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Sustainable Technology Adoption as a Source of Competitive Advantage for Pineapple Production in Ejigbo, Nigeria

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Abstract: Adopting new technology as a strategic resource can result in a competitive edge in any market. However, a competitive advantage cannot be acquired in the production of horticultural goods without first embracing the practices that are inextricably linked to those goods. This paper investigates the adoption of farm practices in conjunction with technology transferred to farmers. Some research debates on competitive advantages have identified both resources and processes of production as sources of competitive advantage. The emphasis on the resource-based view and dynamic capability view stipulates that firms acquire competitiveness via internal resources and capabilities. However, there has not been much empirical exploration of horticultural production sustainability in this regard despite its sufficiently outstanding contribution to the gross domestic product in developing and developed economies. 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 Ejigbo, Nigeria. From the angle of professional practice; the study provides an insight into how farmers strive to suggest solutions to practical challenges faced within the production process. Therefore, it is essential to have practices in place for the adoption of sustainable technology. The outcomes of the study generate two different storylines and demonstrate that attributing factors as well as reinforcing capabilities both boost competitiveness at the farm level and enhance the farmers' desire for farming pineapples. Pineapple farmers in Ejigbo employ a differentiation approach to gain a competitive advantage in their agro-farming industry. This could lead to an increase in the volume of fresh pineapple products that are exported.

Keywords: competitive advantage; economy; cash crop; farm practice; innovation; agriculture; farm resources; capability; technology adoption practice; sustainability; pineapple farm; agro-farm

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1. Introduction

With the rise in the adoption of new equipment that ease work and increase productivity, there has been a subsequent increase in the use of technology. Technology is often regarded as firm-specific operational knowledge (Nonaka 1994; Spyropoulou et al. 2018), and this has been applied on farm practices (Nakano et al. 2018; Fujisaka 1994). In addition,

technology has also been identified as an aspect of a key goal of sustainability, namely innovation, under the Sustainable Development Goals (SDG) (Sachs 2012; Wu et al. 2018; Bengtsson et al. 2018; Kayikci et al. 2022). In a recent study by Stafford-Smith et al. (2017), the integration of technology was identified as a very important aspect of SDG development. In another study by Richnák and Fidlerová (2022), the impact of technological adaptation and transformation in the industry was investigated to identify the potential of SDGs for industrial businesses. The above studies show the impact of technology on sustainability. Sustainability, which is simply defined as the capacity to support or maintain a process throughout time, helps to improve our lifestyles and working patterns. Looking at the various typologies for sustainability, such as sustainable farming and sustainable entrepreneurship, farmers become more efficient and effective. While the goal of the former is to provide satisfaction through innovation in farming practices, the latter's goal is to provide satisfaction to some societal objectives through innovation in various market contexts. To increase output in farm produce, there is a need to have a competitive advantage. With the increase in various innovative technologies, more recent studies have considered a competitive advantage in some agricultural businesses (Wang et al. 2021; Pan et al. 2021; Jewel et al. 2023; Anzaku and Salau 2017). Different technological models have been developed on sustainable development and economic development. Han et al. (2022) explored the effect of scientific and technological innovation (STI) upon the regional high-quality economic development (HED) in the Yangtze River Delta region. Drljevic et al. (2022) also considered the adoption of an Integrated Adoption Model for the sustainable management of blockchain-driven business innovation which could be applied in the agricultural sector, such as in farm practices.

The concept of technology 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 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 the improvement of technical skills can promote improvement in organisational performance through their positive influence on production processes (García-Sánchez et al. 2018; Toma et al. 2018). To a large extent, most farmers grow crops and adopt management practices the way that their ancestors would have. These agro-farmers are also continually innovating ways to contribute and enhance their livelihood opportunities. However, they face some challenges such as their ignorance in having healthy competitiveness or their state of unconsciousness based on using their resources in achieving competitive advantage. Some other studies agree that one of the challenges is the need to adjust their production systems to meet the demands inherent in the economy and develop their distinctive capabilities to continuously adapt to their dynamic environment (Bobillo et al. 2010; Gutierrez-Gutierrez et al. 2018). Specifically, farmers must have distinctive technological assets to face today's enlightened society (Centobelli et al. 2018). Davcik and Sharma (2016) reviewed various studies that covered areas of competitive advantage and marketing strategies that could be adapted including the use of technology. Technology is, therefore, a mechanism of strategy that improves cooperation, communication, and the exchange of information and knowledge through the presence and proper use of tools or assets (Kastelli et al. 2018; García-Sánchez et al. 2018). The application of technology should meet the demands of sustainability and food security, which was identified by the United Nations (UN) as given in IPPC's 2019 report (Mbow et al. 2019). Thus, the agro-farmers are meeting with the sustainability demand by improving on the adoption of technology and innovative practices.

Sustainable farming, also known as sustainable agriculture, involves using farming practices that consider ecological cycles and are sensitive to the relationships between microorganisms and the environment. In other words, sustainable farming promotes economically viable and environmentally sound methods and practices that also protect

public health. It goes beyond simply focusing on the financial aspects of farming and considers the thoughtful and effective use of non-renewable resources, contributing to the growth of nutritious and healthy food while improving the standard of living for farmers By categorisation; the main categories of sustainability are economic, environmental, and social. Some background is also necessary on the sustainability of the farming practice (Pan et al. 2021; Jewel et al. 2023; Aluwani 2023; Ngobeni and Muchopa 2022). These studies have identified various sustainable approaches that could be adopted in agricultural farming. To add to these, there are other sustainable farming practices that are adopted due to innovative practices. Some studies also supported by the European Union (EU) have been presented an innovative strategies such as the farm-to-fork strategy applied in Europe to support innovative farm practices (Wesseler 2022; Mowlds 2020), innovative ideas are given in terms of policies on farming lands to support Green Land deals in Europe (Montanarella and Panagos 2021; Fayet et al. 2022), policies on eco-innovation (Zhao et al. 2023), innovative crop rotation practices (Toma et al. 2018), policies on EU deals to reduce agricultural greenhouse emissions (Verschuuren 2022) and agro-subsidies from EU towards SDGs (Scown et al. 2020). Other approaches include the use of electric tractors (ET) in farming and mechanised harvesters in harvesting crops as well as the use of solar panels in farms to provide energy as they reduce carbon footprints on the farms.

In global economies, the growth of the agricultural sector has positively impacted various economies through international trade and sustainable approaches (Aluwani 2023; Ngobeni and Muchopa 2022). However, one challenging area of management is how to handle competitors in the industry, for both heterogenous and homogenous firms. According to the study by Dovev (2008), heterogeneous firms have more competitive advantages because they have different strategies and different sources of funds or resources required. 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 adopting farming techniques (Reardon et al. 2017; Rogers 2003). The existing literature lacks guidance on the integration of technology adoption into agricultural farming practices. Nevertheless, farmers embark on a differentiation strategy to develop a competitive advantage based on experiential learning and technology transferred to them from research scientists and organisations (Biam and Barman 2017). Thus, linkages via technology adoption practices and learning capability to create competitive advantage are of paramount relevance to technology adoption in strategic studies. Also, there are different farming methods based on climate change issues, land use acts, and agricultural policies that exist in different nations (Saxena et al. 2016; Teixeira et al. 2017; Pretty et al. 2018; Oladapo 2020). Thus, 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 been significantly missing in the literature. Hence, this article aims to show how TAP is linked to competitiveness in the field of horticulture. According to suggestions from recent research, pineapple growing in Ejigbo has improved owing to the incorporation of more scientific approaches into the production process (Baruwa 2013; Adegbite and Adeoye 2015; Balogun et al. 2018). This has enabled Nigeria to be ranked in the top 10 producers of pineapple globally (Shahbandeh 2023) but unfortunately not among the top 10 exporters of pineapple globally based on the statistics of the pineapple market.

The purpose of this article is to investigate the adoption of farming practices in conjunction with the transfer of technology to farmers. The paper contributes to the gap in the literature on principles of competitive advantage. It proffers a solution to the two research questions on how adoption practices enhance technology adoption in the production of pineapple fruits and how the adoption of technology practices could 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 have a link to competitive advantage. This

study investigates explicitly how TAP in pineapple production could lead to a competitive advantage among farming communities.

2. Theoretical Background

Although the study's objectives were to examine the causal link between technological adoption and competitive advantage, the grounded theory approach was used. This approach usually results in the development of a theoretical framework. The literature on competitive advantage establishes two separate viewpoints in achieving the competitive edge. These are the industrial organisation theory and the resource-based theory, in which every business creates its competencies and capabilities which lead to competitive advantages (Bogner et al. 1999; Gareche et al. 2019; Huang et al. 2015; Raza et al. 2015). In another dimension, some researchers view competitive advantage as a perceived benefit. Laszlo and Zhexembayeva (2011) and Payne and 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 a competitive advantage. Porter (1980), in his reasoning, identifies the achievement of a competitive advantage in three ways: cost leadership, focus strategy, and differentiation of the product. However, while the aim of any business is to make profit, and be sustainable, there must be strategic management geared towards profitability (Amit and Schoemaker 1993; Baruwa 2013; Campbell et al. 2017; Barney 2017a).

Environmental research debates on competitive advantages have identified both resources and processes of production as sources of competitive advantages. The emphasis on the resource-based view (RBV) and dynamic capability view (DCV) stipulates that firms acquire competitiveness via internal resources and capabilities. Applications of the resource-based view can be seen in literature (Peteraf 1993; Mugera 2012; Barney 2017b; Alvarez and Barney 2017; Barney 2012; Bromiley and Rau 2016; Mugera and Bitsch 2005). On that trail, an application of the resource-based view was conducted for a study on dairy farming by Mugera and Bitsch (2005). However, there has not been much empirical exploration of horticultural production sustainability in this regard despite its sufficiently outstanding contribution to the gross domestic product in developing and developed economies. The resource-based view (RBV) has been argued by Barney (1991) that "a firm's sustained competitive advantage is based on its valuable, rare, inimitable, and non-substitutable resources". This implies that the farmers, the agro-firms, and agriculturalists will have higher competitive advantage over their competitors if they can acquire more funds, obtain more grants, or create more resources as their ability to achieve this will affect both their competitiveness and performance. In the other instance, another identified vibrant approach to strategic management is the dynamic capability view (DCV) (Arend and Bromiley 2009; López 2005). According to the dynamic capability theory, senior managers of successful businesses must devise plans for adapting to severe discontinuous change while upholding minimal capability criteria to secure their organisations' competitive survival (Teece et al. 1997; Teece 2014). Dynamic capability, based on the organisational theory, refers to an organization's ability to consciously adapt its resource base. Teece et al. (1997) defined the idea as "the firm's ability to integrate, build, and reconfigure internal and external capabilities to address rapidly changing surroundings". Dynamic capability is deemed a phrase which emphasises that it takes a combination of different capabilities to be able to respond to changes in the environment in a timely and adequate manner.

In this regard, the source of competitive advantage becomes a relevant theoretical framework underpinning the current study by considering dynamic capability (Bashir and Verma 2017; Ambrosini et al. 2009). In line with this assertion, Wang and Ahmed (2007) as well as Bowman and Ambrosini (2007) affirm that the source of competitive advantage would to a large extent determine the understanding of the concept of a competitive advantage in a broad term. However, Eisenhardt and Martin (2000) complemented and demonstrated that dynamic capabilities are perceived to be the antecedent of organisational

and strategic routines. Thus, farmers and managers of farm operations collaborate 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 and Martin (2000) consider dynamic capabilities as the key drivers behind the recombination of resources in order to create and sustain a competitive advantage and, therefore, argued that dynamic capabilities should be conceptualised as a tool to "manipulate resource configuration(s)". Ambrosini and 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. Although it is relevant to understanding competitiveness at the farm level, the focus of the study is on the relationship between dynamic capability and technology adoption practices as a source of competitive advantage in pineapple farming. In line with this conceptual framework, the study is based on the resource-based view in conjunction with the dynamic capability view. The study considers technology adoption practices as a strategic resource while learning complements as a dynamic capability to achieve competitive advantage. In developing the conceptual framework, we looked at a competitive advantage in Sri Lanka for farm produce in earlier studies (Sachitra and Chong 2016, 2017a, 2017b; Sachitra et al. 2016). To this end, the conceptual framework for this study is illustrated in Figure 1.

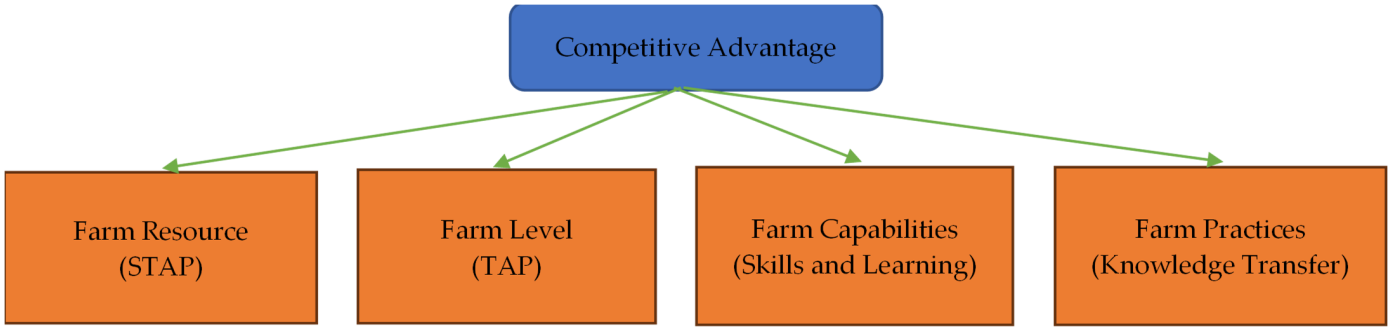

Figure 1. The conceptual framework.

The resource-based view (RBV) and the dynamic-based view (DBV) are connected in a way that is indicated to be integrative by the framework. The framework establishes a link of the role of education (learning), knowledge transfer, and skill development as a complement that is transformative to illustrate the competitiveness of farm-level technology adoption practices in an agricultural community. This link is presented as a complement that is transformational. The framework also illustrates the moderating impact of farmers' level of knowledge. This includes individualistic skills, collective skills, organisational skills, transformational skills, and learning skills on the relationship between STAP and TAP with a competitive advantage. As a result, the graphical depiction of the conceptual framework for the present investigation, which is displayed in Figure 1, establishes a connection between the use of new technology in pineapple production and the attainment of a competitive advantage within a farming community. The focus of this research is on a competitive advantage from the perspective of the element that was aroused by the responses of the participants who took part in the research.

In the present study, a research institute was identified that develops smooth cayenne, a superior planting material for pineapple, which is then passed to farmers for technology adoption. A competitive advantage emerges when a resource and talents work together to achieve their full potential. According to the theoretical underpinnings of the study, it focuses on competitive advantage theory with a focus on indicative theories to attain a competitive advantage among farmers in Ejigbo, Nigeria. In addition to this, it first draws attention to the role that a literature review has in the technique of grounded theory. It

extends to the ways in which agricultural capabilities contribute to the farm level and increase competitive advantages. This explicitly shows how TAP in pineapple production could lead to a competitive advantage among farming communities.

3. Research Methodology and Data Collection

The methodology employed in achieving the goal of the research is presented in this section.

3.1. Study Area

Ejigbo is a community in the Yoruba-speaking region of Nigeria and serves as the administrative centre of the Ejigbo Local Government Area in the state of Osun State of Nigeria. Ejigbo is situated in the centre of southwestern Nigeria between the latitudes of 4°05′′ and 4°24′′ and between the longitude 7°40′′ and 7°55′′ from the equator. The village is surrounded by towns that border Oyo State and Osun State, in western parts of Nigeria. Geographically, notable towns like Ogbomosho can be found to its north as well as Ede which can be found to its south (see Figure 2). The town (Ejigbo) can be found about 95 km to the north-east of Ibadan, 35 km to the north-east of Iwo, and 30 km from Ogbomosho.

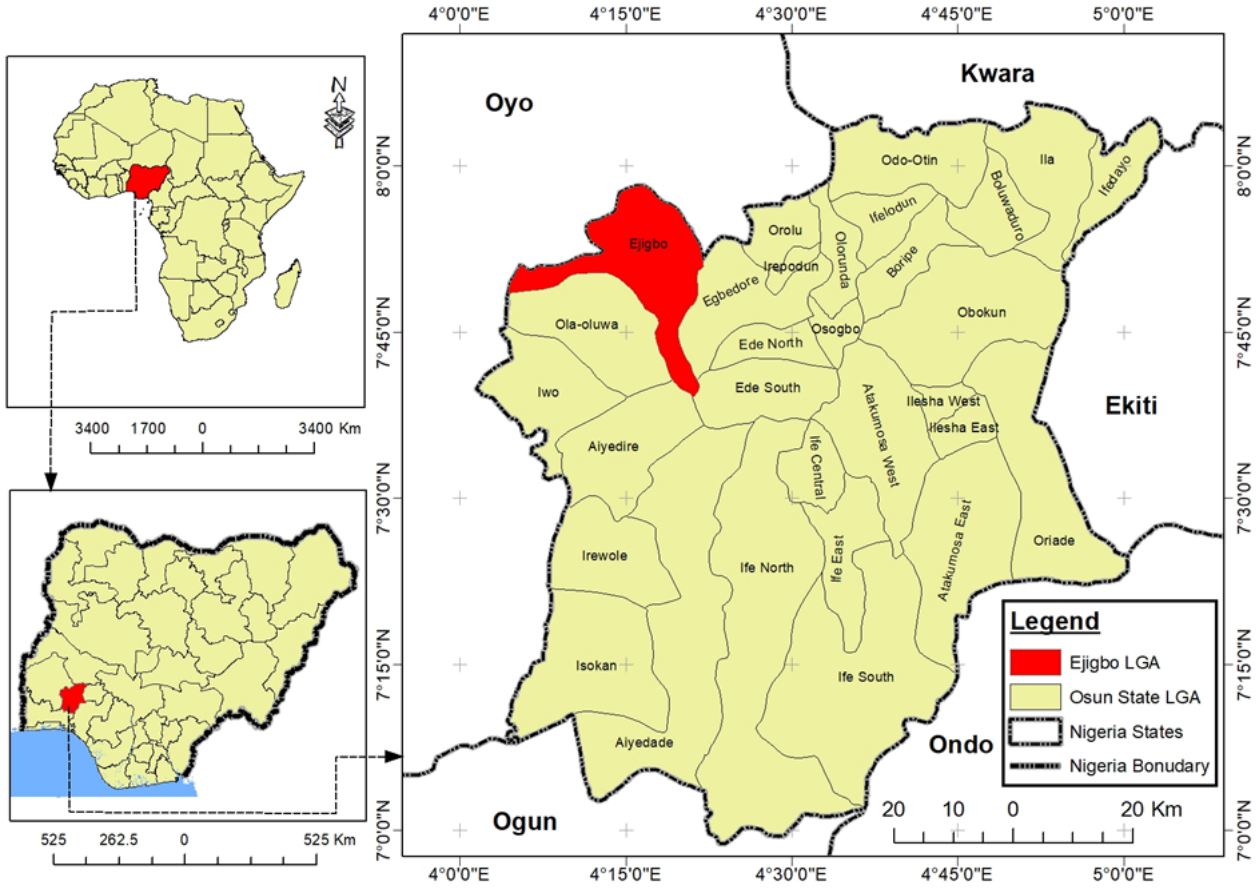

Figure 2. The case study is highlighted in this Map on Ejigbo in Osun State, Nigeria.

While the population was estimated to be 132,641 (based on the results of the Nigeria's census data in 2006), the land area is around 502 square kilometres. The climate of the region is naturally divided into two distinct seasons: the dry and the wet, each lasting approximately six months. November marks the beginning of the dry season whereas April marks the beginning of the wet season. The location, natural attributes, and abilities of the local population all lend themselves to the successful production of large-scale pineapple plantations. Ejigbo is notable for pineapple production among the states in the southwestern part of Nigeria. In addition to this, the town has gained international

recognition in terms of the adoption of technologies and practices for food production. In the home market for fresh and smooth cayenne pineapple, the climate of Ejigbo and its relative accessibility to a number of different marketplaces provided it benefits in terms of both cost and quality. As a result of this, the study area was selected for investigation by the researchers. This is coupled with the fact that the principal investigator is more familiar with this terrain. Additionally, with the assistance of irrigation, pineapples can be grown during each and every season of the year. As a result, there is no adherence to a seasonal schedule in the agricultural process.

3.2. Data Collection

The qualitative study was chosen as the basis for the design of the research design because of the empirical nature of collecting and retrieving information from the participants (farmers and extension agents). The justification for choosing the qualitative and descriptive assessment of a competitive advantage when the literature proposes many quantitative models is because the farmers in the study area are in four categories: while the first category of farmers are educated in the field, some farmers are not schooled as agricultural experts, as well as some farmers did not have any formal education in an English medium school and the last category are farmers that are not educated in the field as such, most of them will have the challenge of completing the questionnaires. Based on the background of the respondents, they were mostly trained in their local language in Yoruba Language rather than English Language. Thus, there were more recorded interviews conducted in the pineapple farms from the pineapple farmers.

The collection of data took place over the course of 15 months. According to Piggott (2010), the methodological strategy was founded on one of the three varieties of grounded theory. This was the basis for the approach. The methodology that has been taken into consideration is that of Strauss and Corbin (1998). According to this point of view, the techniques of data collecting took into consideration the eight features of grounded theory as outlined by Weed (2009). Purposive and theoretical sampling are the two approaches that are utilised here. In this study, the data-driven strategy of sampling provides the researchers with the opportunity to develop attributes and enhance concepts for a variety of categories (Charmaz 2014; Jebb et al. 2017). The development of memoranda and an ongoing comparison of data (both of which are iterative processes) are two additional aspects that are taken into account. The major participants at the farm level comprise both male and female pineapple farmers. These farmers have varying degrees of experience in the production of pineapples but are distinguished by characteristics related to the aim of the research project. A focus group, one-on-one interviews, field observations, and memo writing made up the key sources used in the triangulation-based approach of data collection.

3.2.1. Focus Group

With regard to the gestation period of pineapples, a meeting for a focus group discussion was scheduled to take place between the production cycles of 22 months in order to gain access to the necessary data, observe the practices carried out on the farm by the researchers, and engage in a constant comparison of the data until the collection reached a theoretical saturation point. In the discussion that took place with the focus group, open-ended questions were used to investigate the responses of the participants. During each iteration, the data collected were transcribed and processed in order to produce questions for the subsequent level of iteration. This process continued until the data were deemed to be "saturated" during the third focus group meeting. Debriefing sessions for participants are held at each step of the iteration process to ensure that the authenticity of the discussions is maintained.

3.2.2. One-to-One Interview

The findings of the focus group were used as a basis for conducting interviews with farmers in order to gain a more in-depth understanding of their thoughts and perspectives

on the case study. In order to acquire additional data from the research institute and the farmers for the purpose of triangulation, a semi-structured interview was carried out with eight farmers, two extension agents, and one research director. After a gestation period of 22 months, the one-on-one interview was finally conducted. The interviews helped in understanding what farming practices are adopted during the time when pineapples are grown from the moment the suckers are planted to when they are fertilised, start to produce new suckers, start to bloom, and are ready for harvesting.

3.2.3. Field Study Observations

There was a total of three trips made to the field for this research. The field observation was brought up in the discussion group meeting that took place the day before specifically for the purpose of eliciting and generating conversations at the various meetings. The planting, weeding, and harvesting phases are all included in the operational time. The on-site observations made during the field visits helped in further understanding the farming practices in Ejigbo farming area.

The following was the primary emphasis of the observations:

(1) Having an understanding of the operational practices as they were defined and explained during the one-on-one interview as well as the focus group discussion;
(2) Forming a cooperative partnership between the farmers, agriculturalists, and the research institute;
(3) Having an understanding of and being able to recognise the standard practices, values, and norms that exist within the community as a result of the culture of the farmers in the case study.

3.2.4. Memo

At each stop during the investigation, a memo with detailed notes was taken to record the information based on the observations made. The reflection on the discussions that took place during the focus group meeting is also considered in the memo. The various procedures for the data collection are outlined in Table 1, which can be found here.

Table 1. Summary of the Various Procedures of the Data Collection.

Method	Venue	Activity	Participants	Type of Question
Focus Group Meeting	Farmers community	Three meetings • Planting period • Weeding period • Harvesting	8 Pineapple farmers 2 Extension agents	Open
Interview	Farmers various farms	One to one	8 Pineapple farmers 2 Extension agents 1 Research Director	Semi-Structured
Observation	• Various farm units. • Research Institute	3 Field observations • Planting • Weeding • Harvesting	8 Pineapple farmers 2 Extension agents	Observation
Memo	• Community • Research Institute • Researcher	Various periods, depending on the emergence	Researcher	Open

3.3. Perception on Technology Adoption Practices (TAP)

The utilisation of smooth cayenne suckers, which is the planting material in pineapple cultivation, is the topic of the research being conducted at the moment. Farming practices and operational activities throughout the planting and weeding as well as harvesting stages of production are some examples of the comparable practices that are taken into consider-

ation. These methods were chosen because of their major contribution to the increase in agricultural yield that they brought about. The use of the technology is contingent upon the concurrent implementation of the related farming practices in order to accomplish the goal of producing a crop that can compete favourably with other pineapples grown by farmers. As a consequence, this leads to an increase in revenue and an improvement in the farmers' means of subsistence. According to Abbas et al. (2010), the most significant benefits of the technology are a decrease in the production duration as well as uniformity of the output.

The production cycle for pineapples can take anywhere from 20 to 22 months, depending on whether the plant was grown from crown cuttings or slips in the past. In light of this, the production cycle, which is more commonly referred to as the "gestation period", is contingent on the planting material that is utilised for propagation. However, the National Horticultural Research Institute (NIHORT) has developed technologies and given advice to farmers regarding the selection of planting materials (the smooth cayenne variety) as well as the planting procedure as a way of intervention to produce uniformed pineapple fruit that is an average of 1 kilogramme in weight (NIHORT 2019). Through the intervention, the institute supports the planting of suckers which results in a shorter gestation period of 16 months as opposed to the usual gestation period of 22 months. Aside from the time savings, the overall production will rise, along with the quality of the fruit and the size of the fruit that is suitable to various markets, if the farmers adjust and implement the farm practices in conjunction with the technique of planting suckers of smooth cayenne. This will bring about a win–win situation for everyone involved.

3.4. The Socioeconomic Characteristics of Pineapple Farmers in the Study Area

Farming is the principal employment of the people who reside in Ejigbo and it provides them with their primary means of subsistence as well as an income. The local economy is based on agriculture and there are considerable huge hectares worth of pineapple plantations in the area. In total, 10 prosperous early adopters of the technology under investigation were deliberatively chosen to participate in the research project. According to the NIHORT annual report from 2010, around 75% of the farmers in the community practise pineapple cultivation as a monocrop while the remaining extremely few farmers engage in mixed farming (NIHORT 2010). The ages of the pineapple farmers in the sample range from 25 to 72 years old with a similar distribution of male and female farmers across the age range. It was important to have their age distribution as Ejigbo is a farming settlement community. The research sample consisted of 10 farmers, 9 of whom were male, making female farmers a statistically insignificant minority as only 1 female was available there. According to the sample, around 90% of the pineapple farmers had no formal education at all; this result suggests that this proportion of pineapple farmers were uneducated.

In comparison, only 10% of people had a formal education in agriculture that extended up to the degree level. According to Ogunjimi and Farinde (2012), the average size of an individual pineapple farm in Ejigbo is between 2 and 10 hectares of farmland. This indicates that the farmers in this region are smallholder farmers. In order to carry out everyday operations and management at the farm level, the pineapple farmer looks for assistance from the members of his family as well as hired labourers. In spite of the fact that all of the farmers are members of the Pineapple Farmers Association (PFA), none of them are involved in exporting pineapples. As an alternative source of revenue, they rely on the domestic market for their products (pineapple) which serves as their primary source of income. The most reliable sources of information were obtained on-site from fellow farmers and the umbrella organisation known as the PFA. The agricultural development programme extension linkage as well as the research institute extension linkage are two more sources of information in addition to the media. Overall, 30% of pineapple farmers participate in non-agricultural activities as a hedge against the possibility of losing their livelihood in the event that an agricultural risk materializes. The farmers that participated in this study have been growing pineapples and had an average of 5–48 years in experience.

The application of adequate practice makes the work farmlands to be neat and uniform. Also, the crops will have an appearance of been neatly arrayed in a straight line, well-spaced, and better cultivated. This enables the ease of planting, weeding, and harvesting. Technology adoption can include the use of mechanised farming, such as tractors and harvesters. To confirm the adaptability of these recommendations in pineapple farming, there were site visits to the pineapple farming area of Ejigbo (see Figure 3). Figure 3 shows areas that have adequate farming practice and those that do not have adequate farming practice. This study also found that these sustainable approaches could be adopted to improve pineapple farming; however, further studies are recommended on the technical costs of incorporating new methods against the exiting farming practices.

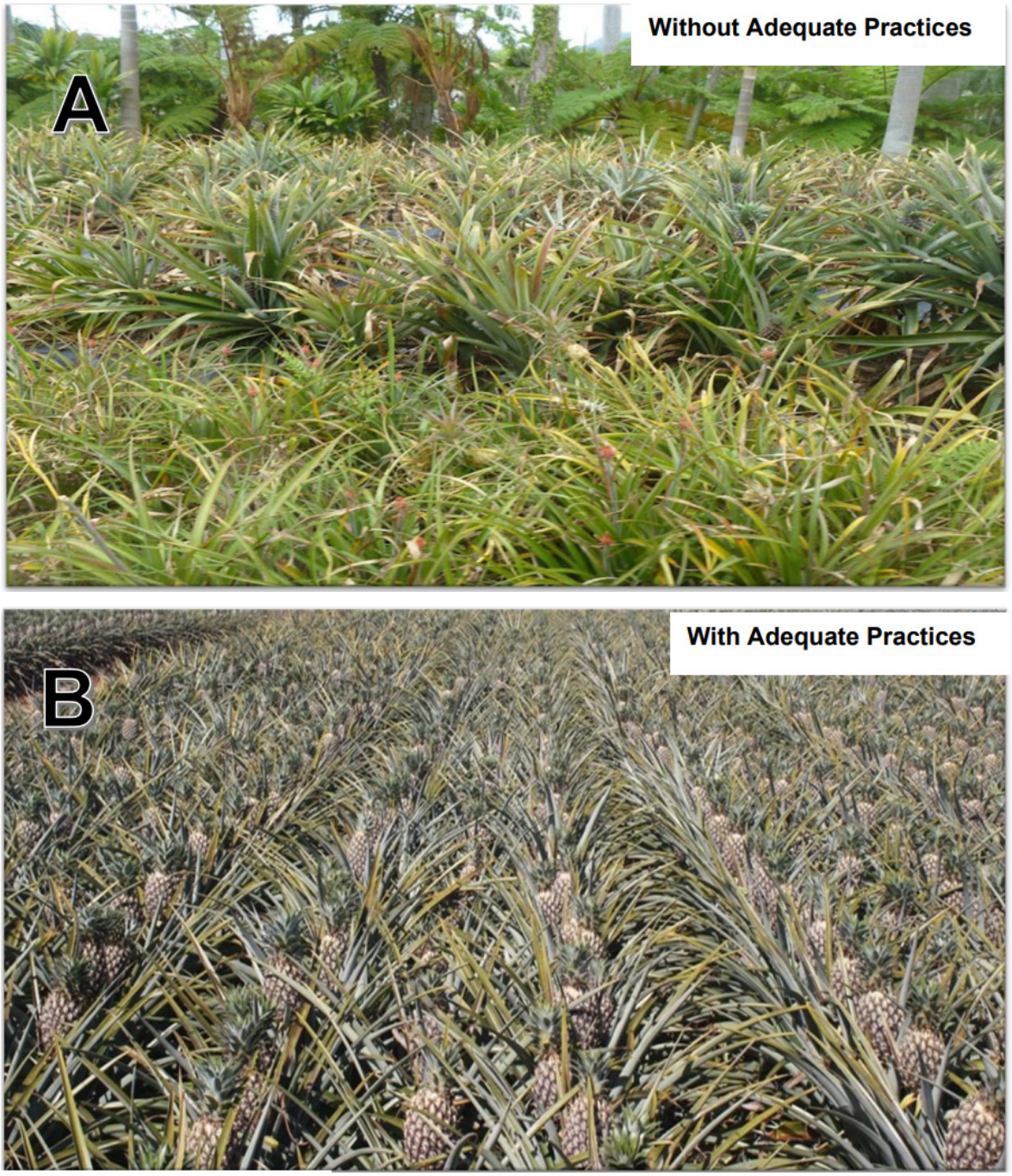

Figure 3. The farming practice in a pineapple farmland in Ejigbo, Osun State of Nigeria, showing areas (**A**) with adequate practices and (**B**) without adequate practices. Credit: M.O.O.

3.5. Research Questions

There are two key research questions for this investigation, especially in understanding storylines from the respondents. The research questions (RQ) are namely:

- RQ1: How have different agricultural practices contributed to the increased use of technology in the production of pineapple fruits?
- RQ2: How can competitive advantages be attained in the pineapple industry as a result of the increased use of technology and modern agricultural practices?

3.6. Ethical Consideration

The primary investigator (M.O.O.—Author 1) obtained the ethical approval for the study without any preconceived notions about how the results would turn out or any bias to influence the study's outcome. In addition, interviews were conducted with participants in both English language and Yoruba language (their native language). It is notable to add that Yoruba is the main language spoken in the western part of Nigeria where Ejigbo lies. This approach helped to foster a sense of community and break down obstacles of communication between the participants and the primary investigator (Oladapo 2020; Easterby-Smith and Prieto 2008). Moreover, data triangulation techniques were used to guarantee accuracy.

The research was conducted in accordance with the ethical standards and tools developed by the University of Huddersfield's research ethics committee. Additional ethics approval was obtained from National Horticultural Research Institute, Nigeria. The details with evidence of the ethical approval documentation exist in the literature (see details in Oladapo 2020). All interviewees were asked to fill out a declaration form stating their willingness to participate in the study (see details in Oladapo 2020). In addition, the principal investigator followed the University of Huddersfield's ethical validation process and received ethical permission from the institution. Also, this approval approach ensures a sufficient level of consistency in the research. It also guarantees that no private, insensitive, discriminatory, or inappropriate information is included in the research materials.

In this sense, it justifies that the research plan is solid enough to prevent participants' time from being wasted during the process of data collection. The ethics committee's requirements and criteria were met. Also, the committee gave their approval for the fieldwork to go forward. The authorisation obtained from the ethics committee explained why they allowed the researcher(s) to conduct the study and assured the respondents that their answers would be kept private. The importance of restricting use to the research project was emphasised as well. In light of this, the lead investigator informed the participants that their personal information and data would be kept private and anonymous. After receiving the consent of each participant, the principal investigator held the focus groups and conducted the interviews.

3.7. Trustworthiness Consideration

The consideration for trustworthiness of the research was also considered using four trustworthiness criteria. For this research, the model of Guba and Lincoln (1994)'s was adapted for the trustworthiness criteria. This was applied to evaluate the study's outcomes which entail transferability, confirmability, dependability, and credibility. The study was carried out using identified methodology and the research design was properly performed. The sampling technique was also well-identified, and each phase of the data collection was planned. Records were also kept of each interview recording as well as surveys gathered on the study. There was also documented evidence of the field visits as well as proper data analysis. The research questions were categorized for better understanding and the data coding was conducted using established methods.

3.8. Robustness and Soundness Consideration

The consideration for robustness and soundness of the research was also considered using four robustness criteria. For this research, the model is guided by the principles in the

text (Yin 2018) adapted to the robustness and soundness criteria. For these criteria on the soundness and robustness of the case method utilized, there are four criteria considered, namely the reliability, external validity, internal validity, and construct validity. The details of the robustness and soundness used in the case study approach are given in Table 2.

Table 2. Criteria on robustness and soundness considered in the study using a case approach.

Criteria on Soundness	Mode of Achieving This in the Research	Research Phase as Used
Reliability	Followed the case study protocol	Data collection
External validity	Relating the core category to the theory of competitive advantage	Research design and data analysis
Internal validity	Matching of pattern types Establishing explanation made Addressing related explanations	Data analysis Data analysis Data analysis
Construct validity	Utilized multiple sources of evidence Range of evidence from different data sources using a literature review Sampled some key participants from the study area in Ejigbo Participants reviewed the case study reports	Data collection Data collection Sampling procedure Report generation

3.9. Data Classifications and Data Coding Consideration

The consideration for the data classification as well as the data coding was made to ensure that each recording made and survey filled were analysed to deduce the final results of this investigation. Attention was given to the research questions, the definition of terms, semantic descriptions made, and the keywords extracted from the responses gathered. To achieve this, empirical data was also used to identify the major categories from the sub-categories. The output of the data coding was used in the data analysis presented in Section 4. Figure 4 shows the approach used in the data analysis in this research.

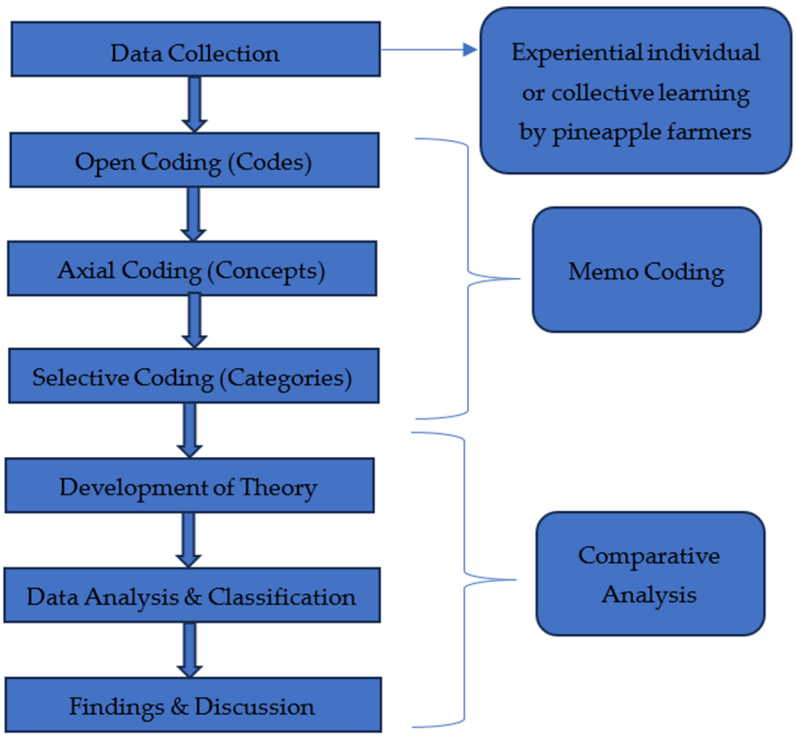

Figure 4. The methodology used in this research.

The methodology for this study was developed from some fundamental principles and theories behind the data analysis. The method that was used to analyse the data in the study was one that adhered to the flexible principles and procedure for coding that Strauss and Corbin (1998) developed. As a result, the concepts for the study were derived from the responses given by the participants and the researchers used the storytelling method that Strauss and Corbin (1998) suggested. In addition to this, it includes a process that is both simultaneous and iterative between the data and the various methods of collection to ensure that there is a continuous comparison between the codes and the categories. It is important to note that the Strauss version of the grounded theory technique provides flexibility in the analytical phase by permitting labelling concepts with similar names from other studies provided that they share the same interpretations (Morse 2001). This is something that should be taken into consideration. According to Morse (2001), tagging with similar constructs from previous studies increases the trustworthiness of the empirical data and supports what is in the existing body of the literature. Even though multiple nomenclatures can be used when referring to coding and analysis in grounded theory, the methodological approach that Strauss developed for grounded theory is followed in the analysis process.

Based on this methodology, the analytical method used particular codes to analyse each broad category. These codes were called analytical codes. The approach for this study was developed using these concepts, as detailed in the text (Charmaz 2014). Throughout the iterative process of the data collection, the list of codes that may be used was enlarged. Inductive patterns and links between coded categories (pattern codes) were developed through further expansion of the research. After that, tentative correlations between variables will begin to emerge which will serve as a building block in the process of establishing a theoretical framework. The establishment of a storyline, which was accomplished through an iterative approach, constitutes the final step of the data analysis process.

4. Data Analysis and Discussion of Results

In this section, the data analysis and discussion of results are presented.

4.1. Classifications and Discussion of Results

There are six significant classifications that emerged from the study which are given in Table 3 and Figure 5. The focus of the research is on the technical aspects of production and the effect of competitive advantage as there has not been enough publications on this area. The discussion made from this study looks at some factors that affect competitiveness in this sector: the market aspects, farmers' perceptions of the market, how they behave there, and how well they understand their customers.

In principle, a farm gains a competitive advantage when it sells its products. The majority of farms in developing nations are small-scale and use a subsistence farming method. Even though we have studied a certain cash crop, namely pineapple, a mixed farming method may result in its production being less marketable and its lack of marketing. Thus, the objective of studying competitive advantage is important in this situation as it will enhance sales, production, employment opportunities, processing opportunities, and investment opportunities. These proposed classifications also address the research questions by providing explanations, like pineapple cultivation in the Ejigbo farm community. However, they have been summarised and prepared by the categorisation approach whereby each of the classifications made reflects the major and subcategories, as analysed in Figure 5.

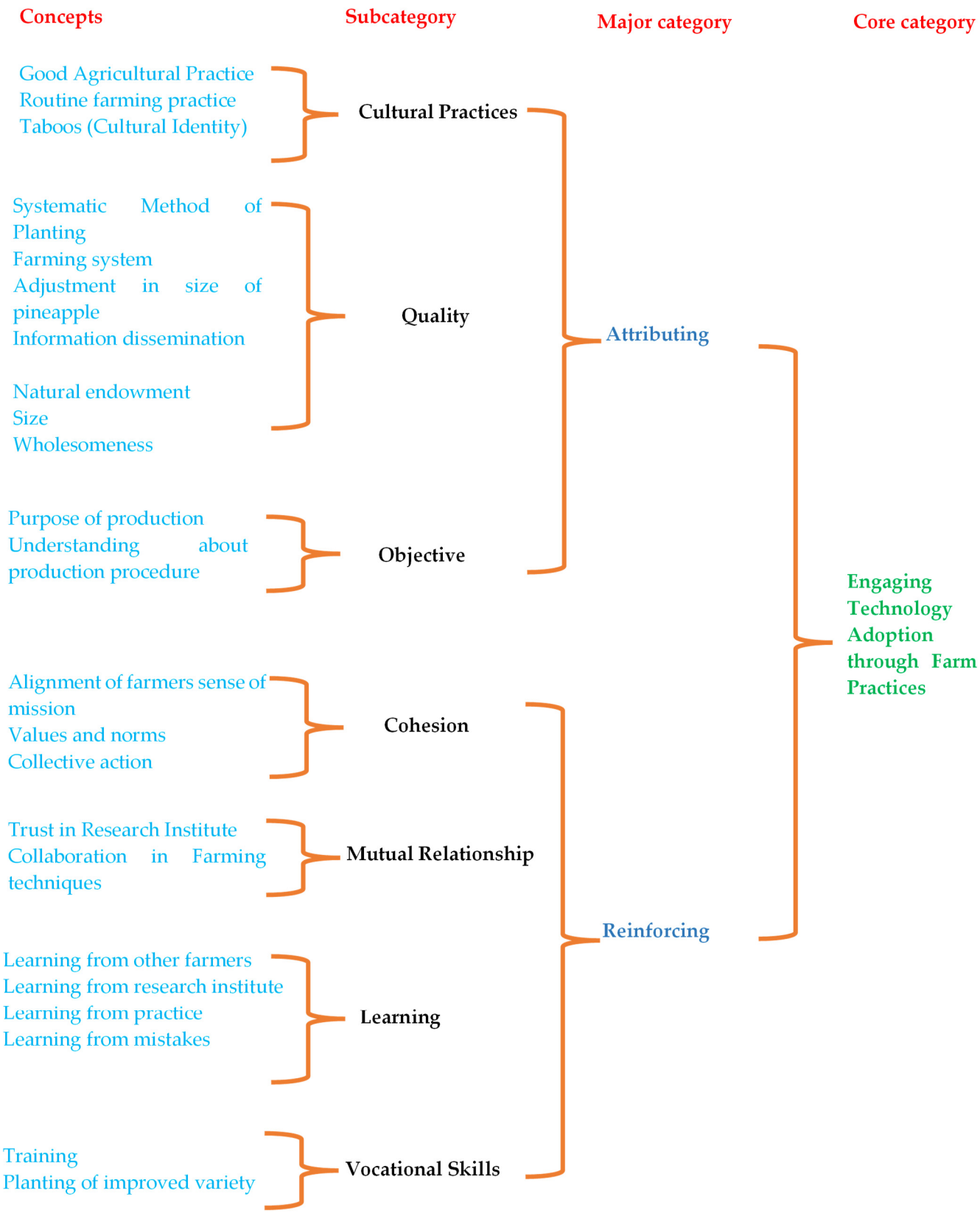

Figure 5. Summary of factors leading to the emergence of the theory.

Table 3. Classifications considered on the study.

Major Categories	Subcategories
Production and product characteristics that enhance pineapple cultivation	• Natural endowment • Good agricultural practices • Approach to cultivation • Product quality • Process quality • Uniqueness
Farmers' satisfaction at the current level of production	• Mindset • Satisfaction
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
Mutual relationship with the change agent	• Trust • Collaboration
Learning	• Learning from errors • Learning from other farmers • Learning from experts • Learning from practice
Skills Development	• Training • Technological change

4.1.1. Production Characteristics

According to the outcomes of the study, production as well as the qualities of pineapple fruits are factors that contribute to increased output in the study region. The natural endowment, which includes favourable soil, terrain, weather, and climate, is considered by pineapple producers to be a driving force behind their decision to cultivate the fruit. Based on the classification, it appears that the location has a natural advantage which has the potential to turn into a comparative advantage for farmers in the states that are nearby. At some point in time, a comparative advantage will eventually lead to competitive advantage among the farmers (Mugera 2012). This observation was made. This classification is consistent with those on cassava production in Thailand by Howeler and Hershey (2002) who found that a cost strategy is an efficient method for competing with other businesses. Although the finding classification that was discovered from this study suggests a differentiation strategy for competitiveness, this study identifies sound agricultural practices as a vital factor that support the enhancement of pineapple output. This finding contradicts the recommendation that was found from the finding classification that was discovered from this study. Since this study links the principle and notion of enhancing technology adoption practice, the finding classification that was found is still applicable now. A good agricultural practice, on the other hand, should make it abundantly obvious that it comprises a guideline for the operational management of farm produce at every stage, from planting through harvesting and beyond. In this area, the classification that was obtained fits with what Lubis et al. (2014) found regarding the economic efficiency of pineapple production at West Java, Indonesia.

Although Lubis et al. (2014) reached their conclusion based on data collected in Indonesia, the evidence presented in the current study is consistent with that group's finding that improved agricultural practices lead to increased crop yields. Based on the findings of the study, routine farm activities are established as an essential component

of the farming system that enables farmers to obtain increased fruit output and yield. According to the findings of the classification, good production is likely to arise from operational farm activities and practices that are carried out consistently. According to the classification found on quality, the pineapple's physical traits and characteristics are important to the production pattern and processes. As a result, the quality of the fruit takes into account the characteristics and qualities of pineapples that satisfy the expectations of consumers as well as the capacity of pineapple farmers to provide the quality of pineapple fruits that consumers anticipate receiving. In this setting, the capacity and applicability of technology as well as the procedures for the adoption of technology become relevant to the achievement of a competitive advantage. It is consistent with Hernandez-Aguilera et al. (2018)'s argument that the physical features/attributes of products impact farming practices. In addition, it was found that the consumer preferences for product quality can impact the intended outcomes for farmers and encourage the adoption of farming practices that promote environmental sustainability. This observation also conforms to Hernandez-Aguilera et al. (2018)'s conclusion that consumers' preferences for product quality can influence the physical features/attributes of products. This classification also suggests that the adoption of new varieties or technologies can lead to an improvement in the quality of fruit. It was suggested by Cavatassi et al. (2010) that the adoption of a new variety of sorghum seeds resulted in improved quality of sorghum in Ethiopia as well as in Baruwa (2013) where it improved quality for determining the profitability of pineapple production in Osun State, Nigeria. The classification found also suggests that the adoption of new varieties or technologies can lead to an improvement in the quality.

4.1.2. Farmers' Satisfaction

An additional observation that came out of the research reveals that pineapple producers are pleased with the amount of production they have reached. This assertion is in line with the goal that they have set for themselves of serving domestic demand. This observation was made. Based on this classification, it appears that pineapple producers are content with supplying the demand in their own country due to the economic sustainability of their operations and are not particularly interested in exporting the crop. This classification found explains why Nigeria does not export the product, despite the country's status as the seventh largest producer of pineapple in the world (FAOSTAT 2017). Considering the attributes of this classification, pineapple producers appear to be pleased with the current level of pineapple production. Thus, pineapple farmers in Nigeria were unable to meet the demand for the fruit on the domestic market. This observation aligns to the suggestions made by Robert et al. (2017) which state that the farmer's purpose influences the decision on the adoption and practice of technology. Hernandez-Espallardo et al. (2013) conducted research on co-operator satisfaction at the community level and their findings align with the categorisation that was developed from this observation. One of the findings from the present study during the field visit is that those farmers that have technological tools on their farms have easier work and quicker processes adopted. Thus, there are advantages of technology that will contribute to farmer's satisfaction due to better management processes and higher productivity (Mabkhot et al. 2021; Taylor 2018; Srbinovska et al. 2015; Scown et al. 2020).

4.1.3. Farmers' Cohesion

According to the findings of the inquiry that accompanied the study, the purpose of forming the Pineapple Farmers Association (PFA) was to increase the members' standard of living by increasing both production and productivity. The aims of the association are accomplished by the association's dissemination to the farmers of pertinent information on contemporary technologies. Farmers are also educated and trained by PFA through the use of field demonstrations. Farmers' cohesiveness is established as a source of competitive advantage thanks to the classification that was developed based on farmers' sense of collective activity. It seems to imply that farmer's associations improve cohesiveness and,

consequently, the competitive advantage achieved via a unity of purpose. Establishing and maintaining a strong economic and social connection with the pineapple producer's organisation is essential to gaining a strategic advantage in the marketplace. Through the development of a correlation between dynamic capability created by collaborative action and competitive advantage, the classification that was identified matches with the studies that were conducted by Sachitra and Chong (2017a, 2017b). The study also validates the contribution made by Ofuoku and Agbamu (2012) and Ofuoku (2020) that the cohesiveness of farmers has a positive association with the adoption of technology by farmers' groups in the Delta State of Nigeria. This finding was found in Nigeria.

According to the findings of the study, farmers who are members of the Pineapple Farmers' Association form strong bonds with one another and with other farmers in the community. This, in turn, naturally correlates to a high degree of cohesiveness and confidence among the farmers. As a consequence of this, farmers take advantage of the education and training opportunities provided by the association in order to use the newly acquired farming techniques and technological advances. It is noteworthy to note that the findings of agricultural practice in Nigeria support the recommendations of the study by Sidibe (2005) on the farm level adoption of soil and water conservation in Burkina Faso. This is something to take notice of because it relates to the topic of this article. According to Sidibe (2005), members of the farmers' organisation increase the likelihood that farmers will adopt technology that is conveyed by extension agents. This is a confirmed finding. As a result, the professional organisation has an effect on the methods of sustainable farming that are used in this area.

The cultural identity of the farmers was an additional focus area that was connected to the concept of cohesion. Farmers often base their production operations on their beliefs and a sense of belonging to the cultural norms and values of their communities which is reflected in their production activities. In spite of the fact that the study demonstrates cohesion among farmers, the evidence obtained from the study suggests that pineapple growers embrace the adoption practices in principle. Due to the constraints imposed by their culture, some of the farmers have the perception that the implementation of certain practices is incongruous with their standards and priorities. It is therefore abundantly evident that extension professionals need to take into consideration the circumstances and requirements of farmers rather than advocating for the adoption of prescriptive technology. This observation was made. This categorization lends support to a similar discovery made by Warren et al. (2016) about the function of farmers' socio-cultural identities in Scotland.

4.1.4. Mutual Relationship with the Change Agent

Farmers who work together with a research institute (the change agent) are given the ability to more easily gain direct access to the most up-to-date farming techniques and practices, which in turn enables them to achieve better outcomes with their pineapple production. These findings in the synergy of contemporary agricultural practices with traditional cultural practices demand trust and collaboration between the two parties in order to serve as a synergy for enhanced yield in output. The research establishes trust and collaboration in agricultural methods as two aspects that contribute to a mutual relationship betwixt the farmers and the change agent (NIHORT).

Based on this study, it was observed that there is a greater level of trust among farmers (known as farmer-to-farmer trust) as well as between the farmers and the Research Institute (which is NIHORT). Farmers in the Ejigbo community have a high level of trust not only in one another but also in the research institute. This is because the farmers rely on the organisation for the supply of planting materials at a reduced rate, so they have a vested interest in the success of both the research institute and their fellow farmers. In addition to this, it helps to develop the relationship between the farmers and the change agent, which ultimately serves as a dynamic capability to obtain a competitive edge. This observation lends credence to the recommendations made by other researchers who have conducted

studies along the same lines (Tregurtha and Vink 1999; Masuku and Kirsten 2004; Milford 2002; Jayashankar et al. 2018).

According to the findings of categorisation performed on the collaboration of farmers at the farm level in the Ejigbo community, it appears that the farmers' goal is to enhance the process as well as the product's quality by adopting diverse practices and utilising a differentiation strategy. The evidence gathered from the field observations suggests that farmers work together to carry out farming tasks by sharing resources within the farming community to benefit farm families. Pineapple farmers also have access to an example plot that is referenced, as well as assistance activities like visiting other farms and learning how to enhance adoption procedures. The observations on this classification imply that collaboration strengthens the attributing factors of farmers within the community. This observation lends support to the research that was conducted by Perdana et al. (2018) on the growth of collaboration in the agricultural industry. They asserted that cooperative efforts between farmers are what gives agricultural products in Indonesia a competitive advantage in the global market. In addition, the observations that were identified from this study on this classification coincides with the suggestions that Sachitra and Chong (2017a) made in their research on collective actions, dynamic capacities, and competitive advantage of export crop farms in Sri Lanka. In particular, the authors linked the cooperation of farmers directly with competitiveness, which is seen in the current study.

4.1.5. Learning

Learning, routine farm activities, and technology adoption practices advanced the theoretical understanding of dynamic capabilities (Teece et al. 1997; Zollo and Winter 2002; Amit and Schoemaker 1993; Helfat and Peteraf 2003; Lin and Wu 2014). It is worth reiterating that, going by the description of Cohen and Levinthal (1990) that learning creates a competitive advantage through a learning mechanism as well as what is embedded in the description of Sachitra (2019) that learning capability is an intangible resource that creates competitive advantage, learning is what creates a competitive advantage. According to the findings of the study, a complementary resource to TAP is learning, which ultimately results in improved competitiveness. It also lends support to and expands upon the assumption made by McElwee and Bosworth (2010) which states that farmers seek out methods and techniques that will provide them with an advantage over other businesses in their industry. In this regard, education is of the utmost importance throughout every stage of the production process in farming. According to the findings of the study, farmers are consistently working to enhance both the production and adoption processes. Pineapple farmers in Ejigbo dedicate new and emerging farming resources to the improvement of production and the investigation of new operational practices as a result of their learning. However, there was a surge in learning during the recent COVID-19 pandemic (De' et al. 2020), as it impacted the trend of learning by farmers and adoption of technology.

According to the findings of the study, farmers inquire about emerging farming practices and technologies in a variety of different ways. Farmers look to their own experiences and the lessons they have learnt from their mistakes in order to make sense of new farming technologies and practices. As a result, farmers look to their own experiences and the lessons they have learnt from their mistakes in order to refresh their fundamental understanding of farming and agricultural activities. In order to maintain their expertise in matters pertaining to farming practices, they continue their education by receiving instruction from professionals in related fields, such as extension agents and research scientists. According to the findings of the study, one additional method of education is gaining knowledge from other farmers (Ng et al. 2017). This study is consistent with data from previous research suggesting that the learning processes and gains from learning in a cluster primarily occur in an informal manner that promotes the impacts of social cohesion, trust, and connectivity among farm families. The findings of this study support these findings. As a result, the current research highlights various modes of learning that can take place in a group setting. Farmers evaluate their failures based on their experiences and

use such evaluations to promote new ways of thinking among farm families. They also learn by participating in activities and interacting with others in groups. In the context of the present investigation, learning takes place either in the form of learning from other farmers, experts, or experience. Also learning could take place in the form of recognised educational qualifications gained from institutions of learning, or practically on farms since it is a place where a farmer contributes knowledge to improve the quality of agricultural operations and practices in order to realise a change and obtain a competitive advantage. Learning done on farms could be in the form of knowledge transfer or knowledge-based learning.

As a result, the observations of the study indicate that the skill of farmers to learn complements the practices of adopting technology to provide a competitive edge. However, rather than putting an emphasis on cost, the technique has an effect on the fruit's quality and the amount of time saved. According to the results of the study, pineapple farmers in Ejigbo employ a differentiation approach to gain a competitive advantage in their agro-farming industry. While there is large expanse of land available for farming in Nigeria, there is room for growth due to competitiveness (Anzaku and Salau 2017).

4.1.6. Skills Development

The knowledge and expertise of Ejigbo's pineapple farmers has contributed significantly to the region's increased agricultural output and productivity. As a result of this, their performance has improved, as has their capacity to reach competition among other producers. According to McElwee and Bosworth (2010), pineapple producers gain the kinds of skills that strengthen their strategic skills in the context of decision making on production objectives that create value and are financially viable. According to the findings of the study, pineapple farmers who receive training are more likely to gain competitive abilities, which in turn improves the production and adoption processes. It appears that training plays a good role in improving the value and quality of the pineapple fruits that are produced, which in turn has a beneficial effect on production performance. The recommendations in this respect support the findings made by Koori et al. (2017) on the role of training, as a sub-classification here, which was found to increase the performance of farmers in central Kenya within the Central African region in that study. Despite the fact that the research was conducted in a different country on the African continent, Koori et al. (2017) found that it was applicable to pineapple producers in Nigeria. By geo-location, Nigeria is located in the west African part of the continent. Nakano et al. (2018) applied training to improve the productivity of rice farming in Tanzania and concluded that training on technology adoption was a key contributor for productivity.

Lall (1998) defined technological capabilities as the technical, administrative, and institutional skills that enable productive enterprises to make effective use of technical knowledge. This definition of technological capabilities was made in the context of analysing technological change as a competence. In accordance with this description, the research concluded that the majority of pineapple farmers had technological aptitude, as demonstrated in planting practices through a variety of farm activities and procedures. These observations on this classification highlight the necessity of special adoption practices' abilities for combining the knowledge and technological capability gained from research institutes at the farm level. This is particularly important for farmers as they frequently lack the knowledge and experience necessary to locate the information necessary for technological innovation. Therefore, the creation and pursuit of technical capabilities might enable pineapple farmers to use technology transfer to enhance local expertise and gain better integration into global value chains. This could be accomplished through the cultivation of technological innovations, knowledge transfer, and skillsets necessary for technology adoption in pineapple farm practices.

4.2. Results on the Storylines

In this sub-section, the results based on storylines will be presented. The data coding for this research is presented in this sub-section. The representation of the data coding for the research for the storylines can be found in Table 4.

Table 4. Data coding with classifications on the study based on the observations.

Research Question	Storyline	Category	Observations	Source of Evidence	Empirical Evidence
RQ1	Attributes	Major Category 1	Production characteristics Product characteristics Farmers Objective	IF, IRS, TFG, LR, SFG, FFG, FV, Images,	IF4 Q10 (see Appendix A); TFG F2; FFG F4; TFG F5; FAOSTAT (2017)
RQ2	Reinforces	Major Category 2	Farmers' Cohesion Mutual relationship with the Change Agent Learning Skill Development	IF, IRS, TFG, LR, SFG, FFG, FV, Images,	IF6 Q8; IF5 Q7; TFG F2; IRS Q8

Note: LR—literature review; FV—farm visit; IRS—research scientist; IEA—individual extension agent interview; IF—individual farmer interview; TFG—third focus group; SFG—second focus group; FFG—first focus group. For instance, FFG F4 means the first focus group but the fourth focus response while IF4 Q10 means the 4th individual farmer interview but the 10th question's response. See the data code's source detailed as displayed within the Appendix A, from Ref. (Oladapo 2020).

4.2.1. Storyline One—Attributes

The recommendations made from the results of this investigation based on the quality dimension indicate a direct relationship with technology adoption practice. For instance, 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 . . ."* (IF4 Q10)

> *"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."* (TFG F2)

> *"Ejigbo farmers are known to produce high-quality pineapple fruits. The high quality can be attributed to soil management practices such as planting 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. It has also made Ejigbo pineapple fruits have an advantage of overproduction in other communities. Consumers are keen to pay extra for Ejigbo pineapple fruits."* (FFG F4)

> *"We have a natural endowment of suitable 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."* (TFG F5)

The process of achieving high-quality fruit through the production process conforms with the definition by 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 fruit production of varying sizes. This recommendation conforms with the findings that quality permits the improvement of

competitive advantage regarding both costs and differentiation, as seen in a related study by Molina-Azorín et al. (2015).

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 pineapple should be. The participants emphasised the juicy proportion of the fruit to have a clear link to the enormous size of pineapples in Ejigbo. Thus, farmers consider quality dimensions regarding the fruit and competitive advantage in the Ejigbo farming community. The evidence from this study is in line with the suggestions 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 (U.S.A.) by Verhoef and Lemon (2011). Therefore, the suggestion on the quality dimension is consistent with the suggestions of previous studies relating quality to competitive advantage theory. In that light, the study considers the objective features and attributes of products relevant to implicit and explicit consumers. In contrast, an activity or organisation's ability or system to deliver the product is subjective. Thus, it incorporates pineapple features and attributes that respond 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 advantages.

4.2.2. Storyline Two—Reinforcers

Pineapple farmers are looking for better ways to improve their yield, increase sales, and improve their profit margins. Thus, new technologies that could be adopted will enable their farm practices in totality. By presenting additional value to consumers, pineapple farmers attain a competitive advantage. Nevertheless, the addition of value can result in a rise in either the revenue made or production volume. Farmers develop competitive skills when they have access to specialised technology and methods, such as agricultural practices. According to empirical data, most producers favour pineapple production due to the enormous returns on capital. Thus, the objective of pineapple production as a qualification for producers has a strong relationship with technology adoption practices.

According to the responses of the participants, one of the farmer's production goals is to cater to local consumers with a preference for large-sized produce. There is no apparent cause for pineapple farmers to adopt the technology along with the associated farming practices. Participants' responses indicate that the majority of pineapple producers in Ejigbo focus on satisfying 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."* (IF6 Q8)

> *"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 Q7)

> *"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 a farmer is interested in the local market, he does not need to produce small size fruits. There will be nobody to buy. However, suppose one is interested in the international market. He needs to comply with the required international standard regarding the size of fruit exportable and other conditions that are part of the practices. For me, hmmmm . . . I am interested in the international market but have a problem with how to go about it and the required procedure to export pineapple."* (TFG F2)

Hence, the purpose of the farmer moulds the strategy of operation and the strategy determines whether or not the activities involve the complete adoption of technology together with farm practices or whether or not they involve the partial adoption of technology and practices.

In addition, the empirical evidence presented in the paper demonstrates that farmers are able to enhance their production by learning from their previous experiences and applying those lessons. The relevance of the focus placed on experiential and collective learning from the empirical evidence of various sources of data collecting implies its importance in the competitive advantage enjoyed in comparison to other communities in which collective learning plays a less significant role. The present investigation takes into account the significance of both in order to reach higher levels of production and productivity.

Learning does have a direct linkage with the adoption of technology, which finally ends up being an edge over other manufacturers, as confirmed by another result suggested from the study. The observations show that learning has a good impact on technology adoption practices and has a cumulative effect on the links between the experiential learning that pineapple producers have either individually or collectively (see Figure 4).

> *"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 Q8)

The study shows that pineapples from Nigeria have not been prominent in international trade due to a lack of adequate information required by pineapple farmers to meet the required codex standard, which needs to be addressed. This recommendation confirms the assertion made earlier by Beaman et al. (2021), as well as Beaman and Dillon (2018) that technology adoption is characterised by a learning environment in which most farmers need to learn from multiple people before they adopt themselves. It requires a policy intervention in knowledge transfer to local farmers. Other key outcomes of this research study indicate that:

(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 enhance competitive advantage in pineapple production leading to the competitiveness of the product.

The recommendation of the present study is in the same direction that dynamic capabilities, coupled with good strategy, are necessities to sustain superior enterprise performance, which is supported by Teece (2014). In another lane, this recommendation brings to bear the aspect of competitiveness using technology as it confirms the recent study by Kastelli et al. (2018) on investigating the impact of technology transfer on the business performance and competitiveness of young European food and beverages firms. The study concluded that technology transfer is a wheel driver to competitive advantage while the current study affirms that adoption practices lead to competitive advantage.

This study has made findings that support the use of technology adoption in farming practices as well as other related businesses. In other words, businesses strive with effective management processes as well as the use of technology and sustainability (Jazieh and Kozlakidis 2020; Kettinger et al. 1994; Liu and Zhang 2022; Luyckx and Reins 2022). While the present study has identified areas that are evolving, it has also posited that management of farms are important, and relevant policies should be geared for better planning, as seen in the recent COVID-19 pandemic (Paremoer et al. 2021; Ramalingam and Prabhu 2020; Pe'er and Lakner 2020; Haldane et al. 2021), which led to farm management changes in the agricultural sector. Also, that pandemic period affected some farms with obsolete farming practices and those that did not adopt to new times by being TAP-compliant. This study has also applied various management theories using background frameworks, but further study can be conducted by applying a mix of these, like RBV and DCV (Payne and Frow

2014; Powell 2001; Prahalad and Hamel 1994; Wang 2014). Thus, different views can be combined to explore other areas that can enhance pineapple farmers in further studies.

5. Conclusions

The adoption of new technology as a strategic resource can result in a competitive edge in any market. However, a competitive advantage cannot be acquired in the production of horticultural goods without first embracing the practices that are inextricably linked to those goods. The purpose of this article is to investigate the adoption of farming practices in conjunction with the transfer of technology to farmers. The article aims to show how TAP is linked to competitiveness in the fields of sustainability, horticulture, and agroecology. The paper contributes to the gap in the literature on principles of competitive advantages. It proffers a solution to the two research questions on how adoption practices enhance technology adoption in the production of pineapple fruits and how the adoption of technology practices could 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 have a link to competitive advantages. 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 Ejigbo, Nigeria.

There are five main conclusions from the empirical analysis:

- The study offers insights into the realities of adoption practices in horticulture in a developing economy setting, with a case study of Ejigbo pineapple farming in Nigeria;
- While technology adoption and adoption practices are regarded as kin concepts in horticulture, the study sheds light on the possibility of achieving competitive advantages via a combination of farm resources and capabilities in an agrarian community;
- The study provides six classifications of sustainable farming practices that could be adopted with technology and also sheds light on the associative link between learning and adoption practices in the farming community;
- The study further sheds light on how the storyline grounded in data can explain farmers' engagement in technology adoption practices;
- According to the results of the study, pineapple farmers in Ejigbo employ a differentiation approach to gain a competitive advantage in their agro-farming industry.

Overall, the study established that two overarching subcategories (attributes and reinforcers) dictate how technology adoption leads to a competitive advantage among pineapple producers within Nigeria. The outcome of this research confirms that individual and collective learning foster technology adoption practices among farmers, hence the relevance of vocational skills development within the farming community. From the angle of professional practice, the study provides an insight into how farmers strive to suggest solutions to practical challenges faced within the production process. Therefore, it is essential to have practices in place for the adoption of sustainable technology. The outcomes of the study generate two different storylines and demonstrate that attributing factors as well as reinforcing capabilities both boost competitiveness at the farm level and enhance the farmers' desire for farming pineapples. Additionally, discussions were held regarding policies that may be modified depending on the adoption of sustainable technology in order to generate a competitive edge for agricultural practices. Furthermore, this will help strengthen the economy of Nigeria by leading to an increase in the volume of fresh pineapple products that are exported. From the results of research, agricultural, and rural development, policies should place an emphasis on providing support to farmers in the form of reinforcing factors. The study concludes with some suggestions for new lines of inquiry that could be pursued in both strategic management and agribusiness in the future. The observations from the current study contribute to the discussion on the competitive advantage, emphasising strategic horticultural management. However, further research could provide an improved understanding of how technology adoption practices

expand the knowledge bases and capabilities of the farms in various ecological locations. Additionally, the paper has generated implications for both operation management theory and practice, but the results presented are based on a case study approach of sampling and not geographic generalizations to developing nations, as such further research is recommended. Also, future research could analyse competitive advantages by taking into consideration the other market factors like farmers' market awareness and their marketing abilities, among others.

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Informed Consent Statement: Consent was taken from participants to participate in the study.

Data Availability Statement: The data supporting the reported results are available upon reasonable request to the corresponding authors.

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Appendix A. Works Cited

1. FFG F4,
2. IF4 Q10,
3. IF5 Q7,
4. IF6 Q8,
5. IRS Q8,
6. TFG F2,
7. TFG F2,
8. TFG F5.

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