EFFECT OF INNOVATION STRATEGIES ON THE PERFORMANCE OF AGRITECH STARTUPS IN NAIROBI COUNTY KENYA

BY

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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DEDICATION

To all friends and family, your belief in me, your patience during challenging times, and your constant motivation have not only made this accomplishment possible but have also made the entire process meaningful.

ABSTRACT

The general objective of this study was to analyze how innovation strategies affect performance of the agri-tech startups in Nairobi County, Kenya. Its specific objectives were to: determine effects of disruptive innovation, incremental innovation, and open innovation on performance of agri-tech startups in Nairobi County, Kenya. The resource-based view, and diffusion of innovation theory were used to underpin the study. A positivist research philosophy was followed while descriptive cross-sectional survey design was employed. The unit of analysis was 34 agri-tech startups in Nairobi County from which 189 respondents were selected using a census method. A structured questionnaire was designed using a 5-point Likert scale and was also confirmed to be valid and reliable by a pilot study. The data analysis involved SPSS Version 26, with findings presented using tables and figures. The findings indicated 76.8% change in performance of agri-tech startups was explained by disruptive, incremental and open innovation strategies. The study concluded that innovation strategies are significant predictors of performance. The study recommended that the senior management team working with these agri-tech start-ups should show their commitment towards disruptive innovation through allocation of adequate resources. Managers working with agri-tech start-ups in Nairobi should leverage the incremental strategies that are in place to enhance their performance. Managers working with agri-tech start-ups in Nairobi should also increase partnerships with other industry players to gain meaningful insights on open innovation that could be implemented to enhance their performance. There is need for managers working with agri-tech startups in Kenya to keep innovating in the competitive agri-tech space, collaborate and pursue more R&D for continuous improvement. The findings of this study would help the management team working among agri-tech startups in Kenya to understand the need for supporting innovation activities undertaken during their operations. However, the study was limited by the use of a cross-sectional research design, which did not capture the evolving nature of innovations over time. The study was also restricted to agri-tech startups in Nairobi County, which may affect the generalizability of the findings. Additionally, the use of non-probability sampling introduces some sampling bias, as only senior management staff were selected, potentially excluding other employees who could provide valuable insights.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AI	Artificial Intelligence
APA	American Psychology Association
BSC	Balanced Scorecard
EAC	East Africa Community
IPR	Intellectual Property Rights
NACOSTI	National Commission for Science, Technology and Innovation
OECD	Organization of Economic Cooperation and Development
R&D	Research and Development
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences
SU-IERC	Strathmore University Institutional Ethics Review Committee
UK	United Kingdom
US	United States
VIF	Variance Inflation Factors
VRIN	Valuable, Rare, Inimitable, and Non-substitutable

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

In efforts to enhance their performance, firms have realized the need to incorporate innovation in their daily operations (Sterk, Sedláček, & Pugsley, 2021). Innovation strategies are widely regarded as a critical driver that empowers companies to expand into previously untapped and underexplored markets, thereby boosting customer reach and creating opportunities for revenue increase (Rafiki, 2020). Moreover, innovation enables firms to diversify their product offerings, enriching the range of choices available to consumers and potentially enhancing customer satisfaction (Lee, Wang, & Ho, 2020). Presently, there exists a growing debate on the role played by innovation strategies of high-tech firms towards their organizational performance endeavors.

Around the world, innovation strategies have emerged as an important strategy enabling firms to expand into new markets, increase their market share as well as the amount of turnover generated from operations hence overall performance (Farida & Setiawan, 2022). According to Onchong'a (2018), innovation has allowed firms in developing countries like India to acquire customers in untapped markets through creation of new products and modifying the existing ones in line with the identified unique needs of customers.

In Sweden for instance, Braunerhjelm and Thulin (2023) observed that both explorative and exploitative innovation are key predictors of performance at the firm level. However, disruptive innovation can also be associated with negative effects, especially by compelling less developed and emerging countries to adopt it without readiness for the same. In particular, more radical innovation was established as a key force behind the performance of most firms in Sweden.

In Spain, evidence indicates that companies need to engage in determination and recalculation of the costs entailed in innovation activities and intensify their rate of investment in R&D as key forces to drive their performance (Prada, Jordán, & Rodriguez, 2018). In Ecuador, Grijalva, Ayala, Ponce and Pontón (2018) noted that relatively younger firms and those with an increased expenditure in research and development (R&D) per employee are linked to significantly greater performance in terms of sales revenue generation. In Sweden and

according to Spescha and Woerter (2019), innovation enhances the performance of the firm by increasing its sales generation potential.

Naluwooza (2018) indicated that in most African countries like Uganda, Tanzania, Kenya and Burundi, innovation has a positive contribution towards productivity, employment and sales turnover as key aspects of performance at firm level. Firms are highly incentivized to innovate in order to expand the levels of their outputs and hence greater competitiveness. Performance is achieved through introduction of newly created and developed services or products in markets served by a specific firm (Shouyu, 2017). Innovation strategies at the organizational level boost productivity by enhancing a firm's ability to maximize its resources and generate greater revenue. Innovation is an evolutionary technique that seeks to contribute towards an increase in realization of sustainable competitive advantage. According to Braunerhjelm and Thulin (2023), both exploitative and explorative innovations have direct and significant implications on performance of the firm.

According to Prada et al. (2018), any decision made at firm level to support innovation and overall output from the process have direct and significant implications on performance prospects at firm level. Spescha and Woerter (2019) indicated that more innovative firms are characterized by an increase in their sales levels. Similarly, Naluwooza (2018) highlights that incremental, disruptive, and open innovations all significantly affect employment rates, overall productivity, and turnover. Grijalva et al. (2018) further argue that younger firms, dedicating most of their time to R&D activities, exhibit accelerated employment rates, emphasizing the role of innovation in creating employment opportunities thus performance.

Innovation has widely been recognized as a key force that drives overall competitiveness and thus performance at firm level (Muchie & Ezezew, 2022). While prior studies highlight the role of innovation strategies in fostering firm performance, they also note its challenges, particularly for smaller enterprises. Innovation can be costly, especially for small firms (Agil, 2023). The relationship between innovation strategies and firm performance is multifaceted, often producing both positive and negative outcomes.

1.1.1 Innovation Strategies

Schumpeter (1943) described innovation as the development of new products, techniques of engaging in production and new ways of carrying out daily operations at the firm level. Drucker (1985) argued that innovation is an engine of economic development of the country. Rogers (1995) shared that innovation sustains the operations of the firm. Innovation can be defined as

any product, concept, or practice that customers perceive as relatively novel (Mookerjee & Rao, 2021). According to the Organization of Economic Cooperation and Development (OECD), innovation entails the application of enhanced or entirely new methods, services, or products based on recently acquired technological or scientific insights (OECD, 2018). One of the key features characterizing an entrepreneur is the ability to remain innovative. There are various types of innovation strategies that have received considerable attention in literature by scholars: disruptive, incremental, open, process, technological, market, and organizational innovation (Kiveu, 2017).

Disruptive innovation strives to make products simple and affordable to markets that have long been regarded as undesirable (Washima, 2019). The main focus of more established firms is on improving their product offering in markets with high profits and thus ignoring needs from the untapped market segments. Broadly, disruptive innovation can be classified into three categories: low-end, new market, and high-end disruptive innovation (Si & Chen, 2020). According to Kivimaa et al. (2021), the main focus and emphasis of low-end disruptive innovation is on provision of more user friendly or affordable alternative products to customers at the bottom of the market.

The low-end disruptive innovation largely focuses on capturing consumption from customers that are already served by competitors (Wang et al., 2022). For new market disruptive innovation, the main emphasis is on ensuring that products reach overlooked markets as well as customers that have not been considered before. New market disruptive innovation typically targets profitable customers while at the same time creating expansion in up-market customer segments. For high-end disruptive innovation, the key focus and emphasis is on ensuring that the newly introduced products in markets perform better than the ones existing (Zach, Nicolau, & Sharma, 2020).

Incremental innovation seeks to make continuous improvement on systems and operations of the firm (Uribe-Ocampo & Kaminski, 2024). It is an innovation strategy that seeks to refine the product offering landscape of the firm (Law, Sarmidi, & Goh, 2020). It is simply a series of small upgrades or improvements that are made on the existing products and/or services and products (Blank, 2024). Firms embrace incremental innovation to improve their existing products and efficiency in operations (Gui, Lei, & Le, 2022). In most cases, incremental innovation is low cost in nature and the improvements from the process allow the firm to differentiate itself from competitors in the same industry of operation (Al-Khatib & Al-

Ghanem, 2022). Therefore, firms can implement incremental innovation through constant review of their processes with ability for continuous improvement and transformation at an organizational point of view.

Open innovation strategy is supported by formation of partnerships and collaboration with other organizations and suppliers (Misati et al., 2022). Open innovation strategy is usually collaborative in nature, and it can allow the firm to gain and sustain its competitive edge through support for new product development (Obradović, Vlačić, & Dabić, 2021). Open innovation also relies heavily on external support and output including expertise (Surya et al., 2021). It fosters creativity which is an important parameter of performance of firm (Pedersen, 2020). Thus, the major attributes of open innovation include collaboration, risk-reward sharing as well as external inputs and knowledge sharing (Annamalah et al., 2023).

Process innovation entails significant variations in the production techniques or equipment. Organizational innovation is the introduction or development of newly advanced products and services in an organization (Chen, Wang, & Huang, 2021). Market innovation is the alteration of the way businesses are conducted in an organization (Goni & Van-Looy, 2022). Technological innovation is the adoption of new technologies to disrupt the ones existing in an industry (Zhou et al., 2021).

Market innovation strategy involves tools that are linked to social media and enormous data that enable customers to create and configure their own products (Okundi & Muchemi, 2022). It is described as creating and applying new ideas, delivering value to customers, communicating as well as customer relation management. Market innovation is the process initiating substantial and continuous changes in the market with the aim of improving awareness of products and services to the customer (Kanyi & Kihara, 2022). Market innovation is primarily concerned with incremental alteration and changes in a given market and the positive impact these changes have and the effect on organization competitiveness. The innovation within the market favors one player who is capable to keep up with market structure changes hence acquire competitive advantage (Kanyi & Kihara, 2022).

Organizational innovation strategies consist of introducing new organizational business management methods in the workplace and / or the relationship between a company and external agents (Zaied et al., 2015). Organizational innovation strategies are strongly linked with all administrative efforts to renew organizational routines, procedures, mechanisms, and

systems in an effort to renew teamwork, sharing of information, coordination, collaboration, learning and innovation. Organizational innovation is considered a source of sustainable competitive advantage (Okundi, 2022). It is associated with all administrative efforts to renew organizational routines, procedures, mechanisms, systems, etc. and in order to promote teamwork, sharing of information, coordination, collaboration, learning and innovation (Okundi, 2022).

Technological innovation strategies are the methods and plans banks adopt to utilize technology to improve their operations, services, and competitiveness. To keep up with the quickly changing financial landscape and fulfill shifting client expectations, banks have embraced technological innovation progressively (Awuor, 2023). Technological innovation strategies are a key force behind transformation in the banking sector, redefining how financial institutions operate, engage with consumers, and maintain competitiveness in a rapidly changing digital landscape (Awuor, 2023). It is intended to enable the organization to achieve its objectives through better or new products, new ways or processes that are more efficient, all of which serve the stakeholders more effectively, competitively and sustainably (Oginda et al., 2023). Thus, from the foregoing discussion, innovation is a multidimensional construct. It will be measured as supported from literature by disruptive, incremental and open innovation.

1.1.2 Performance

According to Braunerhjelm and Thulin (2023), performance is achieved through effective utilization of resources. There exists a number of issues and factors that can inhibit the performance prospects and potential of the firm including managerial and technical skills that are needed for the businesses to expand in other areas as well to support diversification undertakings (Spescha & Woerter, 2019). Factors like limited competitiveness, inadequate capital as well as limited support from the government have been identified as other key issues that slow down the performance potential of firms (Naluwooza, 2018).

Common measures of performance include employment, sales, market share, customer base, profits and branch networks (Prada, Jordán, & Rodriguez, 2018). In most cases, when a firm expands its operations in other regions, with proper management practices and skills, there would likely be an increase in market share, sales revenues as well as the amount of profits generated as proxies of performance (Grijalva et al., 2018). An increase in customer base as an element of performance would have a ripple effect on the amount of turnover generated at firm level as well as the amount of profit.

One of the widely documented methods of measuring firm performance is the use of the balance scorecard (BSC) that was developed by Kaplan and Norton (1992). The BSC covers four important perspectives: internal business processes, learning and growth, financial and customer perspective. These four perspectives are closely connected, and they reinforce each other (Kumar et al., 2024). The financial perspective of the BSC is used to measure the financial performance indicators like revenues and profit margins (Gazi, Atan, & Kılıç, 2022). By monitoring these financial indicators, the financial health of the business can be sustained.

The customer perspective relates to how well the firm serves its customers. Specific parameters that are measured under it include customer satisfaction and retention as well as market share (Tawse & Tabesh, 2023). The internal operational goals and objectives of the firm are measured under the internal business processes. It relates to how effective and efficient the internal processes of the firm are optimized to meet the strategic goals and objectives of the firm (Mio, Costantini, & Panfilo, 2022). The Learning and growth perspective of the BSC focuses more on innovation ability and places more emphasis on the need for human capital investment (Faraji et al., 2022).

The indicators of performance include customer satisfaction, sales revenue, profitability, returns on investment, employee retention and branch network. The present study measured performance through sales, profit, branch network, and customer satisfaction. These indicators consisted of both financial and non-financial components of performance. Financial indicators focus on explaining the financial objectives of an organization while non-financial indicators that are outside the traditional financial metrics. Using both indicators ensured a holistic picture of performance was assessed.

1.1.3 Agri-tech Startups in Nairobi County Kenya

There is no unified consensus among researchers regarding the definition and characteristics of a start-up. Wetzel and Eiche (2024) define start-ups as companies founded within the last ten years, offering innovative technologies or services that represent a novelty in their nature, and aiming for economic and entrepreneurial growth. da Silva et al. (2021) described them as small organizations, which have bold and replicable business models, in the launching process or even with a short time of operation, where they have a high potential in terms of scalability and with a focus turned to the activities of research and development of innovative ideas. Startups operate in different sectors.

In Kenya, startups are represented in different sectors, and the majority is represented in the FinTech sector (30.2%) with others in e-health, agri-tech, retail-tech, human resource (HR), recruitment, e-commerce, and ed-tech. There are various activities in the startup ecosystem including marketing, energy, waste management, legal-tech, pro-tech, logistics, and mobility. In terms of employment, startups provide employment to 11,462 (Wakwoma, 2024). Agriculture technological (agri-tech) startups are firms that adopt digital platforms to enhance efficiency of the food production process (Moro-Visconti & Moro-Visconti, 2021). These are emerging firms that are leveraging innovation to support enhance their performance.

There are approximately 34 agri-tech startups that have collectively contributed towards creation of employment and payment of taxes to the government (Kariuki, 2023). Some of these firms are involved in undertakings like manufacturing oil from avocados and provision of agribusiness financial literacy programs. Examples of agri-tech startups in Kenya include Apollo Agriculture, i-procure and Twiga Foods. In the past decade, Kenya has emerged as a leading destination and hotspot of this agri-tech start up on two accounts: the central role occupied by agriculture sector to the economy and intensified efforts to support and enhance food security in the country (Kieti et al., 2021). Muathe et al. (2022) research that explained that since the emergence of Covid-19, more tech enabled startups emerged across sectors like health and agriculture.

Some of the unique attributes of these startups have been their drivers of performance. These include targeting small-scale farmers, provision of agriculture-based credit facilities as well as other related farm inputs like for the case of Apollo Agriculture (Kiprotich, 2017). For other startups like Twiga Foods, they have intensified their specialization in connection of small-scale farmers with retailers, hence contributing towards enhancement of value chain. There are other agri-tech firms in Kenya like DigFram and MobiGrow that have intensified their drive for impact creation and change (Audi & Kilika, 2023). The challenges faced by these firms include high levels of competition and market concentration. Given the importance and contribution of the agricultural sector to the economy, agri-tech startups play an important role as a conduit for better performance outcomes for the industry. However, there is limited research on the performance of agri-tech startups and this warranted the research.

1.2 Problem Statement

Performance of agri-tech startups is supported by enhanced access to agricultural information for farmers, reducing vulnerabilities to insecurity and drought in developing countries like Thailand (Kaewsuwan & Kajornkasirat, 2023). In countries like India, these firms have significantly helped to solve the challenge of food insecurity (Sahoo, 2022). These efforts align with the objectives of Vision 2030, which aims to position Kenya as an industrialized twenty-four-hour economy by the year 2030. Agri-tech startups are instrumental components of the development strategies of Kenya at both county and national level with the aim of solving the aforementioned issues like increasing rainfall and reduced floods through timely preparation of farmers who are their clients (Odello, 2024). However, the extent to which these startups can realize their performance goals is influenced by the strategies they put in place, key one being innovation. Emerging as a competitive sector, agri-tech startups must continually innovate to survive and contribute meaningfully to the economy by reducing food insecurity, improving access to agricultural resources, and mitigating drought impacts across various regions (Audi & Kilika, 2023).

At an enterprise and business level, innovation has been identified as a key force that can drive and inspire strategic change for superior performance. This has placed pressure on the need for firms and particularly agri-tech startups to intensify their innovation so as to achieve performance. Previous studies, such as those by Braunerhjelm and Thulin (2023), emphasize that both exploitative and exploratory innovations significantly influence performance.

Specha and Woerter (2019) conducted research on innovation and its influence on firm performance, identifying a significant interaction between these two variables. Naluwooza (2018) covered the member States of the East Africa Community (EAC), where both process and product innovation was found to have notable effects on firm performance. Mohammed (2021) highlighted that no clear bidirectional causality exists between performance and technological innovation. However, some of these studies were done in developed countries and economies like Braunerhjelm and Thulin (2023) in Sweden. Other studies like Mohammed (2021) create conceptual gaps in that they were conducted on technological innovation. There was therefore the need for a more localized study with specific focus on agri-tech startups in Kenya.

The existing studies on startups have focused on their management quality (Wakwoma, 2024), strategic orientation (Maina, 2021), determinants of their success (Nduta, 2024), understanding

their ecosystem (Muathe et al., 2022), and determinants of their growth (Mugo, 2022). There remains paucity of research on their innovation strategies and performance. Contextually, these studies have also focused on all startups and have not specifically been interested in the Agritech startups given their importance in the agricultural sector. This is a contribution the study aimed to make. There are methodological gaps that appear in the previous studies (Chen et al., 2024; Malodia et al., 2023) such as use of desk research or literature reviews that did not collect any primary data and therefore no assessment of relationships was done statistically. This study, by using primary data from respondents in the sector, was able to collect first-hand data and analyse it to make inferences based on statistical significance.

1.3 Research Objectives

The general and specific objectives of the study are as set out as follows.

1.3.1 General Objective

The general objective of the study was to establish the effect of innovation strategies on the performance of agri-tech startups in Nairobi County Kenya.

1.3.2 Specific Objectives

The study was guided by the following specific objectives:

i. To establish the effect of disruptive innovation on performance of the agri-tech startups in Nairobi County Kenya
ii. To determine the effect of incremental innovation on performance of the agri-tech startups in Nairobi County Kenya
iii. To investigate the effect of open innovation on performance of the agri-tech startups in Nairobi County Kenya

1.4 Research Questions

The study sought answers to the following research questions:

i. What is the effect of disruptive innovation on performance of the agri-tech startups in Nairobi County Kenya?
ii. To determine the effect of incremental innovation on performance of the agri-tech startups in Nairobi County Kenya?
iii. To investigate the effect of open innovation on firm performance of the agri-tech startups in Nairobi County Kenya?

1.5 Scope of the Study

This research aimed to assess how innovation strategies influence the performance agri-tech startups in Nairobi County, Kenya. The study took agri-tech startups in Kenya as its unit of analysis. This research was limited to disruptive, incremental, and open innovation strategies while performance was measured by sales, profit, branch network, and customer satisfaction. The study was conducted using primary data that was collected on innovation and performance. The time scope of the study was March 2025.

1.6 Significance of the Study

The study aimed to be of significance to the following actors.

1.6.1 Policy and Decision Makers

The study informs policy makers in the government to realize the need to come up with relevant policies and regulations to support effective decision making. New policies guiding innovation among agri-tech startups in Kenya would be developed. The study would inform new policies in the industry to support the innovation endeavors of the agri-tech startups in Kenya.

1.6.2 Management Teams

The study would help management team working among agri-tech startups in Kenya to understand the need for supporting innovation activities undertaken during their operations. The study also would add to the available body of knowledge by linking theories of innovation to economic and firm-level performance.

1.6.3 Scholars and Academia

The study would be used to link the existing theories on innovation and its implication on firm performance. This would allow future scholars conducting related studies in future to review information covered in this study. This in turn would boost the level of information and knowledge that is available regarding innovation-firm performance nexus.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Theories adopted for the study are highlighted in this chapter followed by a review of empirical studies on each of the specific objectives. A summary of the literature and identification of research gaps are highlighted in Table 2.1. Figure 2.1 highlights the conceptual framework and Table 2.1 shows the operationalization of variables.

2.2 Theoretical Review

The study was anchored on Penrose (1959) Resource-Based View (RBV) and Rogers (2003) Diffusion of Innovation (DOI) further discussed in the following subsection.

2.2.1 Resource Based View

The resource-based view (RBV) grew out of Penrose's (1959) the theory of the growth of the firm. In the 1980s, Wernerfelt (1984) and Barney (1986) advanced the RBV and its argument that resources need to be utilized to support performance of the firm by examining firm competitiveness from the resource side, instead of the product or industrial standpoint. Its main premise being that resources possessed by the firm can be effectively utilized to achieve and sustain an edge (Zahra, 2021). To be effective in promoting competitiveness and performance, these resources should meet specific criteria. This is referred to as the valuable, rare, imperfect imitability and non-substitutability (VRIN) standard (Ployhart, 2021).

Resources are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness (Barney, 1991). Valuable resources owned by a company that are rare or difficult for competing companies to possess. A firm enjoys a competitive advantage when it implements a value-creating strategy that is not implemented simultaneously by many other firms (Barney, 1991). Inimitable resources are difficult or even impossible for its competitors to imitate (Barney, 1991). Non-substitutable resources are those that are difficult to imitate or replace with other resources using different strategies but that can provide the same results (Barney, 1991).

Some criticisms have been leveled against the RBV. First, Priem and Butler (2001) raised concern on the difficulty to discern whether a resource meets these criteria, and for this reason have rejected, at least parts, of the theory (Priem & Butler, 2001). Secondly, its VRIN criteria framework has been criticized for not explicitly state how resources are obtained or developed

(Hoopes, Madsen, & Walker, 2003). Third, lack of clarity in how resources are developed and used has led to the contention that the RBV has no management implications (Priem & Butler, 2001). It offers no prescriptions or insights on how to obtain these resources despite asking managers to obtain VRIN resources (Carrick, 2013).

The resources and capabilities are heterogeneous and unique. It is argued under this theory that the internal factors of the firm determine the quantity of profits and thus performance. The theory argues that when the firm possesses valuable resources which cannot be imitated easily, it is possible to gain competitive advantage and thus better performance (Barney, Ketchen & Wright, 2021). The resources of the firm can be physical, human and organizational in nature. The relationship between innovation as a resource and performance was underpinned by this RBV. The theory explained how effective utilization of resources can allow an organization to achieve superior performance.

2.2.2 Diffusion of Innovation Theory

Rogers (1962) developed this theory to explain the pace at which innovations spread in social environment. Rogers (2003) proposed five attributes of innovation. Individuals' perceptions of these attributes determine an innovation's rate of adoption, which shows the relative speed with which an innovation is adopted by individuals of a social system. The five perceived attributes of innovations are relative advantages, compatibility, trialability, observability, and complexity. The first four are positively related to an innovation's rate of adoption while complexity is the only factor that is negatively related to the rate of adoption (Das, 2022).

Relative advantage that explains whether an innovation is viewed as better than the idea it supersedes. Compatibility describes the degree to which an innovation is viewed as consistent with the current values, previous experiences, and needs of prospective adopters. Complexity dimension explains whether an innovation is perceived as relatively difficult to understand and to use. Trialability consists of the degree to which an innovation may be experimented with on a restricted basis. Observability represents the degree to which the outcomes of an innovation are visible to others (Das, 2022).

Therefore, in startup, any innovation showing high relative advantage, compatibility, triability, and observability will be associated with higher levels of adoption, and this will translate to positive outcomes for the performance of Agritech startups. On the other hand, those innovations that are perceived as complex by the social system of Agritech startups, the less the innovation will be adopted and may not contribute to the positive outcomes of Agritech

startups performance. This implies that managers should place emphasis on the relative advantage, compatibility, triability, and observability of innovations (Das, 2022).

A number of criticisms associated with the DOI theory include its inability to consider social support of innovation adopters as well as its failure to incorporate participatory approach in adoption of innovation (Warner et al., 2021). Second, Clarke (1999) raises issue with the DOI by stating that at its best, it is as a descriptive tool, less strong in its explanatory power, and less useful still in predicting outcomes, and providing guidance as to how to accelerate the rate of adoption. Third, one of the most important criticisms of this theory is that it often does not consider the role of infrastructures in the acceptance and dissemination of innovations (Maharati & Entezarian, 2023).

Despite these criticisms, the adoption of disruptive, open, and incremental innovation strategies demands that the targets and beneficiaries accept them. Therefore, DOI provides a useful lens from which to examine the adoption of innovation strategies in Agritech startups. These open, disruptive, and incremental innovation strategies have to be compatible, observable, triable, and offer relative advantages than the existing technologies or systems.

2.3 Empirical Review

The review of past empirical studies is provided in subsequent sections

2.3.1 Disruptive Innovation and Performance

The nexus between disruptive innovation and performance of the firm is mixed with some studies indicating the relationship to be positive. This means that an investment in disruptive innovation can allow the firm to grow by generating more sales revenues which translates into more profits. For instance, In India, Mookerjee and Rao (2021) conducted a study on disruptive innovation and the connection with both business and market performance of various players. The study leveraged desk review approach that entailed a critical analysis of various documented studies. It was noted that disruptive technological innovation enhances market outcomes including performance. The study noted that firms have realized the need to embrace disruptive technologies including robotics, artificial intelligence (AI) and cloud computing as mechanisms of supporting performance endeavors. In a study that was conducted by Feder (2018) in the United States, the main focus was on determining the effect of disruptive innovations and productivity. The study was done in Italy, the United States and Korea respectively. The analysis showed that disruptive innovation is a major force that drives productivity at firm level.

A study that was done by Macharia (2019) in Kenya, the main focus was on disruptive innovation and its implication on competitive advantage obtaining evidence from small and medium enterprises (SMEs) owned by youths in Nairobi. The variables included technological and market innovations as well as the digital trends. Through purposive sampling, 88 SMEs were sampled and included in the analysis. It emerged that disruptive innovation is a significant predictor of competitive advantage. Chemma (2021) explored the importance of disruptive innovation through an in-depth examination of the yogurt industry in Algeria. The study, conducted using an exploratory qualitative approach, demonstrated that high competition requires enterprises to leverage innovation in order to survive. The results point out the relationship between competitive dynamics and disruptive innovation, which warrants further attention and deeper exploration.

In Australia, Williams, McDonald, and Mayes (2021) determined how disruptive innovation affected creative professionals, focusing on photographers. Using in-depth interviews with professional photographers, the study examined how advancements in technology, digital media, and crowdsourcing platforms have transformed the nature of photographic work, employment patterns, and industry practices. The findings revealed significant changes in labour market dynamics, professional identities and economic opportunities, particularly for freelancers. The study underscores the broader implications of disruptive innovation for the future of work and social protection.

2.3.2 Incremental Innovation and Performance

In the flash memory industry in United Kingdom (UK), Kim, Park, and Lee (2019) did an assessment of the implication of incremental innovation on sustainable performance of enterprises. Their methodology, which involved systematic content analysis, revealed that incremental innovation significantly enhances firm-level performance. In United States (US), Tontini and Dagostin-Piccolo (2013) did an examination of the nexus between incremental innovation and the level of satisfaction of customers. The analysis of the information gathered pointed out the existence of a strong link between incremental innovation and satisfaction of customers. This means that incremental innovation allows firms to customize their product offering aligned to customers hence leading to customer satisfaction.

Yoshioka-Kobayashi, Miyanoshita, and Kanama (2020) examined the interaction between incremental product innovations in enterprises engaged in food manufacturing in Japan from 2009 to 2013. The study was done using data from intellectual property rights (IPR). It was

observed that incremental innovation in product packaging was dominant. In Germany, Pappenheim (2016) did an appraisal of incremental innovation and its implication on the perceptions of consumers. Once data had been gathered and processed, the study was able to point out that consumers expressed both negative and positive perceptions in regard to incremental innovations. At the same time, the studied consumers accepted incremental innovation in terms of product development.

Li and Huang (2019) employed a theoretical framework to assess how these innovations influence the industry's ability to survive under government interventions in China. An empirical analysis based on a panel dataset indicated that while incremental innovation did not significantly enhance industry survival, disruptive innovation played a pivotal role at the national level. Chen, Xie, and Zhou (2024) compared incremental and radical innovations in relation to sustainable competitive advantage. Data collected from 201 Chinese firms through surveys and statistical analysis showed that while both types of innovation positively impact competitiveness, radical innovation has a greater effect compared to incremental innovation.

2.3.3 Open Innovation and Performance

Malodia et al. (2023) investigated the consequences and antecedents of open innovation. Their study examined SMEs in both the US and Europe, identifying key precursors to open innovation, such as bricolage. Audretsch et al. (2023) conducted an extensive review of the effects of open innovation on startups, focusing specifically on the mechanisms and reasons behind how open innovation fosters performance and development in new enterprises in the US. The study noted that external partnership for knowledge creation and utilization was key forces that drove open innovation at an enterprise level.

The focus of the study conducted by Sengupta and Sena (2020) in India was on determination of the implication of open innovation on firms operating in their specific industries. The study identified two dimensions of open innovation as open source and patent-licensing. It was noted that firms under open-source innovation are characterized by higher levels of profits with an increased level of efficiency with respect to their investment in research and development undertakings. Similarly, Rauter et al. (2019) drew insights from a cross-sectional dataset of firms involved in industrial activities in Ghana. The study emphasized that collaborations and partnerships play a critical role in enabling firms to implement open innovation successfully and realize its benefits. Furthermore, open innovation has been shown to significantly influence innovation performance at the enterprise level.

Bigliardi et al. (2020) demonstrated that firms adopt open innovation through mechanisms such as acquiring external technologies (inbound innovation) and leveraging existing technologies externally (outbound innovation). Expósito, Fernández-Serrano, and Liñán (2019) studied open innovation and its implication on the ability of SMEs to perform in Spain. The innovation outcomes that were covered in this study include marketing, organizational, process and product innovation. The analyzed findings were that open innovation is an important predictor of innovation outcomes from the SME point of view. Zhu et al. (2023) adopted data spanning 2016 to 2020 in China. A significant nexus was identified between innovation and performance at a firm level. Similarly, Nguyen, Huang, and Tian (2021) performed a meta-analysis highlighting open innovation as a significant determinant of firm performance in Indonesia where a significant interplay was pointed out.

Sengupta and Sena (2020) investigated the impact of open innovation on firms across various industries, examining metrics such as profitability, technology adoption, and market structure. The study concluded that consumer preference for newly introduced products plays a significant role in driving innovation. Additionally, the findings emphasized the importance of understanding market dynamics and consumer adoption behaviors for future innovation research.

Yulianto and Supriono (2023) explored how open innovation impacts firm performance within Indonesian SMEs. Their quantitative study, which included 107 SMEs in Malang City, East Java, highlighted the importance of tailoring innovation types to specific market needs for enhancing firm outcomes. The findings suggest that open innovation significantly influences performance. Notably, service innovation was identified as having a meaningful effect on firm performance. These results underscore the practical and theoretical implications of focusing on service innovation to maximize the benefits of open innovation.

Bigliardi et al. (2020) highlighted the importance of innovation as a cornerstone for business performance and competitiveness. They identified three key processes through which open innovation is implemented: acquiring external technologies (inbound innovation), leveraging existing technologies externally (outbound innovation), and combining both approaches (coupled innovation). Sanchez-Henriquez and Pavez (2021) used theories of sustainability and environmental innovation as a foundation. The context of the study was Chile and results demonstrated that integrating client and supplier insights with consultant expertise is instrumental in driving eco-innovation success.

2.4 Summary of Knowledge Gaps

The above reviewed empirical studies create relevant knowledge and highlight some research gaps as summarized in Table 2.1 below:

Table 2.1: Summary of Knowledge Gaps

Author	Focus of the study	Methodology	Key finding	Knowledge gap	Focus on present study
Chen et al. (2024)	Did a comparison of incremental versus radical innovation and sustainable competitive advantage	Desk review methodology was adopted	Incremental and radical innovations positively impact competitive advantage	Competitive advantage was the dependent variable	Performance was the dependent variable, thereby addressing a conceptual gap.
Malodia et al. (2023)	An investigation into the consequences and antecedents of open innovation	Desk review methodology was adopted	The key antecedents of open innovation that were discovered include platformization and bricolage	Open innovation was treated as the independent variable	Performance was used as the dependent variable
Macharia (2019)	Disruptive innovation and its implication on competitive advantage obtaining evidence from small and medium enterprises owned by youths in Nairobi	Stratified sampling adopted	Disruptive innovation is a significant predictor of competitive advantage	This was an in-depth study focused on the yogurt industry in Algeria	The present study applies to agri tech firms in general in Kenya
Kim et al. (2019)	An assessment of the implication of incremental innovation on sustainable performance of enterprises	Stratified sampling adopted	Incremental innovation significantly supports firm-level sustainable performance	The methodology that was adopted in this study entailed systematic content analysis.	The present study was empirical
Li & Huang (2019)	Analyzed the effects of incremental and disruptive innovation on the sustainable growth of manufacturing in China	Stratified sampling adopted	Found that while incremental innovation contributed less to firm survival, disruptive innovation had an	The study was done in China	The study was done in Kenya

Tontini & Dagostin-Piccolo (2013)	An examination of the nexus between incremental innovation and the level of satisfaction of customers	Desk review methodology was adopted	inverse effect at the national level Analysis of the gathered information pointed out existence of strong link between incremental innovation and satisfaction of customers	Customer satisfaction was the dependent variable	Performance was the dependent variable

Source: Author (2025)

2.5 Conceptual Framework

Figure 2.1 represents the conceptual framework that highlights the independent variables with their corresponding indicators. Disruptive innovation strives to make products simple and affordable to markets that have long been regarded as undesirable (Washima, 2019). The main focus of more established firms is on improving their product offering in markets with high profits and thus ignoring needs from the untapped market segments. Broadly, disruptive innovation can be classified into three categories: low-end, new market, and high-end disruptive innovation (Si & Chen, 2020).

Incremental innovation seeks to make continuous improvement on systems and operations of the firm (Uribe-Ocampo & Kaminski, 2024). It is an innovation strategy that seeks to refine the product offering landscape of the firm (Law et al., 2020). It is simply a series of small upgrades or improvements that are made on the existing products and/or services and products (Blank, 2024). Firms embrace incremental innovation in order to improve their existing products and efficiency in operations (Gui et al., 2022).

Open innovation strategy is supported by formation of partnerships and collaboration with other organizations and suppliers (Misati et al., 2022). Open innovation strategy is usually collaborative in nature, and it can allow the firm to gain and sustain its competitive edge through support for new product development (Obradović et al., 2021). Thus, the major attributes of open innovation include collaboration, risk-reward sharing as well as external inputs and knowledge sharing (Annamalah et al., 2023). The dependent variable was sales made by the Agritech startups, profits made from the operations of Agritech startups, the number of branches of startups around the country, and the level of customer satisfaction.

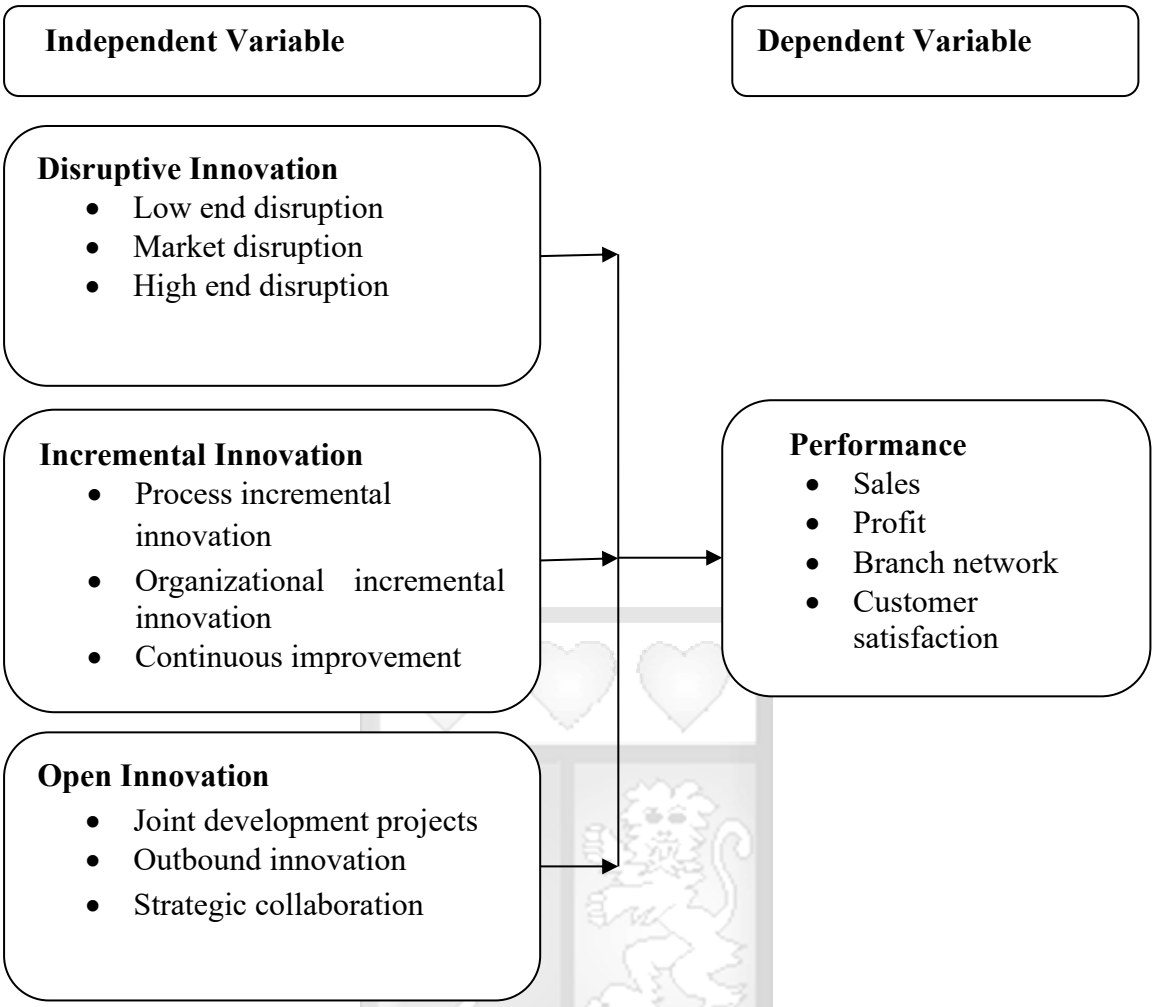

Figure 2.1: Conceptual Framework
Source: Author (2025)

2.6 Operationalization of Variables

Table 2.2 shows the operationalization of variables in which variables are defined, their indicators, and the scale at which they will be measured.

Table 2.2: Operationalization of Variables

Variable	Type of variable	Indicators	Measurement scale
Disruptive innovation	Independent variable	• Low end disruption • Market disruption • High end disruption	Ordinal scale
Incremental innovation	Independent variable	• Process incremental innovation • Organizational incremental innovation • Continuous improvement	Ordinal scale
Open innovation	Independent variable	• Joint development projects • Outbound innovation • Strategic collaboration	Ordinal scale
Performance	Dependent variable	• Sales • Profit • Branch network • Customer satisfaction	Ordinal scale

Source: Author (2025)

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the study's research philosophy, research design, target population, sample size and sampling, data collection methods, data collection procedure, data analysis procedures, research quality, and ethical consideration.

3.2 Research Philosophy

A research philosophy is a collection of beliefs in regard to information gathering and processing as well as the application of data in regard to a given phenomenon being investigated. The various research philosophies existing include constructivism, realism, pragmatism, interpretivism as well as positivism (Rose, McKinley, & Baffoe-Djan, 2019). While Positivism is where socially observed reality is embraced to offer the basis of generalizing findings, constructionism considers the world as having been internally created. The main focus of realism is on providing a description of what is visualized and encountered in respect to fundamental aspects of reality where observed events can easily be created (McKinley & Rose, 2019).

The main argument of pragmatism is that notions and ideas are important in circumstances where they help in reinforcing actions. This study adopted positivism research philosophy since it had scientific attributes, and its focus was on documenting the link between innovation and performance. In this philosophy, knowledge was believed to be objective in nature and thus it was free from biasness. In this philosophy, objectivity was valued through the hypothesis testing process. Thus, through this philosophy, it was critical to provide inferences on innovation and the link with firm performance.

3.3 Research Design

Research design is defined as a structure and framework that guide how information in a study is gathered and processed to offer responses to the established research questions (Ghauri, Grønhaug, & Strange, 2020). This study adopted descriptive cross-sectional survey design. The design was also cross sectional in nature since data was only gathered at a single point in time for the purpose of analysis. Fellows and Liu (2021) indicate that a cross-sectional study provides an opportunity for gaining an accurate account of events or circumstances. Thus, the adoption of this design helped to solicit answers regarding the implication of innovation on firm performance.

3.4 Target Population

Population is a collection of individuals and objectives with related attributes which heighten the attention by the researcher to investigate (Thanem& Knights, 2019). There are 34 agri-tech startups in Kenya (Tracxn Technologies Limited, 2023). From these firms, the study targeted senior, middle and lower-level strategy and innovation managers, adding to 189 respondents as shown in Table 3.1.

Table 3.1: Target Population

Category	Target population
Senior management staff	33
Middle management staff	53
Lower-level management staff	103
Total	**189**

Source: Tracxn Technologies Limited (2023).

3.5 Sample Size and Sampling

Sample size is a collection of representative elements that are identified from the target population (Kara, 2020). A census was undertaken. Hence, all the 189 participants helped to gather information.

3.6 Data Collection Methods

Data collection methods are tools and techniques that are adopted to gather information either from respondents or the existing documented sources (Eden & Nielsen, 2020). Structured questionnaire (Appendix II) aided data gathering. The items on the questionnaire were closed ended as a way of allowing respondents to provide standardized responses. There were five sections that were included in the questionnaire covering demographic and general information, disruptive innovation, incremental innovation, open innovation and lastly performance. The questionnaire was self-administered to enhance the response rate. This also provided ample opportunity for respondents to share relevant information.

3.7 Data Collection Procedure

Data collection procedure covers the steps that are undertaken to gather information from respondents. In this study, an official letter from Strathmore University was sought in advance. This was followed by ethical approval and research permit. The questionnaire was self-administered to respondents as a way of increasing response. The questionnaire was administered and collected later to provide ample time for participants to share their relevant responses.

3.8 Data Analysis Procedure

Once information had been received from participants, it underwent editing and formatting before being coded into the Statistical Package for the Social Sciences (SPSS) Version 26 for analysis. During the analysis, values of mean and standard deviations were generated and appropriately interpreted to describe the data. Before performing regression analysis, several diagnostic tests were conducted as follows:

3.8.1 Multicollinearity Test

Multicollinearity is the high correlation between independent variables that can cause concern in the quality of regression results. To check this, the research performed collinearity statistics of tolerance and Variance Inflation Factor (VIF) values. The interpretation of the VIF scores is to seek values that are less than 10 to confirm no multicollinearity while the tolerance values of less than 1 confirm the lack of multicollinearity in the data.

3.8.2 Normality Test

Normal distribution of data is needed to improve the accuracy of regression results and the study checked for this using the Skewness and Kurtosis values. Bougie and Sekaran (2019), recommend for researchers to obtain values of less than or more than 3 to confirm that the data is representative of a normal distribution.

3.8.3 Linearity Test

The concept of linearity in regression described the situation in which variables under consideration in a study exhibit similar movements whether it is positive or negative. To determine whether the study variables moved together, the Pearson (r) correlation coefficient was used to determine if there was a linear association between variables (Harris et al. (2019). After ensuring the data met threshold for regression analysis, multiple linear regression analysis was conducted at the 95% confidence level to determine the size and direction of the relationship between the independent and dependent variables. The proposed regression model was presented as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where Y is performance

B_0 = Constant

β_1, β_2, and β_3 are Coefficients

ε = error term

X_1= Disruptive innovation

X_2= Incremental innovation

X_3= Open innovation

ε= error term

3.9 Research Quality

Research quality in this study was ensured through determination of validity and reliability as discussed in the following subsections.

3.9.1 Reliability

Reliability refers to the degree of consistency demonstrated by a study's measuring tool (Strijker, Bosworth & Bouter, 2020). A pilot study was conducted among 4 respondents from agricultural startups in Nairobi (2% of the sample size). The selection of the participants taking part in the pilot study was done purposively. To prevent bias, participants involved in the pilot study were excluded from the main study. As shared by Harris et al. (2019), 1-10% of samples can be selected for piloting. Cronbach Alpha Coefficients were determined after pilot testing. Bougie and Sekaran (2019) indicate that such Cronbach Alpha Coefficient values above 0.7 signify that the study tool has a reliable scale. Table 3.2 indicates the overall reliability statistic as 0.845, disruptive innovation had a statistic of 0.873, incremental innovation had 0.779, open innovation had 0,957 while performance was 0.773. According to İnal et al. (2017), whenever values of Cronbach Alpha coefficients are above 0.7, an inference drawn is that the scale adopted in the study is reliable.

Table 3.2: Reliability Results

Variable	Cronbach Alpha Value	Inference
Disruptive Innovation	15	.873
Incremental Innovation	16	.779
Open Innovation	16	.957
Performance	9	.773
Overall score		**.845**

3.9.2 Validity of the Questionnaire

Validity is the degree which the study tool provides measurement of an aspect that it is designed to measure (Dźwigoł, 2019). This study determined validity through the use of the supervisor and other experts in the field of innovation. They reviewed the contents of the questionnaire and shared their suggestions for improvement. All the areas identified during validity testing were captured in the final copy of the questionnaire.

3.10 Ethical Consideration

Ethics is the prescribed code of carrying out the research study (Liamputtong, 2019). By the start of data gathering processing, ethical approval (Appendix IV) was obtained from the Strathmore University Institutional Ethics Review Committee (SU-IERC). Thereafter, a research license from the National Commission for Science, Technology and Innovation (NACOSTI) was obtained (Appendix V). The anonymity, confidentiality, and voluntary participation in the survey was guaranteed in an informed consent form attached to the questionnaire for respondents to give consent.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the findings, and the discussions related to them. The chapter is structured into reliability, response rate, general information, descriptive statistics as well as regression analysis.

4.2 Response Rate

A total of the 189 questionnaires that were administered to employees working in agri-tech startups in Kenya, 143 were filled in and returned. This was equal to a response rate of 75.1% which was adequate to support the findings of analysis as outlined in the subsequent sections. According to Wu, Zhao, and Fils-Aime (2022), an above 70% response is good to support analysis of findings in a survey.

4.3 General Information

The general information of the respondents who participated in the study was determined and summarized as indicated in Table 4.1.

Table 4.1: General Information

Category	Classification	Frequency	Percentage
Gender	Male	107	74.8
	Female	36	25.2
Level of education	Certificate and below	13	9.1
	Diploma	40	28.0
	Undergraduate	64	44.8
	Masters	26	18.2
Years of experience	Less than 3 years	16	11.2
	4-7 years	37	25.9
	8-11 years	66	46.2
	Over 12 years	24	16.8
Years of Firm Operation	Less than 5 years	9	6.3
	5-10 years	54	37.8
	11-15 years	62	43.4
	Over 16 years	18	12.6
Staff head count	Less than 10 employees	18	12.6
	11-50 employees	44	30.8
	51-100 employees	72	50.3
	Over 16 employees	9	6.3

There were 74.8% respondents that were male, while 25.2% were female suggesting there was relatively low gender diversity. In regard to levels of education, 44.8% had undergraduate degrees, 28.0% had diplomas, 18.2% had masters while 9.1% had

certificates and below. This implies that respondents who participated had knowledge and understanding of innovation strategies. In regard to experience, 46.2% had worked for 8 to 11 years, 25.9% had worked for 4 to 7 years, 16.8% for over 12 years and 11.2% for less than 3 years. This means that respondents who took part in this study had worked in their firms for a significant period, which perhaps improved their level of knowledge and understanding of innovation strategies and how they had affected performance of their agri-tech. The study noted that 43.4% of firms had been in operation for 11 to 15 years, 37.8% for 5 to 10 years, 12.6% for over 16 years and 6.3% for less than 5 years. This shows that most of the studied firms had operated for a longer period of time and probably they had implemented a number of innovation strategies that were central in this study. In terms of size, 50.3% of them had 51-100 staff, 30.8% had 11 to 50 staff, 12.6% had less than 10 employees and 6.3% had over 16 staff. This means that all the firms studied were under the Micro Small and Medium Enterprises.

4.5 Descriptive Statistics

This section presents the descriptive statistics on the variables that guided the study.

4.5.1 Disruptive Innovation

A number of statements on disruptive innovation were established and respondents were asked to indicate the extent to which they agreed with each of these statements. A 5-point Likert scale was deployed where 1 meant strong disagreement and 5 implied strong agreement by respondents. Mean and standard deviation scores are summarized in Table 4.2. The overall value of mean and standard deviation on disruptive innovation was given as (M=3.83, SD=0.871) respectively. This means that respondents agreed that disruptive innovation had been embraced in their organization as one of the innovation strategies. Respondents agreed that innovations were used to create entirely new markets for farming products or services (M=4.02, SD=1.080), application of innovation allowed their firm to attract customers from competitors (M=3.99, SD=0.736). This means that disruptive innovation facilitated the creation of new markets which in turn allowed the studied firms to attract new customers from competitors.

Respondents agreed that their company's affordable solutions enabled it to compete with established players in the market (M=3.95, SD=0.846), the disruption efforts had shifted customer preferences away from traditional farming solutions (M=3.93, SD=.694) and that their firm has applied innovation to enter the lower segment of existing markets (M=3.90,

SD=.592). This implies that disruptive innovation improved the affordability of the product offering of the studies firms besides allowing them to meet the preferences and expectations of customers.

Table 4.2 further indicates that respondents agreed that their company focused on serving niche, high-value customers (M=3.90, SD= .882), besides creating high-quality products that outperformed others in the market (M=3.85, SD=.903) as well as offering simple products that attracted customers from bigger competitors (M=3.84, SD=.995). This implies that disruptive innovation allowed the firm to fulfill the needs of customers in specific niches, improve on the quality of product offering besides simplifying features of the products in the market. The study also established that respondents agreed that their firm had applied innovation to capture new segments in existing markets (M=3.83, SD=.839), high-quality innovations by the company met the specific needs of advanced or specialized customers (M=3.81, SD=1.210) and that the firm had applied innovation to introduce new products sold at premium prices (M=3.80, SD=.780). This implies that disruptive innovation allowed the studied agri-tech firms to expand into new market segments, enhance the quality of product offerings and attain the specific needs and preferences of customers.

The findings in Table 4.2 also indicate that respondents agreed that the affordable solutions of their companies made farming easier for small-scale farmers (M=3.76, SD=.750), their firm had innovated products that had disrupted ones existing in the markets (M=3.74, SD=.688), the company's products reached new groups of customers (M=3.62, SD=1.026) and that their firm provided affordable products or services targeted at underserved customers (M=3.57, SD=1.051). This shows that disruptive innovation was a powerful strategy that allowed the studies firms to maximize product pricing and acquire new customers in the market. This might have contributed to the long-term edge of the studied firms.

Table 4.2: Disruptive Innovation

Statement on disruptive innovation	Mean	Std. Dev
Our agri-tech company provides affordable products or services targeted at underserved customers	3.57	1.051
Our company offers simple products that attract customers from bigger competitors	3.84	.995
Our company creates high-quality products that outperform others in the market	3.85	.903
Our company's affordable solutions make farming easier for small-scale farmers	3.76	.750
Our company's products reach new groups of customers	3.62	1.026
Our company focuses on serving niche, high-value customers	3.90	.882
Our company uses innovations to create entirely new markets for farming products or services	4.02	1.080
Our company's affordable solutions enable it to compete with established players in the market	3.95	.846
High-quality innovations by your company meet the specific needs of advanced or specialized customers	3.81	1.210
Our company's disruption efforts have shifted customer preferences away from traditional farming solutions.	3.93	.694
Our firm has innovated products that have disrupted ones existing in the markets	3.74	.688
Our firm has applied innovation to capture new segments in existing markets	3.83	.839
Our firm has applied innovation to enter the lower segment of existing markets	3.90	.592
By applying innovation, our firm has attracted customers from competitors	3.99	.736
Our firm has applied innovation to introduce new products sold at premium prices	3.80	.780
Overall score	**3.83**	**0.871**

4.5.2 Incremental Innovation

The second objective of the study was on incremental innovations. The various statements that had been formulated on this variable on a 5-point Likert scale were used to compute the values of means and standard deviations as shown in Table 4.3.

Table 4.3: Incremental Innovation

Statement on incremental innovation	Mean	Std. Dev
Our agri-tech company regularly makes small improvements to its products to meet changing customer needs.	3.90	.887
Our agri-tech company has improved its internal processes to increase efficiency, leading to higher profits.	3.81	.783
Continuous improvements in our company's tools have led to better service for customers.	3.95	.941
The company's internal improvements help reduce costs.	4.00	.855
Our agri-tech company makes regular updates to its products to help farmers become more productive.	3.98	.721
Organizational changes within our company have made it more adaptable.	3.76	.699
Incremental improvements in our products have made them more affordable for your target customers.	3.69	.760
Our company continuously updates its services based on customer feedback.	3.67	.810
Our company has improved its training programs.	4.09	.701
Regular updates to our company's operations have helped you reach new customers.	3.85	.847
New processes have been adopted in this firm	3.68	1.096
The enterprise has made incremental chances on its organizational design	3.73	.863
Continuous improvement has been adopted in this firm	3.82	.653
Continuous improvement has increased operating efficiency	3.63	.835
New processes have been adopted in this firm	3.77	.875
Our agri-tech company regularly makes small improvements to its products to meet changing customer needs.	3.72	.558
Overall score	**3.81**	**0.800**

From the results in Table 4.3, the overall mean and standard deviation stand at (M=3.81, SD=0.800). This has an implication that most of the respondents agreed that their firms indeed practice incremental innovation. Specifically, the study noted that their companies had improved their training programs (M=4.09, SD=.701), there was internal improvement in the company that helped to reduce costs (M=4.00, SD=.855) and that their agri-tech company made regular updates to its products to help farmers become more productive (M=3.98, SD=.721). This shows that incremental innovation in the firms studied helped to enhance the skills of employees through training besides driving internal improvements that perhaps contributed towards efficiency and effectiveness. Internal improvements from incremental innovation also aided in reduction of costs in the firms studied.

The findings in Table 4.3 indicate that respondents agreed that continuous improvements in their company's tools had led to better service for customers (M=3.95, SD=.941), their agri-tech companies regularly made small improvements to their products to meet changing customer needs (M=3.90, SD=.887) and those Regular updates operations had helped most tech companies to reach new customers (M=3.85, SD=.847). This means that incremental innovation contributed towards improved service delivery allowing the firms studied to meet or exceed the needs and expectations of their customers in the market.

The study established in Table 4.3 that respondent agreed that continuous improvement had been adopted in their firm (M=3.82, SD=.653), their companies had improved their internal processes to increase efficiency, leading to higher profits (M=3.81, SD=.783) and those new processes had been adopted in their firms (M=3.77, SD=.875). This implies that incremental innovation led to an improvement in the internal processes, improved the level of efficiency besides allowing the development of new products that were aligned with the needs of farmers who were customers of the agri-tech companies studied.

Respondents also agreed that organizational changes within their companies had made it more adaptable (M=3.76, SD=.699), the enterprise had made incremental chances on its organizational design (M=3.73, SD= .863) and that the agri-tech companies regularly made small improvements to their products to meet changing customer needs (M=3.72, SD=.558). This implies that incremental innovation strategy in the studied agri-tech companies had improved their adaptability while supporting regular improvement on product offerings for customers.

The findings indicated respondents agreed that incremental improvements in products had made most agri-tech companies to be more affordable for their target customers (M=3.69, SD=.760), the company continuously updated its services based on customer feedback (M=3.67, SD=.810) and that continuous improvement had increased operating efficiency (M=3.63, SD=.835). This means that incremental innovation allowed the studied agri-tech companies to charge reasonable prices on their product offerings besides supporting continuous improvement to enhance the level of operating efficiency.

4.5.3 Open Innovation

The findings of descriptive statistics on open innovation were established and summarized as indicated in Table 4.4.

Table 4.4: Open Innovation

Statement on open innovation	Mean	Std. Dev
Our agri-tech company works with external partners (such as research institutions, universities, or other companies) to develop new products.	3.83	.895
Collaboration with external organizations has led to faster development of products that meet customer needs.	3.69	.980
Sharing ideas with external partners has improved your company's ability to be innovative.	4.04	.515
Our company's partnerships with other organizations have helped you enter new markets.	3.62	.820
Working with external partners has enabled your company to reduce costs.	3.78	.640
Our agri-tech company has co-developed products with external partners that have contributed to higher sales.	3.52	.894
External collaborations have given your company new insights, leading to important service improvements.	4.06	.533
Open innovation practices have helped your company improve its competitive edge	3.78	.873
Our company has benefitted from knowledge-sharing with partners, resulting in new business opportunities.	3.77	.450
By collaborating with others, your company has improved its products and services.	4.01	.489
There is joint collaboration between the agri-techs in some projects for farmers	3.66	.604
Joint development projects in this agri-tech have improved the agriculture data available for farmers	3.81	.863
Our firm has adopted external technologies to ensure the timely delivery of agricultural data to farmers.	3.87	.579
Our firm has shared ideas or technologies, enabling their commercialization by external parties.	3.63	.587
Collaboration with external organizations has led to faster development of products that meet customer needs.	3.60	.964
Overall score	**3.78**	**0.708**

The findings in Table 4.4 indicate the value of overall score as M=3.78 and standard deviation, SD=0.708. This is a clear indication that there was agreement among respondents that open innovation was in place in their organization. More specifically, respondents were in agreement that external collaborations gave their companied new insights, leading to important service improvements (M=4.06, SD=.533), sharing ideas with external partners had improved their company's ability to be innovative (M=4.04, SD=.515) and that by collaborating with others, the studied firms improved their products

and services (M=4.01, SD=.489). This implies that open innovation in the studied agri-tech firms supported external collaboration with other stakeholders which in turn improved quality of product offerings in the studies companies. These external collaborations were supported and enabled by constant sharing of views and ideas for further improvement in product offering.

Respondents also agreed that their firm had adopted external technologies to ensure the timely delivery of agricultural data to farmers (M=3.87, SD=.579), the agri-tech companies worked with external partners (such as research institutions, universities, or other companies) to develop new products (M=3.83, SD=.895) and that joint development projects in the agri-techs had improved the agriculture data available for farmers (M=3.81, SD=.863). This shows that open innovation in the firms studied entails joint projects and partnering with other external information technology providers. Thus, open innovation among the firms studied was more about formation of partnerships with other external stakeholders.

The findings in Table 4.4 also indicate that respondents agreed on the fact that working with external partners had enabled their agri-tech firms to reduce costs (M=3.78, SD=.640), open innovation practices had helped the agri-tech firms to improve their competitive edges (M=3.78, SD=.873) and that the agri-tech firms had benefitted from knowledge-sharing with partners, resulting in new business opportunities (M=3.77, SD=.450). This means that open innovation in the studied agri-tech firms contributed toward waste reduction which in turn improved their competitive advantage. It also helped with the exploration of new business opportunities which perhaps led to an improvement in performance.

The study established from Table 4.5 that respondents agreed that collaboration with external organizations had led to faster development of products that meet customer needs (M=3.69, SD=.980), there was joint collaboration between the agri-techs start-ups in some projects for farmers (M=3.66, SD=.604), the firms had shared ideas or technologies, enabling their commercialization by external parties (M=3.63, SD=.587) and that collaboration with external organizations had led to faster development of products that meet customer needs (M=3.60, SD=.964).

4.6 Diagnostic Tests

Diagnostic tests covering multicollinearity, normality and linearity tests were conducted to validate the assumptions of regression analysis. The findings were established and summarized as indicated in the subsequent sections.

4.6.1 Multicollinearity Test

To detect this, Variance Inflation Factor (VIF) values were computed as a diagnostic measure. Table 4.5 gives an overview of the findings.

Table 4.5: Multicollinearity Test

	Collinearity Statistics	
	Tolerance	**VIF**
Disruptive Innovation	.423	2.364
Incremental Innovation	.323	3.100
Open Innovation	.227	4.219
Mean VIF		**3.228**

The findings in Table 4.5 indicate that while the mean value of VIF was 3.228, disruptive innovation had VIF value of 2.364, incremental innovation had 3.100 and open innovation had 4.219. According to Liamputtong (2019), VIF values within the range of 1-10 generally indicate an absence of problematic multicollinearity in the dataset. This means that there was no multicollinearity condition in the data that was used in the present study.

4.6.2 Normality Test

Normality tests are used to identify whether the data of the study is normally distributed. Table 4.6 gives an overview of the findings.

Table 4.6: Normality Test

	n	**Maximum**	**Mean**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
Disruptive Innovation	143	62.00	57.5734	-.398	.203	.055	.403
Incremental Innovation	143	68.00	61.1469	-.084	.203	-.010	.403
Open Innovation	143	67.00	60.5175	.066	.203	-.591	.403
Performance	143	41.00	34.0420	-.820	.203	.967	.403
Mean Value				**.342**		**.406**	

The findings on Table 4.6 indicate that the average values of Skewness and Kurtosis values stood at 0.342 and 0.406. As noted by Bougie and Sekaran (2019), values in the threshold

+/-3 indicate presence of this condition in the sample data adopted in the study. It then follows that there was normality in the sample data set that was covered in this study.

4.6.3 Linearity Test

It is an assumption under regression that a linear nexus exists between variables. To test this assumption, correlation analysis was adopted. Table 4.7 gives a summary of the results.

Table 4.7: Linearity Test

		Performance	Disruptive Innovation	Incremental Innovation	Open Innovation
Performance	Pearson Correlation	1			
Disruptive Innovation	Pearson Correlation	.870	1		
Incremental Innovation	Pearson Correlation	.742	.759	1	
Open Innovation	Pearson Correlation	.537	.501	.613	1

The findings in Table 4.7 indicate that there is a strong and positive relationship between disruptive innovation (r=0.870), and incremental innovation had (r=0.742) and (r=0.537). According to Harris et al. (2019), the values of Pearson Correlation can have a negative or positive sign that can be interpreted appropriately to assert if a relationship exists between the variables. This means there was a linear relationship between the variables of the study.

4.7 Regression Results

Multiple regression analysis was performed to establish the effect of innovation on performance of agri-tech firms in Nairobi. Table 4.8 is an overview of the model summary.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.879[a]	.773	.768	1.47725

a. Predictors: (Constant), Open Innovation, Disruptive Innovation, incremental Innovation

The findings in Table 4.9 indicate the value of adjusted R-square as 0.768. This means that 76.8% change in performance of agritech startups in Nairobi County Kenya can be explained by the innovation strategies covering disruptive, incremental and open innovation. This also implies that commitment of funds in driving innovation contributes towards performance of the firm. Table 4.8 is the findings of the model Summary.

Table 4.9: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1034.415	3	344.805	158.004	.000[b]
	Residual	303.333	139	2.182		
	Total	**1337.748**	**142**			

a. Dependent Variable: Performance
b. Predictors: (Constant), Open Innovation, Disruptive Innovation, incremental Innovation

The findings in Table 4.9 indicate the value of F calculated as 158.004 with p-value as p as 0.000. Clearly, the p-value is lower than 0.05, an indication that the regression model adopted in this study was significant. The findings on beta coefficients and significance were established and summarized as indicated in Table 4.10.

Table 4.10: Coefficients and Significance

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	26.800	3.702		7.240	.000
	Disruptive Innovation	.801	.069	.725	11.675	.000
	incremental Innovation	.205	.067	.191	3.076	.003
	Open Innovation	.136	.041	.036	3.317	.037

a. Dependent Variable: Performance

From the findings in Table 4.11, the following equation is predicted and fitted between innovation strategies and performance of agri-tech firms in Nairobi:

$$\mathbf{Y= 26.800+ 0.801X_1+0.205X_2+0.136X_3}$$

Where Y is performance

X_1= Disruptive innovation

X_2= Incremental innovation

X_3= Open innovation

Therefore, when all other factors are held constant, a unit increase in disruptive innovation would improve performance of agri-tech start-ups in Nairobi by 0.801 units. Improving incremental innovation and other factors kept constant would increase performance of agri-tech start-ups in Nairobi by 0.205 units. An improvement in open innovation other factors kept constant would increase performance of agri-tech by 0.136 units.

4.8 Chapter Summary

The model was found to explain performance by 77.3% of innovation strategies. The study further established the p-value under disruptive innovation as p-0.000, incremental innovation had p-0.003, while open innovation recorded p as p-0.037.

CHAPTER FIVE
DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is set out to document a summary of the findings and discussion of findings based on the specific objectives. It also covers conclusions and recommendations for policy and practices. Areas that require further research are also highlighted in this chapter.

5.2 Summary of the Findings

The general objective of the study was to analyze how innovation strategies affect performance of the agri-tech startups in Nairobi County, Kenya. Specifically, the study intended to determine the effect of disruptive innovation, incremental innovation and open innovation on performance of agri-tech startups in Nairobi County, Kenya. The study was anchored on resource-based view and diffusion of innovation theory. A descriptive cross-sectional survey design was employed, focusing on 34 agri-tech startups across Kenya while 189 respondents were targeted and census was used.

A structured questionnaire was designed on a 5-point Likert scale and tested for validity and reliability. The findings from 143 respondents indicated an adjusted R-square as 0.768, implying that 76.8% change in performance of agri-tech startups in Nairobi County Kenya can be explained by the innovation strategies covering disruptive, incremental and open innovation. The study further established the p-value under disruptive innovation as p-0.000, incremental innovation had p-0.003, while open innovation recorded p as p-0.037.

5.2.1 Disruptive Innovation and performance of agri-tech firms

In regard to multiple regression analysis results, it can be deduced that disruptive innovation has significant effect on organizational performance. This finding agrees with Mookerjee and Rao (2021) who conducted a study on disruptive innovation and the connection with both business and market performance of various players where it was noted that disruptive technological innovation enhances market outcomes including performance. Feder (2018) showed that disruptive innovation is a major force that drives productivity at firm level. Macharia (2019) established that disruptive innovation is a significant predictor of competitive advantage.

The study noted from descriptive statistics that disruptive innovation facilitated the creation of new markets which in turn allowed the studied firms to attract new customers from

competitors. At the same time, disruptive innovation improved the affordability of the product offering of the studies firms besides allowing them to meet the preferences and expectations of customers. Disruptive innovation allowed the firm to fulfill the needs of customers in specific niches, improve on the quality of product offering besides simplifying features of the products in the market. Disruptive innovation allowed the studied agri-tech firms to expand into new market segments, enhance the quality of product offerings and attain the specific needs and preferences of customers.

The findings indicate that disruptive innovation plays an important part in the performance of Agritech startups, and this provides support for the DOI theory which promotes the idea that innovations are important for the organization. The findings confirmed disruptive innovations and ideas that provide relative advantage, are compatible, can be tried at the individual level first, and can be observed. In addition, the findings support the RBV as it shows that disruptive innovation strategies can be able to provide organizations with the resources that meet the VRIN criteria.

5.2.2 Incremental Innovation and performance of agri-tech firms

As per the findings of multiple regression analysis, it can be deduced that incremental innovation has significant effect on organizational performance. This finding agrees with Kim et al. (2019) who did an assessment of the implication of incremental innovation on sustainable performance of enterprises where it was revealed that incremental innovation significantly enhances firm-level performance. Tontini and Dagostin-Piccolo (2013) pointed out the existence of a strong link between incremental innovation and satisfaction of customers.

Yoshioka-Kobayashi et al. (2020) observed that incremental innovation in product packaging was dominant. In Germany, Pappenheim (2016) was able to point out that consumers expressed both negative and positive perceptions in regard to incremental innovations. Li and Huang (2019) indicated that while incremental innovation did not significantly enhance industry survival, disruptive innovation played a pivotal role at the national level. Chen et al. (2024) showed that while both types of innovation positively impact competitiveness, radical innovation has a greater effect compared to incremental innovation.

From the descriptive statistics, incremental innovation in the firms studied helped to enhance the skills of employees through training besides driving internal improvements

that perhaps contributed towards efficiency and effectiveness. Internal improvements from incremental innovation also aided in the reduction of costs in the firms studied. Incremental innovation contributed towards improved service delivery allowing the firms studied to meet or exceed the needs and expectations of their customers in the market. Incremental innovation led to an improvement in the internal processes, improved the level of efficiency besides allowing the development of new products that were aligned with the needs of farmers who were customers of the studied agri-tech companies.

The findings indicate that incremental innovation plays an important part in the performance of Agritech startups, and this provides support for the DOI theory which promotes the idea that innovations are important for the organization. The findings confirm that incremental innovations and ideas that provide relative advantages are compatible, can be tried at the individual level first, and can be observed. In addition, the findings support the RBV as it shows that incremental innovation strategies can be able to provide organizations with the resources that meet the VRIN criteria.

5.2.3 Open Innovation and performance of agri-tech firms

From regression analysis results, it can be deduced from this finding that open innovation has significant effect on performance of the agri-tech firms in Nairobi. The finding agrees Audretsch et al. (2023) conducted an extensive review of the effects of open innovation on startups and noted that external partnership for knowledge creation and utilization were key forces that drove open innovation at an enterprise level. Overall, Table 4.11 implies that innovation is a significant predictor and enabler of superior performance. This finding contradicts with Mohammed (2021) who highlighted that no clear bidirectional causality exists between performance and technological innovation.

Descriptive statistics indicated that open innovation in the studied agri-tech firms supported external collaboration with other stakeholders, which in turn improved the quality of product offerings in the companies studied. These external collaborations were supported and enabled by constant sharing of views and ideas for further improvement in product offering. Open innovation among the firms studied was more about the formation of partnerships with other external stakeholders. Open innovation in the studied agri-tech firms contributed toward waste reduction which in turn improved their competitive advantage. It also helped with the exploration of new business opportunities which perhaps led to an improvement in performance.

The findings indicate that open innovation plays an important part in the performance of Agritech startups, and this provides support for the DOI theory which promotes the idea that innovations are important for the organization. The findings confirm that innovations and ideas that provide relative advantages, are compatible, can be tried at the individual level first, and can be observed. In addition, the findings support the RBV as it shows that open innovation strategies can be able to provide organizations with the resources that meet the VRIN criteria.

5.3 Conclusion

The first objective of the study was to establish the effect of disruptive innovation on performance of agri-tech startups in Kenya. Regression analysis indicates the p-value under disruptive innovation as p-0.000 which is less than 0.05. Thus, it can be deduced that disruptive innovation has significant effect on organizational performance. Disruptive innovation facilitated the creation of new markets which in turn allowed the firms studied to attract new customers from competitors. At the same time, disruptive innovation improved the affordability of the product offering of the studies firms besides allowing them to meet the preferences and expectations of customers.

The second objective was to determine the effect of incremental innovation on performance of agri-tech startups in Nairobi, Kenya. From regression analysis results, the p-value under incremental innovation is recorded as p-0.003 which is lower than 0.05. Thus, it can be concluded that incremental innovation has significant effect on organizational performance. Incremental innovation in the firms studied helped to enhance the skills of employees through training besides driving internal improvements that perhaps contributed towards efficiency and effectiveness. Internal improvements from incremental innovation also aided in the reduction of costs in the firms studied. Incremental innovation contributed towards improved service delivery allowing the studied firms to meet or exceed the needs and expectations of their customers in the market

The third objective was to assess the effect of open innovation on performance of agri-tech start-ups in Nairobi, Kenya. Based on regression analysis, the p-value under open innovation is recorded as p-0.037. Thus, the study concludes that open innovation has a significant effect on the performance of the agri-tech firms in Nairobi. Open innovation in the studied agri-tech firms supported external collaboration with other stakeholders which in turn improved the quality of product offerings in the companies studied. These external

collaborations were supported and enabled by constant sharing of views and ideas for further improvement in product offering. Open innovation among the firms studied was more about formation of partnerships with other external stakeholders.

5.4 Recommendations

The findings indicated that disruptive innovation has been adopted among agri-tech start-ups in Nairobi and they exert significant effect on performance. Thus, it is recommended that the senior management team working with these agri-tech start-ups should show their commitment towards disruptive innovation through allocation of adequate resources. Managers working with these firms should leverage disruptive innovation to enhance their performance.

From regression analysis, incremental innovation was found to be practiced among agri-tech start-ups, and it had significant effect on their performance. Hence, this study recommends that managers working with agri-tech start-ups in Nairobi should enact strategies for incremental innovation in order to enhance their performance. There is a need for benchmarking with other industry players to establish best practices as far as incremental innovation is concerned among agri-tech start-ups in Nairobi.

The findings of regression analysis indicate that open innovation was a significant enabler of firm performance. Thus, this study recommends that managers working with agri-tech start-ups in Nairobi increase their partnerships with other industry players to gain meaningful insights on open innovation that should be implemented to enhance their performance. There is need for managers working with agri-tech start-ups in Nairobi to increase their investment in collaborative projects and research and development which have been identified as key pillars of open innovation.

5.5 Limitations of the Study

The study adopted a cross-sectional research design which means the examination of the relationship between innovation strategies on performance of agritech startups did not capture the evolving nature of innovations and how this contributed to performance. The study was limited to agritech startups in Nairobi County, and this poses a threat to the external validity of the findings. Third, the selection of the sample was done using non-probability methods and therefore introduces some degree of sampling bias in selection of senior management staff and not all staff working in agritech startups who may have significant insight into their innovation strategies and the effect on their performance.

5.6 Areas for Further Research

In the present study, the value of R-square was given 0.768, this means that 76.8% change in performance of agri-tech startups in Nairobi County Kenya can be explained by the innovation strategies covering disruptive, incremental and open innovation. Thus, there exist other strategic management factors like strategic leadership that were not covered in this study which can influence the performance of these firms that future scholars should focus on. Besides the adoption of performance as the dependent variable, future studies can adopt other constructs like firm growth or even competitive advantage. There is need for further studies adopting longitudinal design on other tech firms to establish the effect of innovation strategies overtime. This is because some effects of innovation efforts take long to bear fruit, and some innovations may be good in the short term and their benefits eroded over time and so a longitudinal study can establish the long-term effects of innovation.

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APPENDICES

Appendix I: Letter of Introduction

Dear Respondents

REF: PARTICIPATION IN AN ACADEMIC RESEARCH STUDY

I am a Masters Student at Strathmore University currently undertaking a research study on **EFFECT OF INNOVATION ON FIRM PERFORMANCE OF AGRITECH STARTUPS IN KENYA.** I am therefore requesting you to assist in filling in the following questionnaire that will take around 20 minutes. Your responses will highly be appreciated and they will only be used for academic purposes. Furthermore, the information you will share will be handled with a strict level of confidence. Thank you.

Regards,

NAIMA BASHIR SHEIKH

Appendix II: Questionnaire

SECTION A: DEMOGRAPHIC AND GENERAL INFORMATION

1. Kindly indicate your gender.

   Male ( )

   Female ( )

2. Kindly specify your highest level of education

   Certificate & below ( )

   Diploma ( )

   Undergraduate degree ( )

   Masters & Above ( )

3. Kindly indicate the number of years you have worked with this agri-tech startup

   Less than 3 years ( )

   4-7years ( )

   8-11years ( )

   Over 12years ( )

4. How long has this agri-tech been in operation?

   Less than 5 years ( )

   5-10years ( )

   11-15years ( )

   Over 16years ( )

5. Kindly indicate the average number of employees in this agri-tech

   Less than 10 employees ( )

   11-50 employees ( )

   51-100 employees ( )

   Over 101 employees ( )

SECTION B: DISRUPTIVE INNOVATION

6. Given below are a number of statements on disruptive innovation. Kindly indicate the extent of your agreement with each of these statements using a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-undecided, 4-aggree and 5-strongly agree.

Statement on disruptive innovation	**1**	**2**	**3**	**4**	**5**
Our agri-tech company provides affordable products or services targeted at underserved customers.	1	2	3	4	5
Our company offers simple products that attract customers from bigger competitors.	1	2	3	4	5
Our company creates high-quality products that outperform others in the market.	1	2	3	4	5
Our company's affordable solutions make farming easier for small-scale farmers.	1	2	3	4	5
Our company's products reach new groups of customers.	1	2	3	4	5
Our company focuses on serving niche, high-value customers.	1	2	3	4	5
Our company uses innovations to create entirely new markets for farming products or services.	1	2	3	4	5
Our company's affordable solutions enable it to compete with established players in the market.	1	2	3	4	5
High-quality innovations by your company meet the specific needs of advanced or specialized customers.	1	2	3	4	5
Our company's disruption efforts have shifted customer preferences away from traditional farming solutions.	1	2	3	4	5
Our firm has innovated products that have disrupted ones existing in the markets.	1	2	3	4	5
Our firm has applied innovation to capture new segments in existing markets.	1	2	3	4	5
Our firm has applied innovation to enter the lower segment of existing markets.	1	2	3	4	5
By applying innovation, our firm has attracted customers from competitors.	1	2	3	4	5
Our firm has applied innovation to introduce new products sold at premium prices.	1	2	3	4	5

SECTION C: INCREMENTAL INNOVATION

7. Given below are a number of statements on incremental innovation. Kindly indicate the extent of your agreement with each of these statements using a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-undecided, 4-aggree and 5-strongly agree.

Statement on incremental innovation	**1**	**2**	**3**	**4**	**5**
Our agri-tech company regularly makes small improvements to its products to meet changing customer needs.	1	2	3	4	5
Our agri-tech company has improved its internal processes to increase efficiency, leading to higher profits.	1	2	3	4	5
Continuous improvements in our company's tools have led to better service for customers.	1	2	3	4	5
The company's internal improvements help reduce costs.	1	2	3	4	5
Our agri-tech company makes regular updates to its products to help farmers become more productive.	1	2	3	4	5
Organizational changes within our company have made it more adaptable.	1	2	3	4	5
Incremental improvements in our products have made them more affordable for your target customers.	1	2	3	4	5
Our company continuously updates its services based on customer feedback.	1	2	3	4	5
Our company has improved its training programs.	1	2	3	4	5
Regular updates to our company's operations have helped you reach new customers.	1	2	3	4	5
New processes have been adopted in this firm	1	2	3	4	5
The enterprise has made incremental chances on its organizational design	1	2	3	4	5
Continuous improvement has been adopted in this firm	1	2	3	4	5
Continuous improvement has increased operating efficiency	1	2	3	4	5
New processes have been adopted in this firm	1	2	3	4	5
Our agri-tech company regularly makes small improvements to its products to meet changing customer needs.	1	2	3	4	5

SECTION D: OPEN INNOVATION

8. Given below are a number of statements on open innovation. Kindly indicate the extent of your agreement with each of these statements using a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-undecided, 4-aggree and 5-strongly agree.

Statement on open innovation	**1**	**2**	**3**	**4**	**5**
Our agri-tech company works with external partners (such as research institutions, universities, or other companies) to develop new products.	1	2	3	4	5
Collaboration with external organizations has led to faster development of products that meet customer needs.	1	2	3	4	5
Sharing ideas with external partners has improved your company's ability to be innovative.	1	2	3	4	5
Our company's partnerships with other organizations have helped you enter new markets.	1	2	3	4	5
Working with external partners has enabled your company to reduce costs.	1	2	3	4	5
Our agri-tech company has co-developed products with external partners that have contributed to higher sales.	1	2	3	4	5
External collaborations gave your company new insights, leading to important service improvements.	1	2	3	4	5
Open innovation practices have helped your company improve its competitive edge	1	2	3	4	5
Our company has benefitted from knowledge-sharing with partners, resulting in new business opportunities.	1	2	3	4	5
By collaborating with others, your company has improved its products and services.	1	2	3	4	5
There is joint collaboration between the agri-techs in some projects for farmers	1	2	3	4	5
Joint development projects in this agri-tech have improved the agriculture data available for farmers	1	2	3	4	5
Our firm has adopted external technologies to ensure the timely delivery of agricultural data to farmers.	1	2	3	4	5
Our firm has shared ideas or technologies, enabling their commercialization by external parties.	1	2	3	4	5
Our agri-tech company works with external partners (such as research institutions, universities, or other companies) to develop new products.	1	2	3	4	5
Collaboration with external organizations has led to faster development of products that meet customer needs.	1	2	3	4	5

SECTION E: PERFORMANCE

9. Given below are a number of statements on performance. Kindly indicate the extent of your agreement with each of these statements using a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-undecided, 4-aggree and 5-strongly agree.

Statement on performance	**1**	**2**	**3**	**4**	**5**
Our agri-tech company has increased its sales in the past three years.	1	2	3	4	5
Our company has opened new branches or offices in different locations.	1	2	3	4	5
Our agri-tech company has attracted more customers in the past three years.	1	2	3	4	5
Our company has increased its team to meet increased demand.	1	2	3	4	5
Our agri-tech company has increased its profits.	1	2	3	4	5
Our agri-tech company has generated more profits from new branches	1	2	3	4	5
Our agri-tech company has employed more people in its branches	1	2	3	4	5
Our agri-tech company has generated more profits from increased sales	1	2	3	4	5
An increase in profits has created sustainable operations of our company	1	2	3	4	5

THANK YOU

END

Appendix III: List of Agri-tech startups in Nairobi County

1. SunCulture
2. Plusfarm Kenya
3. KilimoConnect
4. KifiesAgrishield
5. Shamba Hub Limited
6. Mole Trap Solutions
7. Kiasili Farm
8. FarmTech Kenya
9. Nalima LTD
10. FarmIT Enterprise
11. Yanda Africa
12. Farm Soup
13. Ngeli Foods
14. Shamba Direct
15. Rhea soil health management
16. Farm 2 Table
17. RIMS AGRIVENTURES
18. AggroBell
19. P4CDA FarmHub
20. ForestFoods
21. UpfrontriFarm
22. KwikBasket
23. TunzaNyuki
24. Ecosokoni
25. BIOSORRA
26. VunaTec
27. SatoshiCentre Global Group
28. ROFAM TECH SERVICES LTD
29. Starmax Kenya Ltd
30. Olosida
31. Fresh.ie
32. Grey Edge Monitoring Ltd
33. YcenterShambah Solutions
34. Namna

Source: https://www.f6s.com/companies/agritech/kenya/co

Appendix IV: Ethical Approval

Strathmore UNIVERSITY

4th February 2025

Mrs Bashir Naima,
naima.sheikh@strathmore.edu

Dear Mrs Bashir,

RE: Effect of Innovation Strategies on the Performance of AgriTech Startups in Nairobi County, Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2587/25.** The approval period is from **4th February 2025 to 3rd February 2026.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix V: Research Permit from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **940002**

Date of Issue: **14/February/2025**

RESEARCH LICENSE

This is to Certify that Ms.. Naima Bashir Sheikh of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECT OF INNOVATION STRATEGIES ON THE PERFORMANCE OF AGRITECH DISTRIBUTION STARTUPS IN KENYA for the period ending : 14/February/2026.

License No: **NACOSTI/P/25/415910**

940002

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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