in pineapple production

Overall, the study breaks the new ground in competitive advantage within the horticultural sector and sheds light on the possibility of Nigeria's international trade in pineapple business.

## **7.0 The Impact of the DBA Programme on My Leadership Strategy**

Leadership is a common term loosely used in a variety of different ways. A simple definition Conger, (1992: p18) defines *leaders* as “individuals that establish a direction for a working group of individuals who gain commitment from this group of members to this direction and motivate the members to achieve the direction’s outcomes.”

I have chosen to adopt a leadership strategy that fits into the current needs of my organisation by improving and understanding my self-awareness as well as invest in developing skills that enable me to be more effective. The programme has provided a way to explore its application in my workplace as well as develop my leadership capacity and resilience. It has also elevated and improved my mentoring and coaching skill in the workplace.

During the programme, I have demonstrated elements of perseverance towards the research work - driving every aspect of the research study toward a singular unified purpose of achieving a DBA. Furthermore, the programme has transformed me to orchestrate a high-level plan that drives all participants in the research study toward the unified goal of investigating technology adoption practices as a source of competitive advantage in horticulture. The leadership communication skills incite other participants to work toward the stated goal in line with the path that I have chosen for the research process.

## **8.0 The Impact of the DBA on My Professional Practice**

My participation in this programme has got much tremendous influence on my approach to work and research practice. The issue of confidence in my ability to influence change in a positive direction is a strength that I have gained from the programme. It has, to a large extent, influence my research activities and circumstances at which I have operated as a practising farmer.

Secondly, the programme, through the experience of action learning, has made me more analytic in problem-solving. I now have a greater sense of control over the roles expected of me as a researcher. Apart from being analytic, I have learned to discover the in-depth course of problems in a diversified manner. I am now more likely to step back and examine the practical situation based on available analytic tools rather than judgemental.

The issue of documentation and organisation skills is another skill that I have improved upon as the programme guides us (the learners) through the action learning method to achieve this. On any particular day, I face so many challenges and arising opportunities that my list of “things to be done” often exceeds the time available for me to do them. Before now, I used to find myself spending much time on activities of lower priority. With a practical approach and support for time management counselling from other members of the learning set, there was an improvement in my time management and organisational skills. Currently, I focus enough attention on activities with higher priority, and as a result, become more productive.

## **9.0 Reflection**

I have considered reflection to be a mental process with purpose or outcome in which manipulation of meaning applies relatively to complicated or unstructured ideas in learning or to problems for which there is no obvious solution (Moon,1999). From this statement, it is self-evident that reflection is an

integral part of the action learning with a focus on self-critique. However, Gillings (2000) elaborated on self-criticism as a commitment to self-enquiry and readiness to change in practice. The author affirmed that reflection is an essential element of learning. Although few researchers have argued that critical reflection could lead to discomfort and dissonance (Reynolds, 1999 cited in Densten & Gray, 2001), the lack of it can result in poor decision making and bad judgements (Brookfield, 2017; Cunliffe, 2016).

Schon (1983) identify the engagement in the reflection in one of two ways; 'reflecting on the action,' after the experience or by 'reflecting in action,' during the experience.

I have chosen to reflect on the later one. I can remember very well when Annie was stressing the importance of keeping a reflective diary. Some of us ignore this advice, and for me, I thought it is a mere waste of time. At the beginning of the programme, I thought what was important to me was to pass the coursework rather than keeping records of research work that will not be starting until the third year! In my third year, I got to understand that I have made a mistake by not keeping a diary in the earlier years of the programme. In fact, it was an error that was apparent when I came to realise that Lecturers know what they were talking about in earlier years of the programme. I was later encouraged in the latter part of my third year to keep a reflective diary on realising what I have missed out. In the latter part of my third year, (data collection period from farmers) I realised that I might have referred or reflect on what the participants have said in the previous focus group meeting as a guide to discuss the current issue.

Leadership is about engagement and to achieve my objective of transforming inappropriate inherent norms. I need to adopt a team cohesion leadership style (situation contingency). I also need to listen more, appreciate the logical feedbacks from colleagues and team members and learn to accept their validity. A key aspect of leadership is influencing others. My aspiration to be an effective leader entails focusing on leadership development. Without reflecting and learning from experience, personal development cannot occur. I aspire to be an effective leader and consider critical reflection as integral to my leadership development.

Also, I have appeared to be inconsistent on the research journey. For me, the research work was piling up daily while my job within the period turned to be relatively unstable, coupled with increasing family commitments within and outside the United Kingdom. Moreover, I need to adjust to normal social life to make up for the emotional imbalance.

I took a gap year to reflect on what I could do to move forward. I found out that the use of a reflective diary and dedication of at least one hour on a daily basis was helpful. It also guides me to get the research process in perspective with a focus on potential achievements rather than what I have done wrong in the past.

Thus, the reflective process has made me aware of what my participants (farmers) are not comfortable with when dealing with agricultural professionals. It has also made me develop a critical thought process of what I could improve. Furthermore, it made me develop a new perspective based on the current situation. Reflection has, therefore guided me to accept a change in attitude to achieve and improve on my professional development. There are indications and pointers on lessons learned and what I could have done differently.



While I felt a strong feeling of self-satisfaction in the research process, I realised that I was too focused on unwarranted tasks which have extended the data collection period. I had unconsciously allowed my position as a researcher in a related project to influence the sampling procedure, which has also contributed to the extended data collection period. I allowed my personality trait of ability to cope with the pressure to take on more responsibilities than required. In the future, I will adopt a shared responsibility approach with research assistants and seek a collective agreement on a solution which can lead to adequate resource management.

Rather than using a directive leadership style approach, I could have given the participants the opportunity to willingly undertake the additional tasks of farm visits and observation rather than coercing them to do so.

My emotional capital report at the start of the DBA reveals that I possess the personality traits required for effective leadership. However, the report agreed on the following areas of improvements; feelings, empathy, self-control, adaptability in other to make my strengths more effectively. Thus, my leadership development has strategically focused on these areas of interpersonal skills during the programme, which was achieved as evident in the feedback from NIHORT and other participants of the research project.

In summary, the DBA programme at the University of Huddersfield has improved my ability and skills to approach situations from a varied perspective than in the past, making me more proactive than reactive in problem-solving and decision making. It has also increased my self-awareness, confidence and handling difficult conversations with more sensitivity and confidence in giving and accepting feedback.

## **10.0 Future Plan**

My DBA research is theoretically grounded and empirically informed. While I consider myself a strategic agribusiness researcher, I want to continue in teaching and research with the emphasis of my research on bridging the gap between operational and strategic management in agribusiness. My immediate future is to focus on research work on apprenticeship programme with relevance to agribusiness and farming.

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Doctor of Business Administration Journal Article

**UNIVERSITY OF HUDDERSFIELD**

**Engaging Technology Adoption Practices at the Farm Level:  
Evidence from Pineapple Cultivation**

Publishable article submitted in accordance with the  
requirements of the University of Huddersfield for the  
degree of Doctor of Business Administration

**By**

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Date: April 2020

**Main Supervisor: Professor Gerard McElwee**

The DBA candidate intends to submit this article to the Journal of Technology Transfer which has previously published papers on technology adoption processes and organisational behaviour in different countries.

The submission conforms to the required manuscript standard required by the Journal of Technology transfer.

A note about the author is included as an addendum

Author – Moshood Oladapo is a Lecturer on the University of Suffolk Programme at the Global Banking School, Manchester Campus, the United Kingdom. His professional interests include Agribusiness, Strategic Management and Graduate Apprenticeship. The research outlined in this paper emanated from a Doctor of Business Administration undertaken at the University of Huddersfield.

The word count of the article is 6980 words

## **Engaging Technology Adoption Practices at the Farm Level: Evidence from pineapple cultivation**

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### **Abstract**

Technology adoption, as a strategic resource, can lead to competitive advantage in any industry. However, competitive advantage may not be achieved in Horticultural production without adopting the necessarily associated practices. This paper investigates the adoption of farm practices in conjunction with technology transferred to farmers. It specifically discusses how Technology Adoption Practices (TAP) could lead to a competitive advantage in Horticulture with reference to the production of pineapple fruit in Nigeria.

The study considers a qualitative case study approach of pineapple farmers in Ejigbo, Nigeria, using a Straussian grounded methodological approach to explore the adoption of farm practices support for competitiveness. The method of data collection from purposive participants include focus group discussion, semi-structured interview, field observation and memo.

Findings from the study generate two storylines and reveal that attributes such as farming system, fruit quality and mindset enhance the production of pineapple while community cohesion, mutual relationship with change agent, learning from errors and skills development through training foster and strengthen competitiveness at the farm level. The findings suggest that the passion of the farmers for pineapple cultivation lies in the passion for the crop supported by the attributing elements while the dynamic reinforcing capabilities strengthen the competitiveness.

From a professional practise standpoint, the study gives an insight into how farmers attempt to proffer solutions via technology adoption practices to practical problems encountered during the production process. The research recommends that agricultural and rural development policy should focus on supporting farmers through reinforcing factors. The research also gives recommendations for potential future research studies in the field of strategic management and agribusiness.

The study contributes to the general body of knowledge in the field of strategic management theory and practice. Specifically, it makes a significant contribution to how well pineapple farmers can manage their production system to gain competitive advantage.

**Keywords:** Technology adoption practices, competitive advantage, farm practices

## 1.0 Introduction

Technology is often regarded as firm-specific operational knowledge (Nonaka, 1994; Spyropoulou, Constantine, & Katsikeas, 2018). This concept has direct relevance to horticultural production techniques as modern-day farming demonstrates that technology adoption practices (TAP) play a significant role in improving the quality of products and the state of resources that are critical to the efficient production of the crop leading to market competitiveness. However, most rural communities face significant challenges in agricultural production; they are often rich in natural resources but lack the relevant innovation practices required for the move towards competition. Thus, technology and improvement of technical skills can promote improvement in organisational performance through their positive influence on the processes of production (Garcia-Sanchez et al., 2018). To a large extent, most farmers grow crops and adopt management practices the way their ancestors were doing. They are also continually innovating ways that can contribute and enhance their livelihood opportunities but are unconscious of the state of their resources in achieving competitive advantage. They, therefore, face some challenges. One of the challenges is the need to adjust their production systems to meet the demands inherent in the economy and also develop their distinctive capabilities to be able to adapt to their dynamic environment continuously (Bobillo et al., 2010; Gutierrez-Gutierrez et al., 2018). Specifically, farmers must have distinctive technological assets to face the dynamism of today's enlightened society (Centobelli et al., 2018). Technology is thus a "strategic mechanism that improves cooperation, communication, and exchange of information and knowledge through the presence and proper use of tools or assets that encourage knowledge and information to flow more rapidly and easily throughout the farm community" (Garcia-Sanchez et al., 2018).

Despite the growing prominence of technology and technology adoption as a source of competitive advantage among firms (Rogers, 2003; Yuko et al., 2018), most studies related to agriculture were on the adoption of farming techniques (Reardon et al., 2017; Rogers, 2003). The existing literature lacks guidance on the integration of technology adoption to agricultural farming practices. Nevertheless, farmers embark on a differentiation strategy to develop a competitive advantage based on experiential learning as well as technology transferred to them from research scientists and organisation (Biam & Barman 2017). Thus, linkages via technology adoption practices along with learning capability to create competitive advantage are of paramount relevance to technology adoption in strategic studies. A better understanding of incorporating farming practices as an integral part of technology adoption presents a clearer picture of the farming operations within the farm setting. The investigation of the linkage between TAP in horticulture and competitiveness has significantly been missing in the literature. Hence this article aims to show how TAP is linked to competitiveness in the field of horticulture.

The paper contributes to the gap in the literature on principles of competitive advantage. It proffers solution to the two research questions on how adoption practices enhance technology adoption in the production of pineapple fruits and how can the adoption of technology practices lead to a competitive advantage. The current study extrapolates by understanding the perception of pineapple farmers regarding technology adoption and associated practices. The objective is to develop a theory of the methods that has a link to competitive advantage. This study investigates explicitly how TAP in pineapple production could lead to competitive advantage among farming communities.



## **2.0 Technology Adoption Practices Studied**

The technology under study is the adoption of smooth cayenne suckers as planting materials for the cultivation of pineapple. The corresponding practices considered include farming practices and operational activities at the planting, weeding and harvesting stages of production. These practices were selected because of the significant role in improving the yield of the crop. The adoption of the technology requires a simultaneous adoption of the corresponding farm practices to achieve an outcome that makes the crop competitive among pineapple farmers. Subsequently, it increases revenue and improves the means of livelihood of the farmers. The main advantages of the technology are reduction in the production period and uniformity of the output (Denton, et al., 2000).

Traditionally, Propagation of pineapple can be through the crowns or slips which takes twenty-two months or twenty months, respectively as the production cycle. The production cycle usually referred to as “gestation period”, therefore, depends on the planting material used for propagation. However, National Horticultural Research Institute (NIHORT) develop technology and advice to farmers in the selection of the planting materials (smooth cayenne variety) as well as the planting method as a means of intervention to produce uniformed pineapple fruit with an average size of 1kg. The Institute, through the intervention, encourages the planting of the suckers, which confers a sixteen month gestation period against the conventional twenty-two months. Apart from the time advantage, if the farmers adjust and adopt the farm practices in conjunction with the technology of planting suckers of smooth cayenne, the overall yield will increase with good quality fruit as well as fruit size acceptable to different markets.

### **2.1 The socioeconomic characteristics of pineapple farmers in the study area**

Ejigbo is a farming settlement community with farming as the primary occupation and means of livelihood of the inhabitants. The community runs an agrarian economy with considerably large hectareage of pineapple orchards. Ten successful adopters of TAP were purposefully selected for the research (details of sampling in section 3.11). About seventy-five per cent of the farmers in the community concentrate on pineapple cultivation as a mono-crop, while the remaining very few operate mixed farming (NIHORT annual report, 2010). The age of the sampled pineapple farmers ranges from twenty-five to seventy-two years spreading across male and female farmers. Nine out of the ten sample farmers were males, while the females constitute the minority (Research sample). From the sample, there is an indication that ninety per cent of the pineapple farmers had no formal education. In comparison, ten per cent had formal education up to a degree level in agriculture. The size of individual farm ranges between 2-10 hectares of farmland, indicating that pineapple farmers in Ejigbo are smallholder farmers (Ogunjimi & Farinde, 2012). The pineapple farmer seeks the support of the family members and hired labour to carry out daily operations and management at the farm level. Although, all the farmers belong to the Pineapple Farmers Association (PFA) as members, none of the farmers export pineapples. Instead, they depend on local demand for products (pineapple) for domestic consumption as a means of income. The primary source of information is through farmer to farmer and the umbrella PFA. Other sources of information include media, agricultural development programme extension linkage and research institute extension linkage with farmers. Thirty per cent of the pineapple farmers engage in non-agricultural activities as a guarantee to mitigate against risks in farming whenever it occurs. The level of experience in pineapple farming among the sampled farmers ranges from five to forty-eight years

### 3.0 Theoretical Background

The literature on competitive advantage establish two viewpoints in achieving the competitive edge; the industrial organisation theory and the resource-based theory, in which every business creates its competencies and capabilities which lead to competitive advantage (Gareche et al., 2013; Raza et al., 2015). In another dimension, some researchers view competitive advantage as a perceived benefit. Laszlo & Zhexembayeva (2011) and Payne & Frow (2014) fall into this category. They argue that any producer aiming to achieve competitive advantage wants the perceived benefit of the product to be higher than the competition. In line with this argument, Porter (1996) supported that superior performance is a function of perceived benefit that leads to competitive advantage. Porter (1980), in his reasoning, identifies the achievement of competitive advantage in three ways, cost leadership, focus strategy and differentiation of the product.

In this regard, the source of competitive advantage becomes a relevant theoretical framework underpinning the current study (Bashir & Verma, 2017). In line with the assertion of Wang, Bowman & Ambrisoini (2007) affirm that the source of competitive advantage would determine to a large extent the understanding of the concept of competitive advantage in a broad term. However, Eisenhardt & Martin (2000) complemented and demonstrated that dynamic capabilities are perceived to be the antecedent organisational and strategic routines. Thus, farmers and managers of farm operations collaborate in order to alter and reconfigure their organisational resource base, that is, acquire and shed technology adoption resources, integrate them, and recombine them as necessary– to generate new value-creating strategies (Grant 1991). Eisenhardt & Martin (2000) therefore, consider dynamic capabilities to be the key drivers behind the recombination of resources in order to create and sustain a competitive advantage.

Eisenhardt & Martin (2000: 1118) argue that dynamic capabilities should be conceptualised as “tools that manipulate resource configurations”; since long-term competitive advantage lies in resource configurations via dynamic capabilities, and not in the actual dynamic capabilities themselves. Ambrosini & Bowman (2009) found that the deployment of dynamic capabilities might lead to four different outcomes. The outcomes identified are a sustainable competitive advantage; a temporary competitive advantage; competitive parity and failure if the resulting resource base is irrelevant to the market. However, this study does not aim to study the relationship between dynamic capabilities and firm performance; instead, the focus is on the relationship between learning as a dynamic capability and technology adoption practices as a source of competitive advantage in pineapple farming. The reason for this choice is that in practice, there is need to identify why pineapple from Nigeria is not in the export market even though the country is the seventh producer in the world (FAOSTAT, 2017). In line with this conceptual framework, the current study is based on the resource-based view in conjunction with dynamic capability view. The study considers technology adoption practices as a strategic resource while learning complements as a dynamic capability to achieve competitive advantage.

## **4.0 Methodology**

The research design was based on the qualitative study, due to the empirical nature of finding facts from the participants (farmers and extension agents). Data collection was carried out within fifteen months. The methodological approach was based on one of the three types of grounded theory, as illustrated by Piggott (2010). The approach considered follows that of Strauss & Corbin, (1998). From this perspective, data collection methods considered the eight characteristics of grounded theory as highlighted by Weed (2009). The method of sampling used is theoretical and purposive. The data-driven method of sampling in this research allows the researchers the opportunity to refine concepts and develop properties for various categories (Charmaz, 2006; Jebb et al., 2017). Other characteristics put into consideration include a constant comparison of data (iterative process) and generation of memos. The key participants at the farm level include female and male pineapple farmers with a different level of experience in the production of pineapple but characterised by features regarding the purpose of the research study. The data collection method is based on triangulation and relied on four primary sources: focus group, One to one interview, field observation and memo writing.

### **4.1 Focus Group**

Due to the gestation period of pineapple, scheduled meeting for focus group discussion was slated between the production cycle of twenty-two months to gain access to necessary data, observe the practices on the farm by the researchers and constant comparison of data until collection achieves a theoretical saturation. Open-ended questions were used to probe participant responses in the focus group discussion. Data collected were transcribed and analysed on each iteration to generate questions for the next level iteration until data were considered saturated at the third focus group meeting. At each level of iteration, debriefing takes place for participants to confirm the authenticity of the discussion.

### **4.2 One to one Interview**

Interviews were conducted based on the outcome of the focus group to explore farmers thought in-depth and gave insight into the case study. A semi-structured interview was conducted with eight farmers, two extension agents and one research director to collect more data from the research institute and farmers for triangulation. The one to one interview was carried out after the twenty-two -month gestation period of pineapple production.

### **4.3 Observation**

Three field visits were carried out. The field observation comes up the previous day to discussion group meeting specifically to eliciting and generating discussions at the various meetings. The operational period includes planting, weeding and harvesting periods. The observations focus on:

- (1) Understanding the operational practices as defined and explained in both the focus group discussion and one-one interview.
- (2) Establishing the working relationship between the farmers and the research institute.

- (3) Understanding and detecting the norms and values within the community based on the culture of the case study farmers.

#### 4.4 Memo

Detailed notes were taken in the form of a memo at each visit of observation. The memo also considers the reflection of discussion at the focus group meeting.

**Table 1: Summary of the Methods of Data Collection.**

<i>Method</i>	<i>Venue</i>	<i>Activity</i>	<i>Participants</i>	<i>Type of Question</i>
<i>Focus Group Meeting</i>	<i>Farmers community</i>	<i>Three meetings</i> <ul style="list-style-type: none"> <li><i>Planting period</i></li> <li><i>Weeding period</i></li> <li><i>Harvesting</i></li> </ul>	<i>8 Pineapple farmers</i> <i>2 Extension agents</i>	<i>Open</i>
<i>Interview</i>	<i>Farmers various farms</i>	<i>One to one</i>	<i>8 Pineapple farmers</i> <i>2 Extension agents</i> <i>1 Research Director</i>	<i>Semi-Structured</i>
<i>Observation</i>	<i>Various farm units. Research Institute</i>	<i>3 Field observations</i> <ul style="list-style-type: none"> <li><i>Planting</i></li> <li><i>Weeding</i></li> <li><i>Harvesting</i></li> </ul>	<i>8 Pineapple farmers</i> <i>2 Extension agents</i>	<i>Observation</i>
<i>Memo</i>	<ul style="list-style-type: none"> <li><i>Community</i></li> <li><i>Research Institute</i></li> <li><i>Researcher</i></li> </ul>	<i>Various periods, depending on the emergence</i>	<i>Researcher</i>	<i>Open</i>

## 5.0 Data analysis and discussion of results

The analytical procedure in the study follows the flexible guidelines and procedure for coding by Strauss and Corbin (1998). Hence, the study develops concepts from the responses of the participants and follows the storyline approach as recommended by Strauss and Corbin (1998). It also involves the simultaneous and iterative process between the data and different methods of collection to ascertain

constant comparison between codes and categories. It is worth to note that the Strauss version of grounded theory methodology allows flexibility in the analytical procedure by allowing labelling concepts with similar names from other studies provided they share the same interpretations (Morse 2001). Morse (2001) emphatically affirms that labelling with similar constructs from past studies enhance the trustworthiness of the empirical data and confirms what is in the extant literature. Although there are different nomenclatures regarding coding and analysis in grounded theory, my analytical process follows the procedure in the Strauss grounded theory methodological approach.

Based on this methodology, the analytical method employed specified codes within each broad category (analytical codes). The list of codes was expanded through the iterative process of the data set. The analysis was further expanded to develop inductive patterns and relationships between coded categories (pattern codes). Afterwards, tentative relationships between variables start to emerge, which serve as a building block for developing a theoretical framework. The last step of data analysis is the development of a storyline which was through an iterative process.

### **5.1 Findings and Discussion of results**

This study investigates the linkage of the aggregate dimension as influencers of technology adoption practices towards competitive advantage.

Six major findings emerged from the study. Each of the findings reflects the major and subcategories as analysed in chapter four. The findings also address the research questions by providing explanations.

1. Production and product characteristics that enhance pineapple cultivation in Ejigbo farm community

- Natural endowment
- Good agricultural practices
- Approach to cultivation
- Product quality
- Process quality
- Uniqueness

3 Farmers' satisfaction at the current level of production

- Mindset
- Satisfaction

4 The impact of cohesiveness of farmers on the technology adoption practices

- Collective group action
- Pineapple farmers association membership
- Cultural identity
- Alignment of sense of mission

5 Mutual relationship with the Change agent

- Trust
- Collaboration

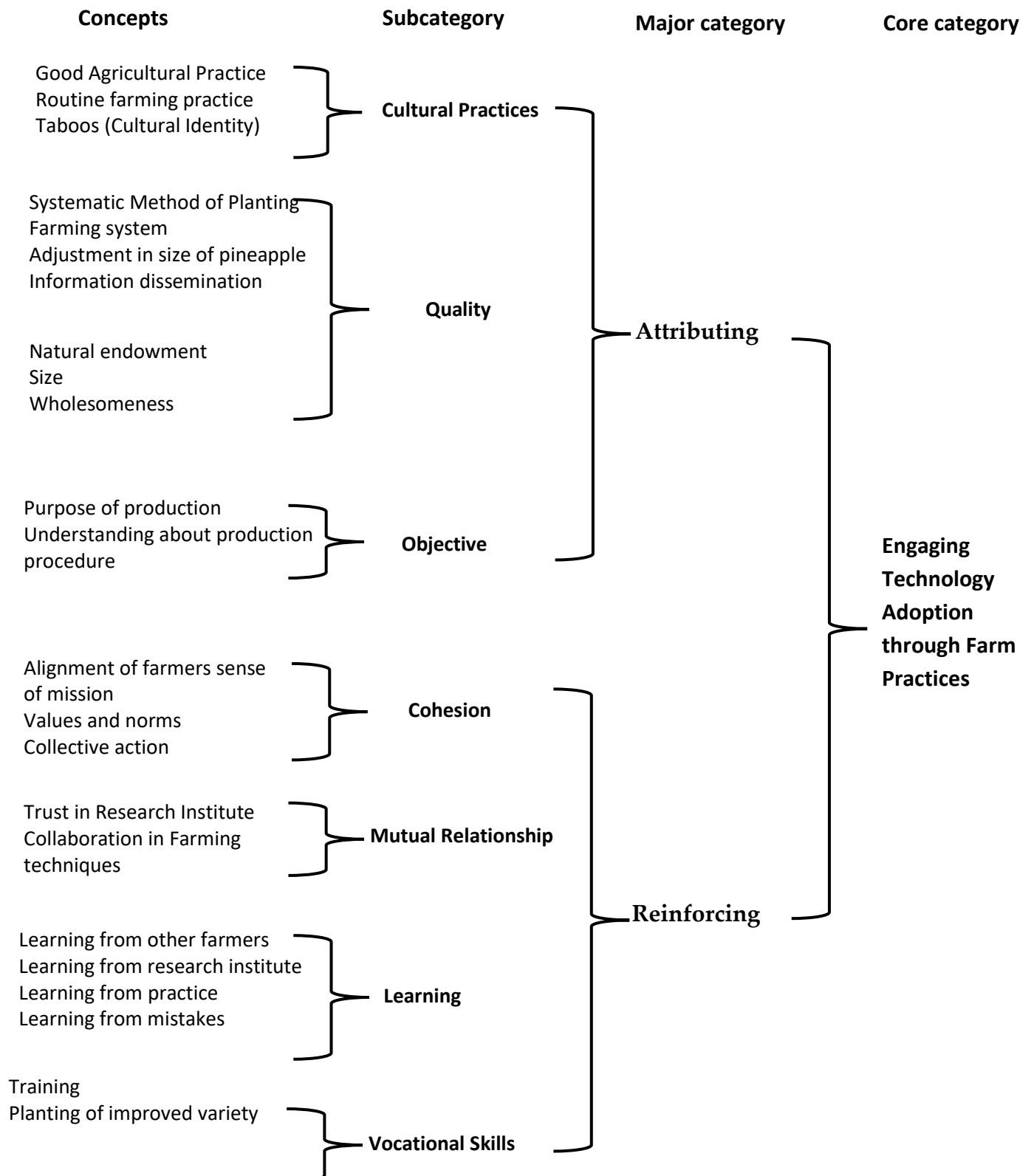
6 Learning

- Learning from errors
- Learning from other farmers
- Learning from experts
- Learning from practice

7 Skills Development

- Training
- Technological change

Figure 2: Summary of factors leading to the emergence of the theory



### **5.1.1 Production Characteristics**

The study identifies production and pineapple fruit characteristics as one of the factors enhancing production in the study area. Pineapple farmers identify the natural endowment including good soil, topography, weather and climate as motivating factor to cultivate pineapple. The finding suggests that the location has a natural advantage which could transform to comparative advantage among farmers in neighbouring states. Eventually, comparative advantage leads to competitive advantage among the farmers. The finding aligns with the finding on cassava production by Howeler, (2020) in Thailand that cost strategy is an effective competitive strategy. Although, the finding from this study recommends a differentiation strategy for competitiveness.

This study identifies good agricultural practices as a key ingredient that supports the enhancement of pineapple production. Although, the findings on good agricultural practices deviate from the standard norm of good agricultural practice. The finding is still relevant because the study links the principle and concept of the enhancement of technology adoption practice. However, it should be clear that good agricultural practice entails a guideline for the operational management of farm produce from planting to harvesting stage and beyond. The finding in this category aligns with the conclusion of Lubis et al. (2014) on the economic efficiency of pineapple production in West Java, Indonesia. Although the study by Lubis et al. (2014) was based in Indonesia, evidence from the current study aligns with their conclusion that good agricultural practices enhance crop production.

The study establishes routine farm activities as an integral portion of the farming system that supports farmers to achieve improved fruit production and yield. The finding suggests that sound output results from consistent operational farm activities and practices.

The finding on quality indicates that the physical features and attributes of pineapple are relevant to production pattern/techniques. Thus, the quality of fruit incorporates features and attributes of pineapple that responds to consumers' requirements and the ability of pineapple farmers to deliver the expected quality of pineapple fruits to consumers. In this context, the ability and suitability of technology and technology adoption practices become relevant to competitive advantage. It conforms with the assertion by Hernandez-Aguilera et al., (2018) that the physical features /attributes of products and consumer preferences for product quality can influence desired farmers' outcomes and encourage the adoption of farm practices that promote environmental sustainability.

The finding also suggests that the adoption of new variety or technology can lead to an improvement in the quality of fruit as suggested by Cavatassi et al., (2010) on the adoption of a new variety of sorghum seeds leading to improved quality of sorghum in Ethiopia and Baruwa (2013) on quality determining the profitability of pineapple production in Osun State, Nigeria.

### **4.1.2 Farmers Satisfaction**



Another finding from the research study indicates that pineapple farmers are satisfied with their level of production. The assertion is consistent with their objective for satisfying domestic demand. The finding suggests that pineapple farmers are satisfied with meeting up the domestic demand based on their economic sustainability and not keen on the exportation of the crop. This finding explains why Nigeria, despite its position as the seventh-largest producer of pineapple in the world (FAOSTAT, 2017), does not export the crop. The finding suggests that pineapple farmers are contented at the present level of pineapple production. This finding implies that pineapple farmers in Nigeria could not satisfy domestic demand. This finding conforms to the submissions of Robert et al., (2017) that the objective of the farmer influences the decision on technology adoption and practices. This is consistent with the findings by Hernandez- Espallardo et al. (2013) on co-operator satisfaction at the community level.

#### **4.1.3 Farmers' Cohesion**

The investigation from the study establishes that pineapple farmers association was formed to improve the livelihood of the members through improved production and productivity. The association achieve the objectives by disseminating relevant information on modern technologies to the farmers. PFA also train and educate farmers through field demonstrations. The finding on farmers sense of collective action establishes farmers' cohesiveness as a source of competitive advantage. It indicates that farmers association enhance cohesiveness and subsequently, the competitive advantage gained through a unity of purpose. The continuous economic and social linkage with pineapple farmers association serves as a pivot towards achieving competitive advantage. The finding aligns with the study by Sachitra and Chuong (2017) through the establishment of linkage between dynamic capability developed by collective action and competitive advantage. The study also confirms the contribution by Ofuoku and Agbamu (2012) and Ofuoku (2020) that farmers cohesiveness has a positive relationship with the adoption of technology by farmers' group in the Delta State of Nigeria.

The study identifies that farmers' membership of Pineapple Farmers' Association builds a strong bond among the farmers in the community, which automatically translates to a high level of cohesiveness and confidence among the farmers. Subsequently, farmers seize the opportunity of learning and training gained through the association to adopt the transferred technology and farming practices. It is worthy to note that the finding in Nigeria is consistent with the finding by Sidibe (2005) on-farm level adoption of soil and water conservation in Burkina Faso. Sidibe (2005) confirms that members of farmers association strengthen the tendency for farmers to adopt technology transferred by extension agents.

Another area of emphasis that was linked to cohesion is the farmers' cultural identity. Farmers attach their production activities towards their belief and sense of belonging to the cultural norms and values. Although the study establishes cohesion among farmers. However, evidence from the study indicates that pineapple farmers accept the adoption practices in principle. Some of the farmers perceive that the adoption of practices is incompatible with their norms and values as a result of cultural limitation. It is, therefore, clear that extension agents need to consider farmers' situation and need rather than prescriptive technology adoption. The finding reinforces a similar finding by Warren et al. (2016) on the role of farmers socio-cultural identity in Scotland.

#### **4.1.4 Mutual relationship with the Change Agent**

Collaboration between farmers and research institute (Change Agent) empowers the farmers to gain direct access to modern farming techniques and practices to achieve improved results on pineapple production. This results in the synergy of modern farming practices with traditional cultural practices require trust and collaboration of the two parties serve as a synergy for improved yield in output. The study establishes two factors contributing to a mutual relationship between the farmers and the change agent (NIHORT) as trust and collaboration in farming techniques.

The study establishes an element of trust among farmer to farmer and farmer to research institute. While farmers trust one another on the transfer of knowledge and learning process, the trust on the research institute is equally laudable as farmers rely on the organisation for the supply of planting materials at a reduced rate; thus farmers in Ejigbo community place a high level of trust in the research institute and one another. This strengthens the relationship between the farmers and the change agent, which subsequently serve as a dynamic capability towards achieving competitive advantage. The finding supports similar studies by Masuku and Kirsten (2004); Milford (2002); Jayashankar et al. (2018) and Tregurtha and Vink (1999).

The finding on the collaboration of farmers at the farm level in Ejigbo community suggests that farmers aim at improving the process and product quality through adoption practices and differentiation strategy. Evidence from the field observations shows that farmers collaborate by sharing resources to support the farm family within the farming community. Pineapple farmers also have a referenced demonstration plot and support activities such as inter farm visit and learning to improve the adoption practices. The finding suggests that collaboration reinforces the attributing factors of the farmers within the community. The finding in this regard supports the study on the development of collaboration in agribusiness by Perdana et al. (2018). They affirm that collaboration among farmers leads to the competitive advantage of agricultural products in Indonesia. Also, the finding from the current study aligns with the finding of Sachitra and Chong (2018) on their study on collective actions, dynamic capabilities and competitive advantage of export crop farms in Sri Lanka. Specifically, they linked collaboration of farmers directly with competitiveness which the current study reflects.

#### **4.1.5 Learning**

Going by the description of Cohen and Levinthal (1990) that learning creates a competitive advantage through a learning mechanism and embedded in the description of Sachitra (2019) that learning capability is an intangible resource that creates competitive advantage, It is worth to reiterate that learning, routine farm activities and technology adoption practices advanced the theoretical understanding of dynamic capabilities (Teece et al. 1997; Zollo and Winter 2002). The study identifies learning as a complementary resource to TAP, which eventually improves competitiveness. It also supports and builds on the assertion by Mc Elwee and Bosworth (2010) that farmers look for ways and strategies to create an advantage over competitors. In this regard, learning is paramount at every stage of production in farming. The study identifies that farmers continuously improve on both production and adoption processes. With learning, pineapple farmers in Ejigbo devote new and emerging farming resources to enhance productivity and explore new operational practices.

The study suggests that farmers enquire about new technology and farming practices in different ways. They place reliance on their farming experience and mistakes to make sense of new technologies and farming practices; thus, farmers consider experiential learning and learning from errors to update basic

knowledge around farming and farming activities. They further learn from practitioners such as extension agents and research scientist to update their knowledge relating to farming activities. Other ways of learning identified from the study include learning from other farmers.

The current study is consistent with evidence from past research that learning processes and gains from learning in a cluster occur mainly in an informal way that reinforces the effects of social cohesiveness, trust and connectedness among farm families. (Ng, et al., 2017). Thus, the current study identifies different types of learning in a communal setup. With learning, farmers assess failures from experience and establish a change of ideas among farm families. They also learn through participation and interaction in groups. In the context of the current study, learning occurs either in the form of learning from other farmers, experts, experience or place when a farmer shares knowledge to enhance the quality of farming operations and practices in order to realise a change and achieve competitive advantage.

Therefore, the study ascertains that farmers learning capability complements technology adoption practices in creating competitive advantage. However, the strategy influences the quality of fruit and time saving rather than an emphasis on cost. The study affirms that pineapple farmers in Ejigbo operate a differentiation strategy to achieve competitive advantage.

#### **4.1.6 Skills Development**

The skills of the pineapple farmers in Ejigbo has gone a long way to improve their farm production and productivity. This has extended their performance and ability to achieve competitiveness among other producers. Pineapple farmers develop such skills which enhance their strategic skills in making decisions about production objective that creates value and also financially viable (Mc Elwee and Bosworth, 2010). The study identifies that training of pineapple farmers make them develop competitive skills that improve the production and adoption processes. This suggests that training can help to improve the production and adoption processes. This suggests that training helps to improve the value and quality of pineapple fruits produced with a positive effect on production performance. The finding in this regard supports the finding of Koori et al. (2017) on the role of training on the performance of farmers in central Kenya. Although Koori et al. (2017) carried out the study in a different country within the same continent; it is congruent to the finding among pineapple farmers in Nigeria.

In considering technological change as a capability, Lall (1998) perceived technological capabilities as technical, managerial and institutional skills that allow productive enterprises to utilise technical information efficiently. In line with this definition, the study found out that majority of the pineapple farmers possess technological capability demonstrated in planting practices through various farm activities and processes.

At the farm level, these findings point to the need for specific adoption practices skills for incorporating knowledge and technological capability from the research institutes. This is especially relevant for farmers who often lack the expertise to locate the knowledge required for technological innovation. Thus, the development and pursuit of technological and capabilities could help pineapple farmers to exploit technology transfer to develop their knowledge bases and achieve greater integration into global value chains and international market.

## 5.0 Storylines

### 5.1 Storyline one - Attributes

The findings on the quality dimension indicate a direct relationship with technology adoption practice. For instance, some participants, while responding to the question of quality and the constraints faced by farmers and the association in the adoption of technology practices highlighted as follows:

*“Personally, I do not have enough cash to operate cultivation of pineapple to my expected scale/size of production. I still have a product of varying sizes. However, the buyers of pineapple are interested in big sizes. I am aware that I have not incorporated all the necessary adoption practices...”*

*“By good quality, I mean that Ejigbo pineapple is very juicy with a high level of vitamins, big compared to other pineapples in other communities.”*

*“Ejigbo farmers are known to produce high-quality pineapple fruits. The high quality can be attributed to soil management practices such as planting a high to medium texture soils relatively acidic which is naturally endowed. Good juicy pineapple with big fruits is eventually produced which to local customers are the best. This has also made Ejigbo pineapple fruits to have an advantage of overproduction in other communities. Consumers are keen to pay extra for Ejigbo pineapple fruits.”*

*“We have a natural endowment of right climate, soil and planting suckers that gives us an edge over another producer of pineapples in the neighbouring communities. Thus, our yield is high; the size of pineapple is big; local consumers prefer big pineapple fruits.*

The process of achieving high-quality fruit through the production process conforms with the definition of Grant (1991) and Eisenhardt and Schoonhoven (1996) of resources as production process inputs (farming and management practices) that can be converted into final products to enhance the quality of the output (Pineapple).

The data above indicate that farmers know they are responsible for producing fruits based on the standard requirement of the consumers. Farmers understand that not incorporating all the necessary adoption practices leads to fruits production of varying sizes. The findings conform to the findings of Molina-Azorin et al. (2015) that quality permits the improvement of competitive advantage regarding both costs and differentiation.

From the response, it is evident that consumers have some level of expectation regarding pineapple fruits. In the third focus group discussion, participants define what good quality of pineapple should be. The participants emphasised juicy proportion of the fruit to have a clear link to the big size of pineapple in Ejigbo. Thus, farmers consider quality discipline dimensions regarding the size of the fruit and competitive advantage in Ejigbo farming community. The evidence from this study is in line with the findings by Brock and Zhou, (2012) on the positive relationship between customer intimacy and competitive advantage. A similar relationship was observed in the United States of America by Verhoef and Lemon (2011). The finding on quality dimension is, therefore, consistent with previous findings relating quality to competitive advantage theory.

The current research considers the objective features and attributes of products to be relevant to both implicit and explicit consumers while the ability of an activity or organisation or a system to deliver the product as subjective. Thus, it incorporates features and attributes of pineapple that responds to consumers' requirements and the ability of pineapple farmers to deliver the expected quality of pineapple fruits to consumers. In this context, the ability and suitability of technology and technology adoption practices become relevant to competitive advantage.

## 5.2 Storyline two - Reinforcers

Pineapple farmers achieve competitive advantage by providing additional value to consumers. However, the provision of additional value can translate to increase in either production or revenue. Farmers develop competitive skills when it has unique technology and processes such as farming practices. According to the empirical data, most of the farmers prefer to produce pineapples because of the huge returns on invested capital. Thus, farmers' objective as a qualifier for the production of pineapple has a strong linkage with technology adoption practices

The responses from the participants indicate that some of the farmer's purposes for production is targeted at local consumers who have a flair for big-sized fruit. Pineapple farmers do not see an

apparent reason why they should adopt the technology holistically with the associated farming practices. Response from the participants indicates that the objective of most of the pineapple farmers in Ejigbo is the concentration on satisfying the domestic demand.

*" I am not interested in the international market. We have not been able to meet up the local demand. You should understand that pineapple is a perishable crop."*

*"Other farmers are looking out to go into the international market while farmers in Ejigbo communities are not showing interest. We prefer to serve the local demand for pineapples."*

*"Adoption of practices should be considered based on the objective of the farmer. Some of us are interested in the local market while some farmers are interested in the international market. If for instance, a farmer is interested in the local market, then, he does not need to produce small size fruits. There will be nobody to buy. However, if one is interested in the international market, then he needs to comply with the required international standard regarding the size of fruit exportable and other conditions which are part of the practices. For me, hmmm..... I am interested in the international market but have a problem with how to go about it and the required procedure to export pineapple."*

The objective of the farmer, therefore, shapes the strategy of operation where strategy determines the actions of the full adoption of technology with farm practices or partial adoption of technology and practices

Furthermore, the empirical evidence from the study shows that farmers learn from their experience to improve the present production. The emphasis on experiential and collective learning from the empirical evidence of different sources of data collection implies its significance in the competitive advantage enjoyed over other communities where collective learning is less prominent. The current study incorporates the relevance of both to achieve improved production and productivity

Another finding from the study confirms that learning has a direct linkage with technology adoption, which eventually turns to be an advantage over other producers. The evidence confirms that learning

has a positive impact on technology adoption practices and a cumulative effect on the relationships between the experiential individual or collective learning by pineapple farmers (Figure 1).

*“Pineapple farmers learnt from one another and as well from their previous mistakes. Education and training are vital elements. It helps to improve the understanding of farmers in the adoption process. It also guides farmers in deciding on a knowledge economy. Development in research and extension linkage is based on the training of farmers. Based on a field visit to pineapple plots in Ejigbo, there has been a great positive impact of training of farmers on translated output and level of advantage on competition of pineapple production.”*

The study shows that pineapples from Nigeria have not been prominent in the International trade due to lack of adequate information required by pineapple farmers to meet the required codex standard. The finding confirms that of Beaman et al. (2018) that technology adoption is characterized by a complex contagion learning environment in which most farmers need to learn from multiple people before they adopt themselves—This requires a policy intervention on knowledge transfer to local farmers. Other findings of this research study are:

- (1) Collective learning and training foster technology adoption practices among pineapple farmers.
- (2) Adoption of agricultural practices in conjunction with production technology adoption could serve as a breakthrough for the technicality of pineapple fruit size adjustment.
- (3) Adoption practices could enhance competitive advantage in domestic pineapple production leading to the competitiveness of the product.

The study is in the same direction as the findings of Teece (2014) that dynamic capabilities, coupled with good strategy, are necessities to sustain superior enterprise performance. These findings confirm the recent study by Kastelli et al. (2018) on the investigation of the impact of technology transfer on the business performance and competitiveness of young European food and beverages firms. The study concluded that that technology transfer is a wheel driver to competitive advantage while the current study affirms that adoption practices lead to competitive advantage

## 6.0 Conclusion

There are four main conclusions from the empirical analysis:

- This paper offers insights into the realities of adoption practices in horticulture in a developing economy setting. The paper has generated implication for both operation management theory and practice.
- While technology adoption and adoption practices are regarded as kin concepts in horticulture, the study sheds light on the possibility of achieving a competitive advantage within a horticultural production setting in a developing economy.
- The study also sheds light on the associative link between learning in the farming community and adoption practices.
- The study further sheds light on how the storyline grounded in data can explain farmers engagement in technology adoption practices

The findings confirm that individual and collective learning foster technology adoption practices

among farmers hence the relevance of vocational skills development within the farming community.

The findings from the current study contribute to the discussion on the competitive advantage with an emphasis in the field of horticulture. The study found that two overarching subcategories dictate how technology adoption leads to a competitive advantage within horticultural production with an emphasis on pineapple production in Nigeria. Further research based on in-depth case studies could provide more information on these issues and a better understanding of how technology adoption practices expand the knowledge bases and capabilities of the farms involved and the type of policy initiatives that would foster the process.

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