THE ROLE OF INNOVATION HUBS IN SUSTAINABLE FINANCE OF STARTUPS IN GHANA.

by

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DECLARATION

I, Franklin Russell Nyamadi, hereby declare that this research report is my own work, except as indicated in the references and acknowledgements. It is submitted in fulfilment of the requirements for the award of a Doctor of Philosophy degree in the field of Accounting Sciences, at the University of South Africa. It has not been submitted before for any degree or examination in this or any other university.

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December 28th, 2025
Date

FRANKLIN RUSSELL NYAMADI
Signature

DEDICATION

To Mary, the mother of Jesus Christ.

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ABSTRACT

This study examined the impact of Innovation Hubs (IHs) on Sustainability Performance (SP) among youth-led startups in Ghana. It evaluated the mediating role of Sustainable Finance (SF) and the moderating effect of Stakeholder Pressure (STP). This study employed a mixed-method exploratory design. Drawing from a population of 7000 youth-led startups, the qualitative aspect utilised a purposive sampling technique to interview 20 respondents, while the quantitative aspect employed a stratified random sampling technique to collect data involving 588 respondents. Structural Equation Modelling (SEM) was used for data analysis. The findings indicate that Innovation Hubs significantly enhance Sustainability Performance ($\beta = 0.111$, $p < 0.01$) and considerably boost Sustainable Finance ($\beta = 0.544$, $p < 0.01$). Sustainable Finance was identified as a key mediator linking Innovation Hubs to Sustainability Performance, whereas Stakeholder Pressure showed a suppressive direct effect ($\beta = -0.046$, $p < 0.01$) but amplified the influence of Sustainable Finance on SP. The reliance on self-reported cross-sectional data may restrict causal inference and introduce bias. Future research could investigate longitudinal designs, cross-country samples, and other moderating factors such as regulatory support or digital capability. Innovation Hubs should develop stronger financial support pathways and partnerships to foster sustainable practices among youth enterprises. Incorporating elements of Innovation Ecosystem Theory, Sustainable Finance Theory, and Stakeholder Theory, this study offers a comprehensive model of how innovation environments influence sustainability outcomes in developing economies.

Key Words:

Startups, Innovation Hubs, Sustainable Finance, Stakeholder Pressure, Sustainability Performance, Sub-Saharan Africa, Emerging Economies, Structural Equation Modelling, Exploratory Sequential Mixed-Method, Entrepreneurial Ecosystem.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
AfDB	African Development Bank
AMOS	AMOS Version 23 software
AVE	Average Variance Extracted
BC	Bias-Corrected
CA	Cronbach's Alpha
CB-SEM	Covariance-Based Structural Equation Modelling
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMB	Common Method Bias
CMV	Common Method Variance
COVID-19	COVID-19 pandemic
CR	Composite Reliability
EFA	Exploratory Factor Analysis
ESG	Environmental, Social, and Governance
ESD	Exploratory Sequential Design
GFI	Goodness-of-fit Index
GDP	Gross Domestic Product
G*Power	G*Power software
ICMA	International Capital Market Association
NEIP	National Entrepreneurship and Innovation Plan report
NVivo	NVivo 14 software
RGDG	Registrar General's Department of Ghana
RMSEA	Root Mean Square Error of Approximation
SMME	Small, Micro, and Medium Enterprise
SRI	Socially Responsible Investment
SSA	Sub-Saharan Africa
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SEM	Structural Equation Modelling
SDR	Socially Desirable Responding

SRMR	Standardised Root Mean Square Residual
SMEs	Small and Medium Enterprises
SFN	Sustainable Finance
STP	Stakeholder Pressure
TLI	Tucker-Lewis Index
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
USCB	United States Census Bureau
VIF	Variance Inflation Factor
3D	Three Dimensional printers

CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION AND CONTEXTS

The development of sustainable finance (SF) and environmental, social, and governance (ESG) standards in the modern world economy has moved from being a peripheral corporate social responsibility (CSR) concern to an essential element for determining which companies will survive and receive access to capital (Migliorelli, 2021:975; Cunha et al., 2021:3821–3838). The drive by countries worldwide to meet the United Nations' Sustainable Development Goals (SDGs), particularly SDG 8 (Sustainable Economic Growth and Decent Employment) and SDG 9 (Building Resilient Infrastructure, Promoting Industrialisation, and Supporting Innovation), has led capital markets to rethink how they support the funding of startup ventures (Ziolo et al., 2021:45–70; UNEP, 2015).

On a larger scale globally, the development of sustainable finance systems to fund early-stage venture activity through equity or debt funding has increased substantially. However, despite the increasing recognition among global sustainable finance systems of the importance of startup ventures as drivers of innovative disruption in their respective industries, there remain significant barriers to accessing sustainable capital for new and growing businesses relative to large multinational enterprises. These financing frictions are exacerbated in developing and emerging economies.

While international financial institutions and global investors are establishing a number of different types of sustainable investments, including green bonds and impact investment funds (Oman & Svartzman, 2021:3–11), the structure needed to channel these global funds toward micro and small-scale venture capital activities in low-income countries continues to be quite disorganised. Thus, it is within the larger global framework of uneven capital allocations that institutional intermediary organisations, such as Innovation Hubs (IHs), play a critical role in connecting global sustainable capital with indigenous entrepreneurial ecosystems (Jimenez & Zheng, 2021:163–176; Atiase et al., 2020:161). Nowhere is this need for structured intermediary support more pressing than within the African continent. Despite recent rapid growth performance in African countries, the major political and socio-economic challenge of unemployment persists (Masipa, 2018:2). Therefore, economic growth has not led to a decrease in unemployment across the region. One of the most urgent issues is youth unemployment, which has reached alarming levels. Chigunta, (2016:433) highlights a significant demographic trend in 41 African countries, where an extraordinary 70% of the population is made up of young people aged 30 or younger. However, despite this large youth majority, unemployment rates remain stubbornly high (Awad, 2019:1-7).

South Africa, despite its relative wealth within the subregion, faces youth unemployment rates that are twice the regional average and those in more populous regions such as East and South Asia (Ebrahim & Pirttila, 2024:20; Metu et al., 2020:3). This ongoing crisis constitutes a key socioeconomic challenge. For example, South Africa's unemployment rate was 27.7% in 2017 and was rising rapidly (Abé Ndjié et al., 2019:2). This figure excludes those in vulnerable employment, often referred to as the "working poor" (Gangopadhyay et al., 2014:1). It is noted that 77% of the

working population in sub-Saharan Africa is involved in vulnerable employment, one of the highest levels globally.

The continued problem of youth unemployment is primarily due to the labour market's failure to create regular and secure jobs (Berloffa et al., 2016:4-5). This situation has led to disillusionment among young Africans regarding their prospects for sustainable livelihood. Studies such as the one by Flückiger and Ludwig (2018:19-33) warn that large youth populations without opportunities can lead to political and social instability, increased crime, and illicit environmental activities. In Ghana, for instance, the government continues to engage in efforts to counter youth involvement in illegal small-scale mining ("Galamsey") (Eduful et al., 2020:2).

As a result, increasing job scarcity in the formal sector has shifted attention towards youth entrepreneurship within the Small, Micro, and Medium Enterprise (SMME) landscape (Olaniran and Mncube, 2018:1–10). Governments and policymakers across sub-Saharan Africa now see entrepreneurship as a vital tool for addressing youth unemployment (Fatoki, 2018:2). However, entrepreneurial success depends on both internal strategies and external environmental factors, including market conditions, regulatory environments, technological changes, and access to finance (Chesbrough, 2003:43-48; Hathaway, 2020:12-17).

A key external factor that has enabled entrepreneurial growth in recent years is the rise of innovation hubs. According to Elbahjaoui and Elabjani, (2021:41) the establishment of incubation and innovation hubs functions as a strategic mechanism for financing startups and boosting entrepreneurial capacity. Ghana has become a dynamic centre for innovation and entrepreneurship

in Africa, driven by the spread of innovation hubs across the country (Dosso et al., 2021:174-178). These hubs serve as catalysts for innovation, collaboration, and technological progress within the entrepreneurial ecosystem. They play a crucial role in supporting entrepreneurs by providing access to resources, mentorship, co-working spaces, and funding opportunities (Bayuo, 2017:5-7). Despite their potential, innovation hubs face barriers that limit their ability to deliver sustainable finance and improve sustainability performance among startups (Girma Aragaw et al., 2025:1–37). Such barriers include limited access to capital, inadequate infrastructure, and restrictive regulations. Tackling these challenges requires targeted interventions through collaboration, policy support, and investment in digital and technological infrastructure.

In Ghana, leading innovation centres such as MEST and Impact Hub Accra have demonstrated their worth by incubating startups and promoting entrepreneurial growth. However, empirical evidence remains limited on how these hubs influence long-term financial sustainability and sustainability performance outcomes within the start-up ecosystem. This study, therefore, aims to address this gap by examining the relationships among innovation hubs, sustainable finance, and sustainability performance, while accounting for stakeholder pressure as an external factor that may strengthen or weaken these relationships.

Traditional finance theories, which are built on the assumptions of rational investors and efficient markets (Ackert, 2014:25–41), fail to explain real-world financial behaviour fully. Investors are not always rational, and markets often exhibit inefficiencies. A United Nations Environment Programme (UNEP, 2015) study argued that the financial system must be reimagined to align with sustainability and inclusivity goals. Recent years have seen a global surge of interest in sustainable

finance, driven by both private-sector initiatives and public policy developments (Cunha et al., 2021:3821-3838; Kuhn, 2022:497–524; Migliorelli, 2021:975; Thistlethwaite, 2014:61-75).

However, the conceptual and theoretical grounding of sustainable finance remains weak. Scholars have discussed its potential role in banking (Jeucken, 2010:20; Weber, 2014:1-6), regulatory development (Ahlström & Monciardini, 2021:193-212), prevention of greenwashing (Zeidan, 2025:525-528) and alignment with the Sustainable Development Goals (Ziolo et al., 2021:45-70). Yet, these perspectives seldom explain the patterns of innovation hubs and economic actors in adopting sustainable finance practices.

Migliorelli (2021:975) further observed that the field of sustainable finance remains heterogeneous, which complicates its conceptual development. This highlights the need for robust theories to explain the actions and motivations of innovation hubs and entrepreneurs towards sustainability. Accordingly, this research proposes six theoretical perspectives for understanding sustainable finance: Priority Theory, Resource Theory, Peer Emulation Theory, Life Span Theory, Positive Signalling Theory, and System Disruption Theory. These theories collectively elucidate how innovation hubs mobilise resources, emulate best practices, and use signalling mechanisms to promote sustainable financial behaviour and support long-term sustainability performance.

1.1 OVERVIEW OF SUSTAINABLE FINANCE

Several studies in the literature have defined sustainable finance. For instance, Ryszawska (2016:185–194) defines sustainable finance as finance that supports sustainable development across three dimensions: economic, environmental, and social. Migliorelli (2021:975) defines

sustainable finance as finance that supports sectors or activities that contribute to achieving at least one of the relevant sustainability dimensions. Gerster (2011:20) defines sustainable finance as finance that considers environmental, social, and governance (ESG) factors. Gerster (2011:20) defines sustainable finance as financial activity that considers ESG factors in investment decisions within the financial sector. Ozili (2021:1–7) defines sustainable finance as investment decisions that account for the ESG factors of an economic activity or project. Bakken (2021:16) defines sustainable finance as the mobilisation and allocation of capital to support the transition towards a more sustainable economy.

The International Capital Market Association describes sustainable finance as finance that incorporates climate, green, and social finance, while also considering the longer-term economic sustainability of the funded organisations and the role and stability of the overall financial system in which they operate (International Capital Market Association, 2020:30). The United Nations Environment Programme defines sustainable finance as finance that meets the long-term needs of a sustainable and inclusive economy across all relevant dimensions, including economic, social, and environmental issues (UN Environment 2017:20).

Collectively, these definitions of sustainable finance can be classified into two categories. The first considers sustainable finance as finance that incorporates economic, social, and governance factors. Conversely, the second view of sustainable finance is that it addresses an economy's long-term requirements. Consequently, this research endorses the second category of definitions, as it offers a comprehensive understanding of the topic. By emphasising financing that meets an economy's

long-term needs, this study emphasises the interconnectedness of economic, social, and environmental concerns in sustainable development.

The sustainable finance literature has emerged as a rapidly expanding field within the broader field of finance. Migliorelli (2021:975) notes that an excess of diverse concepts, definitions, and industry and policy standards characterises the sustainable finance landscape. Migliorelli (2021:975) suggests that this diversity may impede the smooth development of sustainable finance concepts. To address this heterogeneity, the author recommends referring to the conceptual and practical aspects of sustainable finance as 'finance for sustainability'. A bibliometric analysis of sustainable finance research from 1981 to 2018 was conducted by Migliorelli (2021:975). The study shows that the debate centres on five themes: the performance of socially responsible investment (SRI) funds; corporate social responsibility; the performance of responsible companies and stock market indices; the investment strategies of financial actors; and the role of pension funds in sustainable development.

Existing studies in the sustainable finance literature highlight the importance of financial institutions prioritising sustainable financing. For instance, Oman and Svartzman, (2021:3-11) argue that the financial sector must assume a stronger role in transitioning to a sustainable economy and that policymakers across regions have begun developing sustainable finance programmes to meet the ambitious goal of combating climate change, as outlined in the Paris Agreement. Shabb et al. (2021:20) point out that the finance sector is increasingly supporting the shift to sustainable development by integrating sustainability into its financial analysis and investment portfolios. Schoenmaker (2018:26) shows that some financial institutions have begun to avoid unsustainable

companies from a risk-management perspective and to invest in sustainable companies and projects to generate long-term value for the broader community.

Schumacher et al. (2020:13-46) examine the role of sustainable finance and investment in Japan and how the Japanese financial sector can mitigate growing climate risks and support Japan's transition to a zero-carbon, sustainable economy. They show that the Japanese financial sector and its institutions are exposed to significant climate risks originating both inside and outside Japan, and that the industry has begun to consider climate-related risks and align itself with the Sustainable Development Goals and the 2°C warming scenarios outlined in the Paris Climate Agreement. Urban and Wójcik (2019:17-45) investigate how investment banks integrate sustainability in their underwriting services. They find that investment banks continue to patronise underwriting companies flagged for major environmental, social, and governance misconduct, and that they do not refrain from underwriting companies that provide contentious products, such as tobacco, coal, and nuclear weapons.

Fatemi and Fooladi (2013:101-113) argue that the current approach to shareholder wealth maximisation is no longer a valid guide for creating sustainable wealth because it emphasises short-termism, which has had the unintended consequence of forcing many firms to externalise their social and environmental costs. The authors call for a shift to sustainable finance. Ryszawska (2016:185-194) also shows that the role of finance is shifting from the dominant view of maximising profits and shareholder wealth towards one that supports sustainable development, a green economy, a low-carbon economy, and the mitigation of climate change. Ozili (2021:1–7) proffers solutions that can make finance sustainable. Ozili (2021:1–7) argues that (i) there should

be greater focus on how some aspects of finance can contribute to sustainability; (ii) light-touch regulation may be needed to grow the relatively small sustainable finance sector; (iii) there is a need to adopt a bottom-up approach to grow the sustainable finance sector; (iv) voluntary ESG disclosures and related sustainability reporting should be encouraged; and (v) short-term financial instruments can complement long-term instruments in sustainable financing.

1.2 SYNOPSIS OF SUSTAINABLE FINANCE AND INNOVATION HUBS

Innovation hubs have recently attracted significant interest, recognised as a vital element of the start-up entrepreneurship revolution currently sweeping the world (Friederici, 2019:9–28). According to Jiménez and Zheng (2021:163-165), innovation hubs facilitate the launch of new business models by bridging startups and their environments. The importance of innovation hubs in the emergence and sustainability of startups cannot be overstated (Friederici, 2019:9–28). He further explains that the success of startups in various settings stems from collaborations and networks originating from innovation and incubation hubs. Incubation hubs are vital in shaping and sustaining the growth trajectories of startups by fostering a creative environment, supporting early-stage enterprises, and enhancing their prospects for long-term sustainability (Sohail et al., 2024:2-4).

Incubation hubs offer a vital network and mentorship ecosystem crucial for startup success (Isenberg, 2010:40–50). Mentorship programmes provide guidance from experienced entrepreneurs, industry specialists, and advisors by sharing their knowledge and insights. This support helps companies navigate challenges, make smarter decisions, and avoid typical pitfalls. Such mentorship cultivates a culture of learning and flexibility, equipping entrepreneurs with the tools and expertise needed to succeed in competitive markets. Additionally, these hubs supply

essential infrastructure, facilities, and access to resources that startups often lack in their early stages (Hackett & Dilts, 2004:55–82). Incubation hubs address resource gaps by providing a range of services, including office space, laboratories, technology, legal assistance, and financial assistance. This enables companies to upfront focus on research and product development without the burden of high initial costs, thereby improving their prospects of success.

Furthermore, the collaborative environment within incubation hubs fosters startup engagement, information sharing, and collaboration (Clarysse et al., 2014:1164–1176). This atmosphere often leads to partnerships, synergies, and the exchange of ideas, all of which promote innovation and creativity. Startups leverage collective capabilities through peer learning and collaboration, enhancing their sustainability by learning from one another's experiences. Incubation centres act as a link between companies and potential investors, industry actors, and other stakeholders in the broader entrepreneurial ecosystem (Gorman and Sahlman, 1989:231–248). This network access significantly enhances companies' visibility and reputation, thereby attracting potential investment and partnership opportunities that are crucial to their long-term growth.

Innovation hubs have also become increasingly popular across the African continent. Some scholars argue that the number of innovation hubs continues to grow worldwide, with a particular focus on technology. However, some researchers report that the number of innovation hubs worldwide does not match the rate at which startups emerge, thereby calling into question the real impact of innovation hubs, particularly in Africa (Friederici, 2019:9–28; Mwantimwa et al., 2021:39–63). It is also suggested that while innovation hubs are an effective way to promote collaboration and networks among entrepreneurs, there is no clear evidence of such a connection.

Similarly, Muathe et al. (2022:138–146) suggest that further research is required to improve the understanding of how innovation hubs operate in general. They recommend investigating how innovation hubs facilitate collaborations and support startups. However, they also contend that relying on successful startups to measure the impact of innovation hubs is inadequate.

This empirical overview suggests that innovation hubs and startups are closely connected, with innovation hubs affecting the emergence and longevity of startups. However, there is debate about the precise influence that innovation hubs have on the sustainability of startups. This relates to the numerous failures recorded among startups, as well as a lack of research investigating the true value of innovation hubs (Adler & Dewi, 2019:121–130).

1.3 NOVELTY OF THE STUDY AND THE GHANAIAN SETTING

Entrepreneurship has become an essential route for reducing youth unemployment and encouraging economic growth in developing countries such as Ghana (Fatoki, 2018:2; Nhemachena and Murimbika, 2018:115–127). Although innovation hubs are widely recognised for their capacity to support entrepreneurship, little is known about how these hubs assist young entrepreneurs in Ghana in adopting sustainable financial practices (Girma Aragaw et al., 2025:1–37). This study aims to address this gap by examining how innovation hubs contribute to sustainable financing, financial stability, and sustainability outcomes among youth-led start-ups in Ghana.

This study's focus on the specific Ghanaian context is a notable innovation. Ghana has seen an increase in entrepreneurial activity in recent years, with the government and other stakeholders

recognising the role of entrepreneurship in stimulating economic growth and job creation (Karadağ, Sahin, & Matemane, 2023:235-238; Brancu et al., 2025:319-328; Matemane et al., 2025: 197-205). Nonetheless, several challenges confront Ghanaian youth entrepreneurs, such as limited financial resources, inadequate infrastructure, and regulatory constraints (Chesbrough, 2003:43-48; Hathaway, 2020:12-17). By focusing on Ghana, this study aims to provide insights pertinent to the local context, contributing to the growing body of literature on entrepreneurship in Africa.

Another distinctive aspect of this research is its focus on sustainable finance within youth entrepreneurship. Sustainable finance has garnered global attention, with increasing recognition of the importance of aligning financial practices with environmental, social, and governance (ESG) factors (Kuhn, 2022:497–524; Migliorelli, 2021:975). In Ghana, where young entrepreneurs face substantial financial barriers, understanding how innovation centres can contribute to sustainable financial practices is vital for promoting long-term business viability and growth (Girma Aragaw et al., 2025:1–37).

The study aims to address the specific challenges faced by young entrepreneurs in Ghana by utilising existing literature on entrepreneurship, innovation hubs, and sustainable finance. It seeks to offer practical insights for policymakers, entrepreneurs, and other stakeholders within Ghana's entrepreneurial ecosystem by analysing the success factors of innovation hubs, the financial intricacies of youth entrepreneurship, and their role in sustainable finance.

1.4 PROBLEM STATEMENT

A significant body of research focuses on the challenges of accessing funding for young entrepreneurs in developing countries and thus the role of innovation centres or incubators in supporting their startup ventures. These incubators are seen as a key component in facilitating access to sustainable capital for young entrepreneurs in developing economies (Nyerere et al., 2022:40-58). However, despite the growing number of incubators and innovation centres globally, there continues to be a lack of empirical evidence from developing countries. Most existing research has focused on developed economies, particularly those in Europe and North America (Stojanova et al., 2022:14620; Chowdhury et al., 2023:20). Therefore, little is known about how innovation centres operate in developing economies (Nnanna et al., 2023:133-143).

In addition, while there is an increasing amount of literature available regarding the impact of innovation centres on economic development in developing economies, most studies focus on the social or economic benefits associated with these institutions (Megbowon et al., 2022:6). Little attention has been paid to the financial mechanism of innovation centres and how they affect the growth and success of new businesses (Simuka & Chinakidzwa, 2022:155-179).

As such, a critical knowledge gap still exists concerning how innovation centres support access to sustainable financing and ultimately affect the sustainability performance of youth-led startups in developing economies. No empirical models exist that examine the relationship between innovation centres and access to sustainable financing. This gap also includes the lack of understanding of how stakeholders influence the ability of innovation centres to support youth-led startups (Girma Aragaw et al., 2025:1-37). This study will address this critical knowledge gap by examining the structural relationships between innovation centres, access to sustainable financing

and sustainability performance of youth-led startups in Ghana. In addition, the study will explore how stakeholder pressure moderates the relationship between innovation centre operations and the sustainability performance of youth-led startups.

1.5 RESEARCH AIM AND OBJECTIVES

This study aims to examine how innovation hubs impact startup entrepreneurship in pursuing sustainable finance in a developing economy such as Ghana.

Specifically, the study seeks to:

1. Assess the impact of innovation hubs on sustainability performance of startups in Ghana.
2. Examine the impact of innovation hubs on sustainable finance of startups in Ghana.
3. Assess the impact of sustainable finance on sustainability performance of startups in Ghana.
4. Investigate the mediating role of sustainable finance in the relationship between innovation hubs and sustainability performance in Ghana.
5. Examine the moderating role of stakeholder pressure in the nexus between innovation hubs and sustainable finance in Ghana.
6. Explore the perceptions and experiences of key stakeholders (e.g., managers, policymakers, and investors) regarding the role of innovation hubs in promoting sustainable finance and sustainability performance in Ghana.

1.6 RESEARCH QUESTIONS

Based on the problem, the study seeks to answer the following question: How can Innovation Hubs (IH) contribute to Sustainable Finance (SF), Financial Sustainability (FS), and sustainability outcomes among youth-led entrepreneurs in a developing economy like Ghana?

The specific questions are as follows.

1. To what extent do innovation hubs drive the sustainability performance of youth-led startups in Ghana?
2. In what ways do innovation hubs facilitate access to sustainable finance for Ghanaian youth-led startups?
3. How does the acquisition of sustainable finance translate into improved sustainability performance for youth-led startups in Ghana?
4. What is the mediating mechanism of sustainable finance in the pathway between innovation hub support and startup sustainability performance?
5. Under what conditions does stakeholder pressure moderate the relationship between innovation hubs and sustainable finance?
6. What are the lived experiences and perceptions of key stakeholders (managers, policymakers, and investors) regarding the utility of innovation hubs in fostering sustainable finance and performance?

1.7 DELINEATION AND LIMITATIONS

Although there are various aspects of entrepreneurship, this study was limited to startup entrepreneurs incubated by innovation hubs. Of these incubatees, the focus is on youth aged between 15-39 years. The selection of this age group is based on the GSS (2021:1-81) report, which defines the youthful population as those between 15-39 years. A significant drawback in using such a demographic bracket (15-39) is that it can obscure substantial socioeconomic and experience-based differences among individuals in that age range. For example, there are many important categorical distinctions when comparing the funding needs, entrepreneurial knowledge

and risk-taking behaviour of a 15-year-old who starts their first venture with the funding requirements, entrepreneurship knowledge and risk profile of a 39-year-old, who has a great deal of social capital and family obligations. Therefore, the aggregated analysis results may fail to accurately represent the complex reality associated with smaller age ranges within the larger 15-39 age segment. The study examines how innovation hubs have contributed to youth entrepreneurship and job creation. Although there are several dimensions of entrepreneurship, this study concentrates on the financial aspect. Therefore, the study investigates the activities of innovation hubs and their contributions to financial sustainability among youth startup entrepreneurs.

The study was limited to innovation hubs in Ghana. However, the selection of incubates (i.e., startups) was conducted nationwide, as trainees may have established businesses outside major regions where their mother innovation hubs are situated. Ghana was selected because it is the centre of youth migration in West Africa (Cobbinah et al., 2020:97), and because it shares characteristics of entrepreneurs found in neighbouring countries in the Global South. Again, Ghana's economy is primarily driven by small and medium-sized enterprises, which are heavily operated by young startups (Sarbah & Quaye, 2021:250–264), providing a suitable context for the study. Preliminary research indicates that Ghana has had innovation hubs for more than 10 years.

A limitation of the study was that some beneficiaries of innovation hubs over the past ten years may be located far away or scattered nationwide; therefore, reaching them to conduct face-to-face discussions, who provide valuable insights, was difficult. Hence, in some cases, the researcher had to resort to using Zoom to solicit information. Some did not respond, while others have changed

the contact details they left with the hubs. This affected the response rate and sample size of the research.

1.8 SIGNIFICANCE OF THE STUDY

The findings of this study have contributed to the advancement of entrepreneurship finance research as well as provided theoretical, practical and policy-level responses to the multiple stakeholders within the entrepreneurial ecosystem.

At a **theoretical/academic level**, this study expands the body of knowledge related to entrepreneurial finance literature by empirically validating an integrated theoretical model in the context of an emerging economy. Additionally, this study contributes to the development of a new Structural Equation Model (SEM) for identifying quantifiably measurable mediation mechanisms of sustainable finance that illustrate how innovation hubs transform their support for startups into actual sustainability-related outputs; thereby filling in a previously unexplored knowledge gap.

As an evidence-based resource to **policymakers/regulators**, these results will allow government agencies in Ghana and similarly situated developing nations to design evidence-based policies. This study identifies the specific financial constraints that exist in the startup ecosystem. Consequently, government agencies can develop targeted regulatory intervention strategies through guarantees offered by the government to encourage innovation hubs to operate formally and reduce the perceived risks associated with providing green financing and generating economic growth.

With regard to **practical applications for hub managers**, **institutional investors/banking practitioners and hub investors**, this research provides actionable strategic information. Hub managers will have empirical evidence to justify transitioning from simply being business incubators to becoming formal financial intermediaries. Institutional investors and banking practitioners will be able to utilise this validated framework to identify and assess potential risk mitigation opportunities related to affiliation with an innovation hub. Therefore, the latter group may also be able to develop credible proxy indicators for measuring the operational resiliency and creditworthiness of affiliated startups.

Finally, for youth-led startups and entrepreneurs, this study demystifies how to access funding sources. The study demonstrates how strategically partnering with innovation hubs while implementing ESG principles can directly alleviate capital constraints facing startups and ultimately contribute to enhanced long-term survivability.

1.9 ORGANISATION OF STUDY

The study was organised into five main chapters. Chapter one provides a general introduction to the study, including background information on the problem, a statement of the problem, the aim and objectives, research questions, delimitations and limitations, the significance of the study, the scope, and the organisation of the study. Chapter Two presents a conceptual and theoretical review of the subject matter, examining relevant concepts and theories related to innovation hubs and entrepreneurship. Chapter Three discusses the methodology and specific methods chosen to guide the study. The methodology section presents the research design, research strategy, sampling procedures, instrumentation, data collection, and procedures for data analysis and presentation. Chapter Four offers data analysis and discussion aligned with each objective. Chapter Five

provides a summary of findings, draws conclusions, and offers recommendations for future research.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This section examines the theoretical foundations of sustainable finance and illustrates its integration into entrepreneurial ecosystems through various conceptual frameworks. It discusses the priority theory, resource theory, peer emulation theory, life span theory, positive signalling theory, and system disruption theory of sustainable finance. The various theories collectively provide insights into the mechanisms and strategies that support sustainable finance and promote innovation and entrepreneurship. The mutually beneficial relationship between innovation hubs and sustainable finance is analysed, with a focus on their transformative effects on Ghana's entrepreneurial landscape and their broader importance for emerging economies.

A critical review of the literature synthesises existing knowledge on the subject to ensure that the research is well-grounded in academic discourse. This review provides the foundation for addressing the research questions and guides the methodological approach. The discussion begins by emphasising how startups are vital drivers of innovation, economic growth, and employment creation. In developing economies like Ghana, startups can tackle some socio-economic challenges through the introduction of innovative solutions. However, their success and survival often depend on access to key resources that support sustainable finance and ecosystems, which are also the focus of this study. Another significant focus is the role of innovation hubs in fostering entrepreneurship. Innovation hubs act as incubators for creativity, collaboration, and capacity-building, offering tools, networks, and resources that enable entrepreneurs to take an idea from

conception to a viable business. These hubs create an enabling environment where startups can thrive by facilitating access to finance, mentorship, and technological infrastructure.

Particular emphasis is placed on the connection between innovation hubs and sustainable finance in highlighting their combined impact on Ghana's entrepreneurial ecosystem. Sustainable finance encompasses long-term economic, social, and environmental sustainability, which is essential for scaling operations, fostering innovation, and achieving financial resilience among startups. Theories of sustainable finance illustrate how financial systems can support startups with regard to sustainability. For example, priority theory focuses on allocating resources to sectors with high sustainable impact, while positive signalling theory demonstrates how sustainable finance attracts investors and builds credibility for startups. This also involves discussing the challenges faced by startups in emerging economies, including financial access barriers, inadequate infrastructure, regulatory barriers, and skill gaps.

Innovation hubs and sustainable finance are seen as solutions to these issues and as ways to enhance entrepreneurial capacity and resilience. This section establishes the theoretical and conceptual foundation for the study’s exploration of sustainable finance theories and their relevance to startups and innovation hubs. It demonstrates how integrating sustainable finance with innovation hubs could drive entrepreneurial success, particularly in emerging economies such as Ghana. The chapter synthesises existing knowledge on the subject, identifying critical gaps and opportunities that pave the way for deeper exploration of the research questions and methodologies in subsequent sections. This contributes to the ongoing discourse on sustainable finance, innovation hubs, and startup entrepreneurship.

2.1 THEORETICAL FRAMEWORK

2.1.1 Priority Theory of Sustainable Finance

According to Wilson (2010:267–280), the priority of the sustainable finance agenda is reflected in the extent to which economic agents in a specific country or region work towards achieving sustainable finance goals. Three factors can be used to evaluate this priority: (i) the coordinated, autonomous, and cooperative efforts made by economic actors to meet sustainable finance goals; (ii) the speed with which agreements are reached; and (iii) the promptness with which these objectives are implemented (Atiase et al., 2020:161). Economic agents, such as government agencies, financial institutions, and innovation hubs, have varying priorities, which might be ranked from least to most significant (Jiménez and Zheng, 2021:163–176). The order in which these agents prioritise sustainable finance goals demonstrates the emphasis they place on sustainable finance (Wilson, 2010:267–280). These goals may shift over time in response to changing national and global conditions (Awad, 2019:1-7). If these economic agents focus on sustainable finance, significant effort will be devoted to meeting these objectives (Kuhn, 2022:497–524).

In contrast, if sustainable financing is not prioritised, these agents are likely to exert less effort to achieve these goals during that period (Krauss et al., 2016:55-66). For example, financial institutions can show their commitment to sustainable finance by integrating sustainable financing principles into their core business models, making sustainability a fundamental guiding principle for their operations (Cunha et al., 2021:3821–3838; Setyowati, 2023:108–121). Prioritising sustainable finance goals has implications because it may lead to the neglect of other key objectives (Setyowati, 2023:108–121). This trade-off can be costly and may lead to rejecting the idea of

prioritising sustainable finance over other vital goals (Isenberg, 2010:40–50). For instance, developing nations with urgent needs for economic growth, such as raising GDP per capita, may not prioritise sustainable financing because they view it as a secondary economic requirement (Acs & Audretsch, 2010:1–19).

Innovation hubs are essential to the sustainable financing of businesses in Ghana (Clarysse et al., 2014:1164–1176). These hubs function as economic actors by promoting collaboration and providing resources to businesses, enabling them to adopt sustainable practices in their models (Sarasvathy, 2001:243). Prioritising sustainable finance enables innovation hubs to embed sustainability as a key part of startup development, aligning with the priority theory of sustainable finance (Krauss et al., 2016:55-66). This demonstrates the importance of innovation hubs in pushing sustainable finance forward and supporting broader economic and environmental goals (Atiase et al., 2020:161). The priority theory of sustainable finance suggests that the significance of other goals is shaped by the priority assigned to sustainable finance goals at the time of prioritisation.

Innovation hubs in Ghana can significantly support the long-term development of startups by prioritising sustainable funding, ensuring that economic growth aligns with environmental sustainability (Krauss et al., 2016:55-66). To further understand the role of innovation hubs, their collaborative nature is essential. Innovation hubs act as platforms for knowledge exchange, resource sharing, and the development of innovative solutions that incorporate sustainability into business practices (Clarysse et al., 2014:1164–1176). By fostering an environment conducive to collaboration, these hubs bridge the gap between traditional economic objectives and sustainable

finance goals. For example, they provide startups with access to funding mechanisms that emphasise sustainability, such as green bonds or impact investments. These mechanisms not only address environmental issues but also generate long-term value for businesses and communities (Setyowati, 2023:108–121).

The integration of sustainable finance principles into startup ecosystems in Ghana demonstrates how innovation hubs contribute to broader sustainable development goals. By aligning their activities with the priority theory of sustainable finance, these hubs allow startups to incorporate sustainability into their operational frameworks from the beginning (Hackett & Dilts, 2004:55–82). This approach ensures that sustainability becomes a fundamental value rather than an afterthought, thereby strengthening the resilience and competitiveness of these businesses in global markets (Kuhn, 2022:497–524).

Furthermore, the role of government agencies in supporting innovation hubs cannot be ignored. Policies and regulatory frameworks that encourage sustainable finance initiatives are essential for the success of these hubs. For instance, tax incentives for businesses adopting green technologies or subsidies for renewable energy projects can motivate startups to prioritise sustainability (Schaltegger & Wagner, 2011:222–237).

Additionally, public-private partnerships can enhance the impact of innovation hubs by pooling resources and expertise to promote sustainable development (Ozili, 2021:1–7). The collaboration between financial institutions and innovation hubs is another vital element in advancing the sustainable finance agenda. Financial institutions can offer customised financial products and

services that meet the specific needs of sustainability-focused startups. For example, providing low-interest loans for renewable energy projects or grants for research and development in green technologies can boost innovation and economic growth (Cunha et al., 2021:3821-3838). This partnership highlights the interconnectedness of economic agents in reaching sustainable finance goals (Wilson, 2010:267–280).

The dynamic nature of sustainable finance priorities demands continuous adaptation to changing global and local contexts. For instance, the growing urgency to address climate change has increased the significance of sustainable finance in many regions. This shift requires economic agents, including innovation hubs, financial institutions, and government agencies, to stay flexible in their strategies and actions. Doing so enables them to effectively respond to emerging challenges and opportunities, ensuring that sustainable finance remains a key focus (Krauss et al., 2016:55-66).

2.1.2 Peer Emulation and Positive Signalling Theory

To understand the mechanisms through which innovation hubs and startups gain access to resources, we need to combine the two theoretical approaches of Peer Emulation and Positive Signaling. Peer Emulation explains how actors in an economy, when faced with competition, mimic or copy the success of their peers' sustainability initiatives as a way to stay competitive (Cowett, 2008:9), while Positive Signalling Theory explains how actors deliberately project outwardly (in order to decrease the degree of uncertainty associated with asymmetric information) the characteristics of quality that make them credible to others (Quatrini, 2021:101-240). Therefore,

both theories represent the same general process by which actors acquire resources based on their reputation and image. For example, innovation hubs can be considered as centres of activity for this double action. That is, if a major hub in Ghana succeeds in integrating green financing options into its operational activities, not only does it signal its commitment to global environmental, social and governance (ESG) standards to foreign investors; but at the same time, it provides a reference point for other smaller hub organisations and startup businesses in Ghana who will attempt to replicate its structure and operational model as a means of establishing themselves credibly. Instead of viewing these ideas as separate entities, this study considers them as part of one coherent theoretical perspective whereby internal emulations of good practice are complemented by external signalling of such practice in acquiring sustainable financial sources.

The impact of peer emulation is particularly significant in the context of innovation hubs. These hubs often act as pioneers in adopting and implementing sustainable finance solutions. By showcasing the viability and benefits of sustainable practices, they inspire other hubs and startups to adopt similar approaches. This creates a ripple effect, where the adoption of sustainable finance practices spreads across the entrepreneurial landscape. For example, a hub that successfully integrates green technologies into its business model can serve as a benchmark for others, demonstrating the practical and economic benefits of sustainability (Ditlev-Simonsen & Midttun, 2011:25–38).

Ghana's innovation hubs have the potential to play a crucial role in creating benchmarks for sustainable finance. By implementing and advocating sustainable finance solutions, these hubs not

only help their own companies but also encourage other hubs and startups to integrate sustainability into their business models (Aldianto et al., 2021:13). This leadership role positions innovation hubs as catalysts for change, driving the adoption of sustainable practices across the entrepreneurial ecosystem. Peer emulation in this context has the potential to result in a more cohesive and robust national approach to sustainable finance. This, in turn, creates an environment in which environmental sustainability objectives are balanced with economic growth (Cowett, 2008:9; Ditlev-Simonsen & Midttun, 2011:25–38).

The effectiveness of peer emulation in promoting sustainable finance is further strengthened by the social and economic interconnectedness of innovation hubs (Hackett & Dilts, 2004:55–82). These hubs often collaborate with a wide range of stakeholders, including government agencies, financial institutions, and other startups. This interconnectedness facilitates the sharing of knowledge, resources, and best practices, making it easier for sustainable finance strategies to be adopted and adapted across different contexts (Sarasvathy, 2001:243). For instance, when a leading innovation hub demonstrates the profitability of sustainable practices, it provides a compelling case for other hubs to follow. This not only accelerates the adoption of sustainable finance but also enhances the overall competitiveness and resilience of the entrepreneurial ecosystem (Aldianto et al., 2021:13).

Furthermore, the influence of peer emulation goes beyond the immediate entrepreneurial ecosystem. Governments and financial institutions also have a significant role in shaping the landscape of sustainable finance. When these entities observe successful examples of sustainable finance practices within innovation hubs, they are more inclined to support and incentivise similar

initiatives. For example, a government that recognises the positive impact of sustainable finance on economic growth and environmental sustainability may introduce policies or subsidies to promote wider adoption (Clarysse et al., 2014:1164–1176).

Similarly, financial institutions may develop customised products and services, such as green loans or impact investments, to support startups and hubs that prioritise sustainability (Isenberg, 2010:40–50). The long-term benefits of peer emulation in sustainable finance are substantial. By creating a culture of sustainability within the entrepreneurial ecosystem, innovation hubs and their peers contribute to the development of a more resilient and inclusive economy. This culture not only addresses immediate environmental and economic challenges but also positions Ghana's entrepreneurial sector as a leader in sustainable development (Hackett & Dilts, 2004:55–82). The collective impact of peer emulation ensures that sustainable finance becomes an integral part of the business landscape, fostering innovation and growth while addressing critical sustainability issues (Aldianto et al., 2021:13).

However, it is important to recognise that peer emulation presents its own challenges. The success of this method relies on having accurate and reliable benchmarks and the willingness of economic agents to adapt and innovate. In some instances, blindly copying without considering local contexts and conditions could lead to less favourable results. Therefore, innovation hubs and their peers should approach emulation thoughtfully, making sure that sustainable finance practices are customised to their particular needs and circumstances (Acs & Audretsch, 2010:1–19).

Despite the limitations above, the peer emulation theory of sustainable finance emphasises the importance of adopting and replicating successful practices to achieve sustainability goals. In Ghana, innovation hubs act as key catalysts in this process, establishing benchmarks and motivating others to follow their example. By fostering a culture of peer emulation, these hubs help create a more unified and effective national approach to sustainable finance. The ripple effects of their activities reach beyond the entrepreneurial ecosystem, influencing government policies and financial institutions (Krauss et al., 2016:55-66). Consequently, peer emulation becomes a powerful tool for advancing sustainable finance, balancing environmental aims with economic growth, and fostering a more resilient and inclusive economy.

2.1.3 The Life Span Theory of Sustainable Finance

The lifespan theory of sustainable finance, based on Vernon's product cycle hypothesis, asserts that the duration of sustainable finance instruments, programmes, policies, or activities significantly influences consumer and stakeholder interest in sustainable finance (Vernon, 1979:41). According to this theory, knowledgeable economic actors recognise that sustainable finance products undergo a life cycle consisting of four stages: introduction, growth, maturity, and decline (Cunha et al., 2021:3821–3838). This understanding enables them to predict the likely life cycle of a specific sustainable finance product and to make informed decisions about their level of engagement, whether short-term, long-term, or none at all (Hackett & Dilts, 2004:55–82). The stages within the life cycle are essential in shaping the behaviour of economic actors towards sustainable finance products.

During the introduction phase, a product is often characterised by high costs and uncertain benefits. As the product gains traction and enters the growth phase, its advantages become more evident, leading to increased adoption and investment. Widespread acceptance and stable demand characterise maturity, whereas the decline phase involves a reduction in interest as newer products or innovations emerge (Vernon, 1979:41). By understanding these dynamics, economic actors can strategically align their resources and priorities with the anticipated trajectory of sustainable finance products.

Innovation hubs, as key players in the entrepreneurial ecosystem, are significantly influenced by the life span theory of sustainable finance. The extent to which these hubs embrace sustainable finance depends on their perception of the longevity and potential of specific sustainable finance products (Acs & Audretsch, 2010:1–19). If innovation hubs believe that a product is likely to have a short lifespan or limited impact, they may reduce their support or commit only in the short term.

Conversely, if they perceive a product as having long-term viability and the potential to replace traditional funding models, they are more inclined to extend their support and make lasting commitments (Vernon, 1979:41). The role of innovation hubs in encouraging and supporting sustainable finance products is vital, especially within Ghana's entrepreneurial landscape. These hubs serve as intermediaries, connecting startups with sustainable finance opportunities. By endorsing products they believe will have a lasting impact, innovation hubs help create a stable environment for sustainable financing. This stability guarantees that entrepreneurs receive the necessary support to sustain growth and remain viable (Acs & Audretsch, 2010:1–19).

The ability of innovation hubs to assess the lifespan of sustainable finance products also affects their strategic decision-making. For instance, hubs that anticipate the long-term benefits of green bonds or impact investments are more likely to integrate these instruments into their operations. By doing so, they not only enhance their sustainability credentials but also encourage startups to adopt similar practices. This alignment creates a ripple effect, fostering a culture of sustainability within the entrepreneurial ecosystem (Isenberg, 2010:40–50). A critical aspect of the life span theory is its emphasis on adaptability. Economic actors, including innovation hubs, must remain flexible in their approach to sustainable finance, continuously monitoring the evolving product landscape and trends. This adaptability allows them to shift their focus and resources to emerging opportunities with greater long-term potential. For example, as renewable energy technologies become more cost-effective and accessible, innovation hubs can pivot their support toward startups in this sector, recognizing the enduring value of these solutions (Acs & Audretsch, 2010:1–19).

Furthermore, the life span theory emphasises the significance of collaboration among economic actors. Innovation hubs, financial institutions, and government agencies can work together to prolong the life cycle of sustainable finance products through coordinated efforts. Initiatives such as public-private partnerships, subsidies for sustainable projects, and targeted awareness campaigns can help sustain interest and investment in these products during their maturity phase, delaying or reducing the decline phase. This collaborative approach not only boosts the longevity of sustainable finance products but also reinforces the overall ecosystem supporting sustainable development (Isenberg, 2010:40–50).

In the Ghanaian context, the life span theory provides valuable insights into how innovation hubs can more effectively manage the transition from traditional to sustainable funding. By

understanding the life cycles of different sustainable finance products, these hubs can strategically prioritise solutions that align with long-term economic and environmental goals. For instance, innovation hubs might focus on promoting circular-economy initiatives or sustainable supply-chain solutions, recognising their potential for sustained impact and growth. This strategic focus ensures that resources are directed toward initiatives with the highest likelihood of success and longevity (Acs & Audretsch, 2010:1–19).

The application of the life span theory also emphasises the importance of innovation hubs to invest in capacity building and knowledge sharing. By equipping entrepreneurs with the skills and knowledge necessary to navigate the complexities of sustainable finance, these hubs enhance startups' resilience and competitiveness. Training programmes, workshops, and mentorship opportunities can empower entrepreneurs to utilise sustainable finance products effectively, maximising their potential throughout their life cycles (Isenberg, 2010:40–50).

2.1.4 The System Disruption Theory of Sustainable Finance

The system disruption theory of sustainable finance, as proposed by Burt (2007:731–749), examines the upheavals that can occur in traditional financial systems and downstream firms when pursuing sustainable finance goals. This theory suggests that the extent of such disruptions can provoke resistance from affected stakeholders, including countries, financial institutions, and the wider public. The resistance often arises from concerns about potential losses in business operations, income streams, or livelihoods.

According to Burt (2007:731–749), the decision of economic agents such as governments, innovation hubs, and financial institutions to support or resist the transition to sustainable finance, it largely depends on their assessment of the trade-offs between the benefits and costs associated with the disruption. The theory emphasises that system disruption is an unavoidable part of the transition to sustainable finance. As financial institutions and businesses are compelled to align their operations with sustainability objectives, traditional practices may become obsolete, resulting in significant structural changes. For example, firms heavily reliant on fossil-fuel investments may experience reduced profitability as the financial system shifts toward renewable energy projects and environmentally friendly practices. These disruptions can create a ripple effect, affecting not only the primary stakeholders but also downstream industries that depend on traditional financial flows (Morgeson et al., 2015: 515–537).

In the context of Ghana, the system disruption theory underscores the importance for innovation hubs to carefully manage the shift towards sustainable finance to minimise adverse effects. Innovation hubs can play a vital role by providing businesses with comprehensive insights into the transition process. For example, they can offer detailed information about which systems are likely to be phased out, the nature of potential disruptions, and the new structures or frameworks that will replace traditional practices. This level of transparency can assist startups and other economic actors in making informed decisions regarding their involvement in sustainable finance initiatives (Clarysse et al., 2014:1164–1176).

Furthermore, innovation hubs can serve as intermediaries, facilitating smoother transitions by encouraging collaboration among stakeholders. By uniting financial institutions, government

agencies, and startups, hubs can establish a platform for dialogue and shared understanding. This collaboration can foster the development of strategies that consider the interests of all parties, thereby reducing opposition to sustainable finance initiatives. For example, innovation hubs can advocate for policies that incentivise businesses to adopt sustainable practices while providing safety nets for those adversely affected by the transition (Isenberg, 2010:40–50).

Providing support and compensation to individuals and organisations adversely affected by the shift is another crucial role that innovation hubs can undertake. This support can take various forms, such as retraining programmes for workers displaced by changes in industry practices or financial assistance for firms adapting to new regulatory frameworks. By addressing the immediate needs of those affected, innovation hubs can reduce opposition and foster goodwill towards sustainable finance initiatives Burt (2007:731–749). This approach ensures that the transition is not only fair but also more likely to gain widespread acceptance.

Communication is a vital element for effectively managing system disruption. Innovation hubs can act as channels for disseminating accurate and persuasive information about the long-term advantages of sustainable finance. These advantages include improved environmental sustainability, better social outcomes, and strengthened economic resilience. By presenting sustainable finance as a means to reach these broader objectives, innovation hubs can assist stakeholders to recognise that the perceived costs and disruptions are outweighed by the potential benefits. This understanding is essential for gaining public support and reducing opposition from entrenched interests (Burt, 2007:731–749).

The theory also emphasises the importance of phased implementation to lessen the severity of disruptions. Innovation hubs in Ghana can advocate for gradual transitions, giving stakeholders ample time to adapt to new practices and systems. For example, instead of enforcing a sudden shift from traditional to green bonds, hubs can adopt hybrid models that integrate conventional and sustainable financial instruments in the early stages of the transition. This phased approach can reduce the burden on affected parties and offer a clear pathway for achieving sustainability objectives (Burt, 2007:731–749).

In addition to managing disruptions, innovation hubs can leverage the transition to sustainable finance as an opportunity for innovation and growth. By encouraging startups to develop solutions that tackle challenges related to the transition, hubs can position Ghana's entrepreneurial ecosystem as a leader in sustainable innovation. For instance, startups working on renewable energy technologies, sustainable agriculture, or waste management can benefit from the growing focus on sustainability, creating new markets and boosting economic growth (Morgeson et al., 2015: 515–537).

Furthermore, innovation hubs can play a proactive role in shaping the regulatory environment to promote sustainable finance. By working closely with policymakers, hubs can advocate for regulations that incentivise sustainable practices while reducing unnecessary burdens on businesses. This collaboration helps create a supportive ecosystem that balances economic growth with environmental and social objectives. For instance, tax incentives for renewable energy projects or subsidies for green technologies can boost participation in sustainable finance initiatives (Morgeson et al., 2015:515–537).

2.1.5 Resource Theory of Sustainable Finance

The resource theory of sustainable finance suggests that differences in human-made resources across countries significantly affect their capacity to achieve sustainable finance goals. According to Foa and Foa (2012:15–32), nations with better infrastructure, technology, and institutional frameworks have a comparative advantage, enabling them to transition to sustainable finance more effectively. This theory highlights the uneven progress worldwide towards sustainable finance, linking disparities to differences in the availability and quality of human-made resources. Countries with abundant resources are better equipped to implement sustainable finance initiatives and meet related objectives, whereas resource-scarce nations face substantial hurdles in achieving these targets (Thavorn et al., 2020:450–463).

For Ghana, the resource theory emphasises the importance of utilising existing human-made resources to advance sustainable finance initiatives. Despite its commitment to sustainable finance through measures such as the establishment of the Green Climate Fund and the enactment of legislation to promote green investments, Ghana continues to face significant obstacles. Limited infrastructure, inadequate technology, and insufficient institutional capacity hinder the country's progress towards achieving sustainable finance objectives. These challenges emphasise the vital role of innovation hubs and other economic agents in addressing resource gaps and promoting sustainable development (Cremasco & Boni, 2024:1018–1036).

Innovation hubs in Ghana have emerged as pivotal actors in closing the resource gap and promoting sustainable finance. These hubs serve as platforms for entrepreneurship and innovation, providing businesses with the resources necessary for long-term growth. With capital, mentorship,

and networking opportunities, innovation hubs help startups and enterprises to develop and apply sustainable business models. For instance, by promoting innovation in renewable energy, sustainable agriculture, and waste management, these hubs help address urgent environmental challenges while driving economic growth (Friederici, 2019:9–28).

One of Ghana's innovation hubs' key strengths is their ability to maximise the utility of existing resources. By identifying and leveraging local strengths, these hubs can support businesses in creating value from limited resources. For example, startups focused on clean energy solutions can utilise Ghana's abundant solar energy potential to develop affordable, sustainable energy products. Similarly, innovation hubs can promote the adoption of sustainable practices in traditional industries, such as agriculture and mining, by introducing resource-efficient technologies and methods. These efforts align with the resource theory's emphasis on the strategic utilisation of resources to achieve sustainable finance goals (Foa et al., 1993:15–32).

Moreover, innovation hubs play a vital role in attracting external resources to support sustainable finance initiatives. By fostering partnerships with international organisations, development agencies, and impact investors, these hubs can secure funding and technical expertise for green projects. For example, collaboration with global institutions like the United Nations Development Programme (UNDP) and the African Development Bank (AfDB) can provide Ghanaian businesses with access to financial and technical support for sustainable ventures. These partnerships not only enhance the capacity of innovation hubs but also contribute to building a stronger ecosystem for sustainable finance in Ghana (Darko, 2022:12013).

The resource theory also highlights the potential for progress through regional and international cooperation. By participating in global sustainability networks, Ghana can gain insights into best practices and innovative approaches to sustainable finance. For instance, learning from the experiences of resource-rich countries that have successfully shifted to sustainable finance can offer valuable guidance for Ghana's efforts. Innovation hubs can serve as conduits for knowledge transfer, sharing insights and expertise gained through international partnerships with local businesses and startups. This exchange of knowledge can speed up Ghana's progress towards achieving sustainable finance goals and overcoming resource-related challenges (Konsek-Ciechońska, 2019:30).

While the resource theory acknowledges the challenges faced by resource-constrained countries, it also highlights the potential for progress through strategic resource management. Ghana's innovation hubs exemplify this principle by showing how resourcefulness and ingenuity can drive sustainable development. By focusing on capacity building, resource optimisation, and strategic partnerships, these hubs help create a more inclusive and sustainable economic landscape. For instance, training programmes and workshops offered by innovation hubs equip entrepreneurs with the skills and knowledge needed to navigate the complexities of sustainable finance, empowering them to build resilient and environmentally responsible businesses (Foa et al., 1993:15–32).

Moreover, resource theory emphasises the need to create an enabling environment for sustainable finance. In Ghana, this involves tackling systemic barriers such as regulatory obstacles, limited access to credit, and inadequate infrastructure. By advocating for policy reform and fostering collaboration among stakeholders, innovation hubs can help establish a more favourable

environment for sustainable finance. For instance, initiatives that streamline regulatory procedures and improve access to green financing can greatly enhance businesses' capacity to adopt sustainable practices. These efforts support the broader aim of achieving sustainable development through the efficient and fair utilisation of resources (Darko, 2022:12013).

2.1.6 Theoretical Synthesis and Application to Ghanaian Innovation Hubs

The application of a single theoretical model to examine the process of startup growth will typically fail to adequately portray the complex and ever-changing roles of innovation centres as incubators of sustainable finance. While each model has its own specific advantages and disadvantages, integrating multiple models theoretically represents the only viable means of obtaining comprehensive insight into the processes involved in sustainable finance.

For instance, although the resource-based view (Foa & Foa, 2012: 15-32) is well-suited for illustrating the manner in which a firm develops and sustains important capital internally, it is inadequate to allow consideration of external market pressure. On the other hand, signalling theory (Quatrini, 2021: 101-240) and peer emulation theory (Cowett, 2008: 9) are better suited to explain how stakeholders view a startup's competitive position. Therefore, it is only when we combine priority theory and resource theory with both the signalling and peer emulation theories that we can achieve a complete comprehension of how startups allocate and strategically utilise the severely restricted resources present in the Ghanaian economy. This synthesised framework illustrates how being affiliated with an innovation centre presents a startup with the opportunity to provide potential investors with credible evidence of its capability to perform, thereby enabling them to obtain financing.

While the above theories explain resource utilisation and market signalling, they do not explain how organisations may endure the adverse effects of external environmental shock over time. In order to address this issue, we have combined life cycle theory (Vernon, 1979: 41) and disruption theory (Burt, 2007: 731-49) to illustrate the degree of temporal resiliency and flexibility required by organisations in order to successfully navigate the transition from traditional business practices to sustainable business practices. Finally, priority theory (Wilson, 2010: 267-80) serves as the analytical tool used to assess how startup managers balance competing demands from various stakeholders.

Together, the synthesised frameworks form a strong, multidisciplinary theoretical base (see Figure 2.1 below). These frameworks demonstrate that innovation centres represent more than simply physical meeting locations for entrepreneurs; rather, they represent socio-economic institutions that serve as an intermediary buffer protecting young firms from environmental shocks in addition to serving as a structure for facilitating access to funding for sustainable development.

2.2 CONCEPTUAL FRAMEWORK

In Ghana, innovation hubs act as vital enablers of long-term financing for startup entrepreneurs. These hubs are characterised by vibrant, collaborative cultures that make them key drivers of growth and financial sustainability within the entrepreneurial ecosystem. By fostering innovation, offering essential resources, and building networks, these hubs create an environment conducive to startups thriving and aligning their operations with long-term development goals (Etzkowitz, 2002:12). One of the main roles of innovation hubs is to improve access to funding for startups. In

Ghana, startups often encounter difficulties in securing finance due to limited access to traditional credit facilities and venture capital.

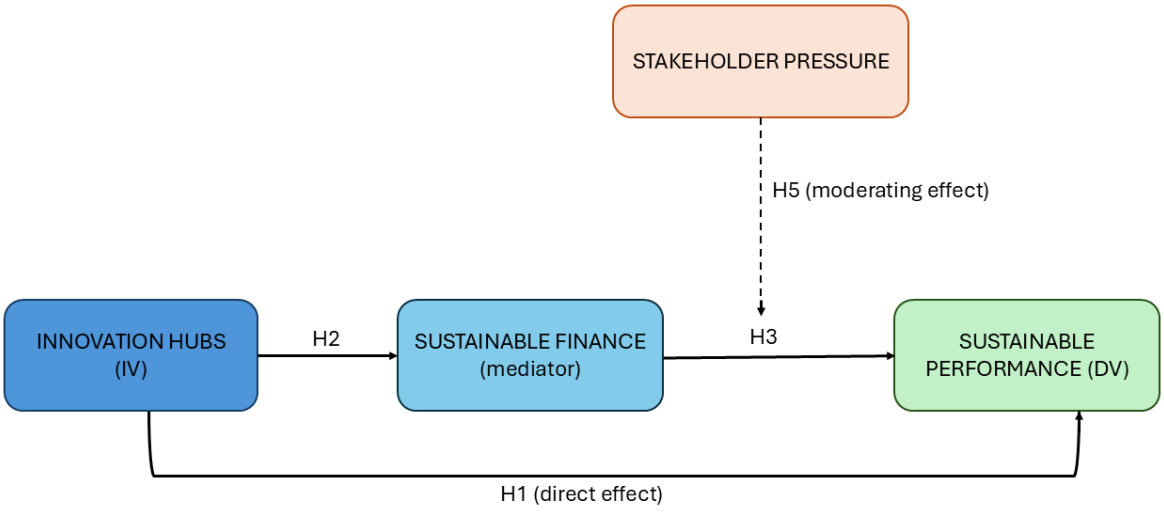
Innovation hubs bridge this gap by connecting entrepreneurs with financiers such as angel investors, venture capitalists, and impact investors who are willing to fund innovative and sustainable business ideas. These hubs serve as intermediaries, ensuring that startups receive the financial support they need to grow and scale. For example, innovation hubs often host pitching events and investor meetups, providing startups with platforms to showcase their ideas and attract funding. This proactive approach greatly enhances the chances of startups accessing long-term financing (Isenberg, 2010:40–50).

Beyond facilitating direct access to capital, innovation hubs offer an array of essential support mechanisms, including physical resources, strategic mentorship, and networking opportunities (the operational specifics of which are comprehensively detailed later in Section 2.2.6).

For example, partnerships with established businesses can provide startups with access to supply chains, distribution networks, and customer bases, thereby enhancing their scalability and market reach.

Furthermore, collaboration with policymakers can assist startups in navigating regulatory frameworks and accessing government support programmes, further strengthening their

sustainability (Etzkowitz, 2002:12). In the context of long-term development goals, innovation hubs play a strategic role in fostering alignment between entrepreneurial activities and national priorities. By supporting startups that tackle critical issues such as renewable energy, waste management, and food security, innovation hubs contribute to Ghana's sustainable development agenda. These hubs encourage startups to incorporate sustainability into their business models, ensuring their operations have positive environmental and societal impacts. For instance, innovation hubs may prioritise support for startups developing clean energy solutions, thereby aligning with Ghana's commitment to reducing greenhouse gas emissions and promoting renewable energy adoption. This alignment not only enhances the relevance of startups within the national context but also attracts funding from international development agencies and impact investors (Isenberg, 2010:40–50).



Source: Author's Construct (2025)

Figure 2.1: Conceptual Framework

*(**Note**: H1, H2, H3, and H5 represent direct and moderating path effects. H4 represents the indirect mediation hypothesis, which is structurally modelled as the flow from Innovation Hubs through Sustainable Finance to Sustainability Performance**)***

Innovation hubs play a vital role in developing the entrepreneurial capacity necessary for long-term economic growth. By fostering a culture of innovation and entrepreneurship, these hubs cultivate a generation of entrepreneurs prepared to tackle complex challenges and to drive transformative change. Training programmes, workshops, and hackathons organised by innovation hubs provide entrepreneurs with opportunities to enhance their skills, test new ideas, and refine their solutions. These activities not only boost individual entrepreneurs' capabilities but also strengthen the overall dynamism of Ghana's entrepreneurial ecosystem (Etzkowitz, 2002:12).

The conceptual framework of innovation hubs in Ghana emphasises their multifaceted role in securing long-term financing for startup entrepreneurs. By improving access to funding, providing vital resources, offering mentorship, and fostering networks, these hubs tackle key barriers to startup growth and sustainability. Additionally, their alignment with national development goals underscores their strategic importance in advancing sustainable entrepreneurship and economic development. Through their dynamic and collaborative cultures, innovation hubs serve as catalysts for innovation and sustained financial viability, making them essential components of Ghana's entrepreneurial ecosystem.

Theoretical foundations and empirical evidence were synthesised into an overall conceptual framework for this study (see Figure 2.1). The study's proposed conceptual framework moves past fragmented frameworks that do not show explicit causal pathways between innovation hubs (independent variable) and sustainability performance (dependent variable), while also illustrating sustainable finance as a mediator and stakeholder pressure as a moderating factor across boundaries. Thus, this translates its research goals into testable structural relationships.In Ghana, the interaction between innovation hubs and sustainable finance for startup entrepreneurship is a symbiotic and transformative partnership that promotes the growth and viability of new companies while fostering financial sustainability within a dynamic ecosystem (Etzkowitz, 2002:12).

Innovation hubs, which serve as vibrant and collaborative spaces fostering entrepreneurial activities, are central to this connection (Etzkowitz, 2002:12). These hubs act as catalysts, providing essential resources, mentorship, networking opportunities, and infrastructure for startup growth. They stimulate creativity and collaboration across diverse entrepreneurial endeavours by creating an environment receptive to innovation (Isenberg, 2010:40–50).

Innovation hubs are vital in improving access to capital for Ghanaian startups. They bridge the gap between startups and potential sources of finance by establishing networks with various financiers, including angel investors, venture capitalists, and government grant programmes (Acs & Audretsch, 2010:1–19). They serve as mediators, connecting startups to funding sources that might otherwise be inaccessible, thereby facilitating the crucial financial support needed for growth and sustainability (Sarasvathy, 2001:243).

The presence of supportive mechanisms within these hubs further reinforces their effectiveness. Networking platforms and mentorship programmes offered by innovation hubs link startups with experienced entrepreneurs, investors, and industry experts (Sarasvathy, 2001:243). This fosters knowledge sharing, mentoring, and exposure to best practices in financial management and investment readiness, thereby enhancing startups' appeal to potential financiers.

Programmes and support services provided by innovation centres act as barriers while creating a nurturing environment that helps startups navigate the challenges of securing and managing funding (Hackett & Dilts, 2004:55–82). These services include capacity-building programmes, access to corporate development resources, and guidance on navigating regulatory frameworks, all of which help reduce the financial risks associated with new businesses. The connection between innovation centres and sustainable finance also involves aligning startup ambitions with long-term development goals (Sarasvathy, 2001:243).

Many innovation hubs focus on 'green finance' and social impact, encouraging startups to develop solutions aligned with the United Nations' Sustainable Development Goals (SDGs) (Schaltegger & Wagner, 2011:222–237). This collaboration not only attracts financiers interested in socially responsible investments but also helps address societal issues through entrepreneurial innovation (Girma Aragaw et al., 2025:1–37). Despite the positive aspects of this connection, challenges exist. Regulatory environments can hinder the ability of new businesses to access capital (Hackett & Dilts, 2004:55–82).

Furthermore, financiers' opinions and preparedness regarding specific sectors, including 'green finance,' may influence funding decisions (de Pádua Pieroni et al., 2018:799–804). Innovation hubs must also address infrastructural limitations and the limited awareness of sustainable finance principles among startups to optimise their impact. To tackle these challenges, innovation hubs in Ghana need to focus on building capacity for both startups and their operations. By fostering an environment that provides access to advanced tools and resources, innovation hubs can better support startup growth.

Additionally, collaborating with policymakers to establish a more supportive regulatory environment will ensure that financial mechanisms are accessible and meet entrepreneurial needs. Innovation hubs should also focus on awareness campaigns and training programmes to familiarise entrepreneurs with sustainable finance principles, thereby bridging knowledge gaps and enhancing their attractiveness to investors. These hubs serve as vital catalysts, creating an environment that not only nurtures entrepreneurial ventures but also improves access to capital and advances sustainable development goals in Ghana (Clarysse et al., 2014:1164–1176). The coordinated efforts of innovation hubs and startups form a landscape that drives financial sustainability, innovation, and positive societal impact, laying the foundation for Ghana's resilient entrepreneurial ecosystem.

The conceptual framework and research questions presented in this study are vital for understanding and promoting sustainable youth entrepreneurship in Ghana. Focusing on the contributions of innovation hubs to the success of youth startups, the influence of financial

difficulties on coping strategies, and the role of innovation hubs in advancing sustainable finance, this study aims to support the growth of Ghana's entrepreneurial ecosystem.

Further investigation of this conceptual framework highlights that collaboration between innovation hubs and sustainable finance must be adaptable and resilient. By utilising Ghana's distinctive entrepreneurial environment, these hubs can take the lead in devising innovative solutions to global challenges. This mutually beneficial relationship ensures that Ghana's entrepreneurial ecosystem continues to develop, achieving both financial growth and environmental sustainability goals. Ultimately, these efforts establish a foundation for a vibrant, inclusive, and sustainable future for Ghana's entrepreneurial landscape.

2.2.1 Startups as an Important Element in Entrepreneurship

Startups are essential to entrepreneurship and play a crucial role in tackling societal challenges through innovative solutions. The willingness to generate and implement new ideas to solve urgent problems and create value for society is vital for development (Thavorn et al., 2020:450–463). Startups exemplify this concept by turning novel ideas into practical business entities that satisfy market demands (Thavorn et al., 2020:450–463). These entities are often based on principles of risk-taking and responsibility, aiming to develop valuable goods and services that address specific societal needs (Bortolini et al., 2021:1765–1783).

Startups involve identifying untapped opportunities and thoroughly assessing their potential for growth and profitability (Aldianto, 2021:13). However, the rapid pace of technological progress and an increasingly competitive landscape have made establishing startups more challenging and

demanding (Ripsas et al., 2018:263–279). The lifecycle of organisations, including startups, typically progresses through four phases: startup, initial growth, maturity, and revival (Widarti et al., 2020:211). At the inception stage, startups endeavour to penetrate existing markets or create new ones by offering innovative products or services (Kanimozhi & Nandhana, 2022:1–6). This initial phase is crucial as it lays the foundation for the startup's operations and strategic direction. Startups are widely recognised as key drivers of economic growth, contributing significantly to job creation and economic development in various countries (Urbano et al., 2019:21–49). These new businesses foster innovation and generate employment opportunities, addressing critical socio-economic issues (Urbano et al., 2019:21–49).

A compelling illustration of startups' economic impact is their role in annual job creation. According to data from the U.S. Census Bureau and the Kauffman Foundation, startups account for a substantial share of new jobs each year. Without their contributions, employment growth rates would often be negative (Prohorovs et al., 2019:26–51). Startups' ability to generate employment highlights their significance in ensuring economic dynamism and resilience (Otchia, 2019:908). To better understand startups, Petrucci (2018:544–566) identified three critical stages in their development: the bootstrapping stage, the seed stage, and the creation stage. The bootstrapping stage marks the beginning of a startup's journey. During this phase, entrepreneurs focus on transforming an idea into a viable business model. This stage is characterised by high uncertainty and risk, compelling founders to rely heavily on personal resources to fund their ventures (Petrucci, 2018:544–566). Following the bootstrapping stage is the seed stage, during which the startup develops prototypes, builds a team, and enters the market.

Entrepreneurs often seek external funding during this phase to expand their operations and sustain growth (Secundo & Capaldo, 2020:55–69). Despite its significance, the seed stage is fraught with challenges, including high levels of uncertainty and difficulty in securing adequate capital (Tokarev, 2018:36–42). The final stage, the creation stage, indicates a startup's readiness to bring its products to market and grow its workforce. At this stage, corporate finance becomes the primary source of funding, and the startup transitions into a fully operational business entity (Molnár & Jáki, 2020: 64–76).

Despite the structured progression through these stages, many startups face significant challenges, with a large proportion failing within their first five years (Cantamessa et al., 2018:23-46). A key reason for this high failure rate is the lack of essential resources, especially financial capital. Startups often struggle to compete with established firms that dominate the market, making it difficult to gain traction and sustain operations (Cantamessa et al., 2018:23-46). Economic constraints are among the most urgent challenges for startups, heavily impacting their ability to implement plans and maintain operational stability (Konsek-Ciechońska, 2019:30). Cantamessa et al. (2018:23-46) emphasise that financial limitations affect startups at various stages, hindering their capacity to scale and expand. Without sufficient funding, startups risk stagnation or complete failure.

Another crucial challenge for startups is attracting and retaining suitable talent. The hiring process in a startup is often critical to its success, as recruiting the wrong individuals can hinder progress and cause operational inefficiencies (Boudlaie et al., 2022:21-43). Due to the competitive nature of the startup ecosystem, identifying candidates with the requisite skills, experience, and

commitment can be challenging. The lack of skilled personnel not only impacts daily operations but also weakens the startup's capacity to innovate and expand (Konsek-Ciechońska, 2019:30).

Furthermore, startups face challenges from environmental factors, including market trends and regulatory frameworks. Navigating these external influences requires startups to remain agile and adaptable, often necessitating strategic pivots to adapt to changing conditions (Konsek-Ciechońska, 2019:30). Limited access to support systems, such as mentorship and business development resources, further exacerbates these challenges, leaving startups vulnerable to market fluctuations and competitive pressure. Despite these obstacles, the entrepreneurial spirit and innovative potential of startups remain vital to economic progress. By addressing financial constraints, encouraging strategic hiring, and utilising external support systems, startups can overcome barriers to success and make meaningful contributions to societal development. With the right resources, mentorship, and infrastructure, startups can drive innovation, generate jobs, and strengthen economies worldwide.

2.2.2 Significance of Innovation Hubs in Entrepreneurship and Startups

In recent years, innovation hubs have gained widespread recognition for their ability to promote economic growth, create employment opportunities, and contribute to social progress (Jiménez & Zheng, 2021:163–176). These hubs are broadly regarded as crucial spaces for technological advancement, entrepreneurship, and creative problem-solving. They have become vital tools for driving innovation, especially in the era of digital transformation. They are considered essential to the ecosystem of entrepreneurship and to the success of startups.

An innovation hub is essentially a space that brings together individuals from diverse professional and technical backgrounds, often with a focus on entrepreneurship. Its purpose is to facilitate serendipitous encounters that might not have otherwise happened, enabling collaboration and the exchange of ideas (Jiménez & Zheng, 2021:163–176). These hubs are designed to act as melting pots for businesses, researchers, and other key stakeholders across disciplines to interact, share resources, and combine expertise for collective growth and problem-solving (Jimenez & Zheng, 2021). The main aim is to promote innovation, stimulate economic development, and tackle urgent societal challenges through a collaborative and supportive environment (Mwantimwa et al., 2021:39–63).

The structural flexibility of innovation hubs enables them to accommodate diverse types of organisations, such as laboratories, co-working spaces, business incubators, and accelerators (Buckley, 2020:16). This adaptability ensures that individuals with different technical skills, resources, and networks come together in a shared environment, fostering collaboration. Likewise, co-working spaces support social interactions and networking opportunities, which are vital for reducing professional isolation and promoting innovation (Schmitt & Muyoya, 2020:1858).

The importance of innovation hubs goes beyond their immediate benefits of collaboration and networking. They are regarded as essential tools for economic transformation, particularly in regions with untapped potential, such as Africa. According to Schmitt and Muyoya, (2020:1858), innovation hubs are vital for fostering networking, improving social interactions among professionals, and encouraging independence. They are deliberately designed to facilitate chance encounters that can be used to develop effective partnerships (Jakonen et al., 2017:235–242).

These hubs contribute not only to the growth of startups but also to wider economic and technological progress.

Africa, with its young population and emerging technological landscape, has been recognised as fertile ground for innovation hubs. The continent started seeing these hubs emerge around 2010, mostly funded by private sector actors and international organisations (Friederici, 2019:9–28). These hubs were designed as platforms to promote digital success, boosting Africa's technological growth and overall development (Jimenez & Zheng, 2021). They were also expected to help develop local networks, enable African stakeholders to join global alliances, and adopt best practices for managing innovation ecosystems (Jakonen et al., 2017:235–242). Innovation hubs have thus become key to Africa's pursuit of technological progress and economic transformation. They are viewed as tools for tackling the continent's development challenges through technology, innovation, and entrepreneurship.

Scholars such as Jiménez and Zheng (2021:163–176) argue that these hubs hold substantial promise for Africa, given its large and youthful population, which acts as a valuable resource for driving innovation and entrepreneurship. Through their activities, innovation hubs aim to create an enabling environment for startups, foster the commercialisation of innovative ideas, and promote knowledge sharing across sectors. Despite the optimism surrounding innovation hubs, there remains a lack of clear evidence that they have consistently achieved their intended outcomes, particularly in the African context (Mwantimwa et al., 2021:39–63). While these hubs have been instrumental in stimulating economic growth and fostering innovation in developed countries, their effectiveness in developing economies such as those in Africa remains a matter of debate. This

uncertainty has not diminished the belief in their potential, as they are widely regarded as vital components of the broader discourse on innovation for development (Mwantimwa et al., 2021:39–63).

The broader importance of innovation hubs lies in their capacity to tackle systemic challenges that impede entrepreneurship and startup development. Moreover, they play a crucial role in bridging the divide between the public and private sectors, encouraging collaborations that promote economic and social progress. For example, partnerships between governments, private investors, and innovation hubs have proven effective in addressing societal issues such as unemployment and limited access to technology.

Innovation hubs have become essential players in the global innovation landscape, particularly in nurturing entrepreneurship and startup growth. Their adaptable structures, focus on collaboration, and ability to unite diverse stakeholders position them uniquely to tackle complex problems and stimulate economic transformation. While their impact on Africa and other developing regions remains an ongoing area of study, their potential to foster innovation, economic development, and societal advancement cannot be overlooked. As nations and cities continue to invest in these hubs, it is vital to ensure that their activities align with broader developmental objectives, particularly in areas where their success is most required.

2.2.3 Importance of Sustainable Finance in Startups and Entrepreneurship

Sustainable finance has become a vital concept in the modern financial and business worlds. It is an evolving process that integrates environmental, social, and governance (ESG) considerations into financial and investment decisions, aiming to foster sustainability across all areas of economic

development (Ziolo et al., 2021:45–70). Although the concept itself is broad and does not have a universally agreed definition, it functions as a context through which governments, financial institutions, and international organisations align their economic activities with sustainable development goals (Kumar et al., 2025:6). Consequently, sustainable finance has developed into a diverse and evolving terminology, marked by different definitions and policy initiatives tailored to the specific contexts of various entities (Claringbould et al., 2019:11-27).

In the context of startups and entrepreneurship, sustainable finance plays a vital role in shaping the development of emerging businesses. Startups are often at the forefront of innovation, with the potential to stimulate economic growth and develop solutions to societal challenges. However, access to financial resources is a common barrier that hampers their ability to scale and make an impact. Sustainable finance provides an alternative route for these businesses by directing financial resources towards projects and ventures that emphasise environmental responsibility, social accountability, and ethical governance practices (Maltais & Nykvist, 2020:1–20). This integration of sustainability into finance offers startups not only the capital they require to grow but also the means to align their operations with global sustainability goals.

The environmental dimension of sustainable finance focuses on funding projects that contribute to the preservation and restoration of the environment (Ziolo et al., 2021:45–70). For start-ups and entrepreneurs, this could mean access to investments in renewable energy, clean technologies, and sustainable agricultural practices. For example, startups developing solar energy solutions or eco-friendly manufacturing techniques are often eligible for sustainable finance because their technologies align with environmental goals. Additionally, these funds frequently include

incentives, such as lower interest rates or grants, that enable entrepreneurs to focus on creating long-term value while minimising their ecological footprint. This approach not only benefits individual businesses but also contributes to addressing global challenges such as climate change and resource depletion (Cremasco & Boni, 2024:1018–1036).

Equally important is the social dimension of sustainable finance, which emphasises the social impact of financial activities (Ryszawska, 2016:185–194). For startups, this can involve investing in initiatives that promote education, healthcare, affordable housing, and community development. Socially responsible investors prioritise funding ventures that contribute to societal well-being and inclusivity. For example, a startup focusing on affordable healthcare solutions for underserved populations may attract investments from impact investors who seek both financial returns and positive societal outcomes. By channelling resources into projects that address social inequality and enhance human well-being, sustainable finance fosters an ecosystem where entrepreneurship can thrive while contributing to broader societal progress (Cremasco & Boni, 2024:1018–1036).

Governance considerations form the third pillar of sustainable finance. This aspect focuses on the ethical and transparent governance practices of companies seeking financial support (Migliorelli, 2021:975). Investors and financial institutions look for businesses with responsible corporate practices, accountability mechanisms, and a commitment to upholding human rights and fair labour standards (Pyka & Nocoń, 2021:34-99). For startups and entrepreneurs, adhering to strong governance principles can be a significant advantage in securing sustainable finance. Not only does it demonstrate their commitment to ethical business practices, but it also enhances their credibility and appeal to investors who value long-term stability and accountability.

Furthermore, good governance practices reduce risks and ensure that businesses operate in ways that benefit all stakeholders, including employees, customers, and the communities they serve. From an entrepreneurial perspective, sustainable finance offers several additional benefits. First, it provides access to a growing pool of capital from socially responsible investors who prioritise sustainability. These investors are increasingly seeking opportunities to finance businesses that align with their values, creating a favourable environment for startups with sustainable business models. Second, the focus on ESG factors allows entrepreneurs to stand out in competitive markets by demonstrating their commitment to sustainability. In an era where consumers and stakeholders are more aware of corporate responsibility, this can be a significant competitive advantage. Third, sustainable finance promotes innovation by encouraging the development of products and services that address urgent environmental and social challenges. For example, startups developing solutions for renewable energy storage or digital platforms for remote education can benefit from the growing demand for sustainable innovations.

Sustainable finance also plays a vital role in bridging the gap between public and private sector efforts. Governments and international organisations often work with private investors to develop funding mechanisms that support sustainable entrepreneurship. These partnerships enable startups to gain access not only to financial resources but also to technical expertise, mentorship, and market opportunities. For example, public-private partnerships in renewable energy projects have allowed startups to expand their operations and contribute to the global energy transition. Such collaborations demonstrate the importance of sustainable finance as a means of aligning diverse stakeholders towards common sustainability goals (Maltais & Nykvist, 2020:1–20).

Sustainable finance is a fundamental element of modern entrepreneurship and startup development, providing financial backing while advancing environmental, social, and governance (ESG) objectives. Its focus on aligning financial decisions with sustainability objectives ensures that startups can thrive in ways that benefit society and the environment. By directing investments into projects that prioritise environmental protection, social fairness, and ethical governance, sustainable finance fosters a supportive ecosystem for innovation and economic growth. As startups and entrepreneurs continue to tackle global challenges, the importance of sustainable finance will only increase, driving positive change and long-term impact.

2.2.4 The Challenges Facing Startup Entrepreneurship in Emerging Economies

Technology and innovation have become essential tools for entrepreneurs in the era of globalisation, enabling individuals to establish startups across various sectors worldwide (Khan et al., 2023:166–183). The technological revolution has opened up opportunities for entrepreneurs to leverage innovative solutions and develop businesses that fill market gaps. The rise of technology-driven startups has been particularly transformative, with entrepreneurs capitalising on the digital economy to disrupt traditional business models and introduce innovative products and services. Africa, like other regions globally, has experienced a surge in startup activity, with many enterprises emerging across the continent (Atiase et al., 2020:161).

Despite the immense contributions of startups to economic development, job creation, and technological advancement, the challenges they face are numerous and often insurmountable. Research indicates that a staggering percentage of startups fail within their initial years of operation.

Kariv (2022:9) reports that nearly 92% of startups encounter significant challenges in their first three years of operation, ultimately leading to closure. These challenges can be broadly categorised into internal and external factors, each playing a critical role in determining the success or failure of startups. Internal challenges, such as poor business models, incompetence in management, inadequate cash flow, and the inability to adapt to dynamic market conditions, are some of the leading causes of startup failures (Kariv, 2022:9).

In emerging economies, the startup ecosystem faces unique challenges that further complicate entrepreneurs' journeys. Developing nations, despite their potential for innovation and economic growth, often lack the structural and institutional support needed for startups to thrive. Soomro et al. (2021:1909–1918) identified funding shortages as the main reason why enterprises failed in Pakistan; however, Sivathanu and Pillai (2020:34–57) attributed the 90% failure rate of India's new ventures to technology-related issues. Both studies have a similar analytical flaw: they view these constraints separately from one another and consider them as inevitable, unchangeable factors. Descriptive methods were used in both studies, which did not provide a critical analysis of the structural ability of innovation hubs to reduce exactly the same financial and technological shocks that impede development. The purpose of this dissertation is to show that examining the level of failures of startups in developing countries will be an incomplete and over-deterministic empirical description if it does not account for the mediating function of sustainable financing facilitated by hubs. The global COVID-19 pandemic further exacerbated these issues, serving as a final blow for numerous startups in Pakistan and other emerging economies.

The dynamic nature of startups means that the challenges they face are varied and context-specific. While some challenges are unique to individual startups, others are more systemic and affect all startups operating within the same environment. One of the most significant and common challenges is the lack of financial resources. Access to funding remains a major obstacle for entrepreneurs in emerging economies, where financial institutions often impose stringent requirements that startups struggle to meet. In many cases, entrepreneurs lack the collateral or credit history needed to secure loans, leaving them with limited options for financing their businesses (Kariv, 2022:9). Soomro et al. (2021:1909–1918) emphasise that securing funding in developing countries is a challenge, which contributes to the high failure rate of startups in these regions. The issue of financing is further complicated by the absence of a mature venture capital ecosystem in many emerging economies.

Unlike developed countries, where venture capital and angel investors play a significant role in supporting startups, entrepreneurs in developing nations often find it difficult to secure funding from investors willing to take risks on early-stage businesses. This capital shortage hampers innovation and prevents startups from expanding or investing in research and development. Additionally, many startups in emerging economies rely heavily on personal savings or informal loans from family and friends, which are often insufficient to sustain their businesses over the long term. Beyond financial hurdles, startups in these regions face challenges in accessing technology and skilled labour. Infrastructure such as reliable internet access, digital tools, and advanced software is frequently lacking, making it difficult for startups to compete globally.

Moreover, the talent pool in emerging economies is often limited, with many skilled professionals migrating to developed countries in search of better opportunities. This "brain drain" leaves startups struggling to acquire the expertise needed to innovate and grow (Kuckertz et al., 2019:11-38). The regulatory environment in many emerging economies presents additional challenges for startups. Complex and bureaucratic procedures for business registration, taxation, and compliance create significant barriers for entrepreneurs. In some cases, unclear or inconsistent policies further complicate matters, leaving startups vulnerable to legal and financial risks.

Furthermore, corruption and lack of transparency in government institutions can discourage entrepreneurs from pursuing their ventures, as they often have to navigate a system that favours established businesses over newcomers. Market-related challenges are also common among startups in emerging economies. Many of these businesses operate in markets with low purchasing power, making it difficult to generate sustainable revenue.

Moreover, cultural and societal factors can influence consumer behaviour, with traditional preferences sometimes obstructing the adoption of innovative products and services. Entrepreneurs often need to dedicate significant time and resources to educating potential customers and establishing trust, which can be a formidable challenge for resource-limited startups. The effects of global events, such as the COVID-19 pandemic, have further exposed the vulnerabilities of startups in emerging economies. The pandemic disrupted supply chains, curtailed consumer spending, and generated economic uncertainty, all of which disproportionately impacted startups. Many entrepreneurs were compelled to shut down their businesses or pivot to entirely new models, often without sufficient resources or support.

This situation highlighted the importance of resilience and adaptability in the face of external shocks, which remain vital for the survival of startups in emerging economies (Soomro et al., 2021:1909–1918). Despite these obstacles, startups in emerging economies have shown remarkable resilience and ingenuity in navigating their environments. Some entrepreneurs have adopted innovative financing models, such as crowdfunding and microloans, to address funding challenges. Others have embraced digital tools and platforms to reach customers and streamline operations, leveraging technology to compensate for the lack of physical infrastructure.

Collaborative ecosystems, including incubators and accelerators, have also emerged in some regions, providing startups with mentorship, networking opportunities, and access to resources. Startups in emerging economies face numerous challenges, including financial constraints, technological barriers, and regulatory obstacles. These issues are exacerbated by systemic factors such as limited access to funding and skilled labour, as well as external shocks such as the COVID-19 pandemic. Nevertheless, the entrepreneurial spirit and resolve of these startups continue to propel innovation and economic growth within their regions. To overcome these challenges and foster a more supportive environment for startups, governments, financial institutions, and other stakeholders must collaborate to provide essential resources, infrastructure, and policy frameworks. In doing so, emerging economies can realise the full potential of their startup ecosystems and contribute to sustainable development worldwide.

2.2.5 Innovation Hubs and Sustainable Startups: An Empirical Overview

The number of innovation hubs has been rising dramatically around the world during the past few decades and has been recognised as an important part of the entrepreneurial ecosystem responsible for driving the startup boom globally. Jiménez & Zheng (2021:163–176) state that it is now commonplace to see innovation hubs proliferate all over the globe, and this trend represents a growing desire to leverage technology as a means to address economic and social challenges.

However, Adler et al. (2019:121–130) indicate that one reason for the high rates of failures among startup companies found globally is due to the fact that there is currently very little comprehensive research available today that identifies and describes the underlying factors that affect innovation hubs, how they function and how they interact and contribute to entrepreneurial ecosystems.

Although innovation hubs have emerged as a prominent component of entrepreneurial ecosystems at both national and international levels, the emergence of innovation hubs in various regions around the world has resulted in some regions exhibiting higher frequencies than others. The frequency of innovation hubs is particularly high across Africa, and Friederici (2019:9–28) indicates that innovation hubs have emerged as important contributors to promoting entrepreneurship and technological innovation across the African continent. Although the potential value of innovation hubs appears promising based on conceptual perspectives, contemporary empirical evidence supporting the degree to which innovation hubs actually provide positive impacts is highly debated—particularly when applied to Africa. For example, Mwantimwa et al. (2021:39–63) suggest that even though innovation hubs have rapidly proliferated, there is no clear indication that the proliferation of innovation hubs has led to a corresponding increase in

successful startups. However, a major limitation of Mwantimwa et al.'s analysis is their use of general startup survival rate data instead of using data that specifically identify and isolate the particular financial mechanisms that determine sustainable startup performance. While they appropriately illustrate a lack of direct empirical evidence indicating linkages between innovation hubs and sustained company growth, their omission of sustainable finance metrics from their analysis limits the conceptual completeness of their findings in determining whether ventures can achieve long-term viability. Furthermore, although Muathe et al. (2022:138–146) appropriately underscored the need for additional empirical analyses focusing on identifying mechanisms related to innovation hubs, their methodology assumes startup success as a singularly defined outcome. This study views the existing empirical knowledge as presently primitive, largely due to previous studies, including those conducted by Muathe et al. (2022), which primarily utilised qualitative assessments of social networks created by innovation hubs, while ignoring rigorous quantitative modelling used to assess how innovation hubs promote access to sustainable capital.

At the national level, Ghana has developed into a vibrant and thriving centre for innovation and entrepreneurship in Africa. The proliferation of innovation hubs across the country has played a major role in establishing Ghana's position as a dynamic centre for entrepreneurial activity in Africa (Dosso et al., 2021:174-178). While several well-established innovation centres, such as MEST and Impact Hub Accra, demonstrate their ability to generate new startups through incubation, there exists limited empirical evidence assessing the extent to which innovation hubs directly influence long-term financial sustainability outcomes in the local ecosystem. According to Girma Aragaw et al. (2025:1–37), while innovation hubs are generally recognised for their

potential in supporting entrepreneurship, relatively little information exists about how these types of organisations assist young entrepreneurs in Ghana to develop sustainable financial habits.

Upon conducting a critical review of this empirical literature base, two gaps exist. First, there is a conceptual gap characterised by a heavy reliance on paradigmatic frameworks that describe broad-based socio-economic impacts. Second, there is a methodological gap evident in the almost complete absence of quantitative structural models examining financial intermediaries. Until the mediational effects of sustainable finance are structurally modelled and until the moderating influences of stakeholder pressures are quantitatively assessed, speculation will continue to be present relative to what degree innovation hubs positively influence the long-term sustainability of startup ventures in developing countries, similar to Ghana. Using an exploratory sequential mixed-methods design, this study systematically fills this gap by advancing the field from descriptive accounts to robust, empirically supported causal pathways.

2.2.6 Role of Innovation/Incubation Hubs

While many of today's researchers are writing about how innovation hubs can serve as a hinge connecting elements of an entrepreneurial ecosystem, the way they describe them is typically descriptive rather than functional. Friederici (2019:9–28) identifies their purpose in linking together and facilitating every aspect of business, but there is no critical distinction made by Friederici between general operational assistance (such as providing physical workspaces or some basic networking opportunities) and the significant financial intermediary functions required for the long-term sustainability of ventures. The academic position of this thesis is that establishing a foundation for entrepreneurs to achieve success through developing the needed skills is insufficient

on an empirical basis. Until research proves that innovation hubs have the capability to structurally facilitate sustainable access to finance for young companies in emerging markets, this study contends that the role of innovation hubs in ensuring the long-term survival of young companies will be both conceptually exaggerated and empirically unsubstantiated.

A key function of sustainable hubs is the development of skills. For many startups, gaining the skills needed to manage the complexities of running a business is a major challenge. Innovation hubs address this by organising training programmes, workshops, and mentorship sessions that provide entrepreneurs with practical knowledge and abilities. These initiatives cover a wide range of topics, including business planning, financial management, marketing strategies, and technological literacy (Khan et al., 2023:166–183). Through exposure to these learning opportunities, startup founders and their teams acquire the expertise required to overcome challenges and grow their ventures effectively.

In addition to skill development, sustainable hubs play a critical role in providing access to essential resources. For many startups, resource constraints, including limited funding and inadequate infrastructure, present significant barriers to entry and growth. Innovation hubs address this gap by providing affordable office space, internet connectivity, and access to state-of-the-art equipment. Furthermore, many hubs maintain partnerships with investors and funding organisations, enabling startups to secure financial support in their early stages. By bridging resource gaps, innovation hubs allow entrepreneurs to focus on refining their ideas and expanding their businesses without being constrained by logistical barriers.

Networking and collaboration are equally vital to the role of sustainable hubs. Innovation hubs create lively communities where entrepreneurs can connect, share experiences, and form partnerships. This culture of collaboration encourages the exchange of ideas and cross-pollination of knowledge, resulting in innovative solutions and new business opportunities. For example, networking events, hackathons, and pitch competitions organised by hubs give entrepreneurs platforms to present their ideas to potential collaborators, investors, and customers. Such interactions not only expand the horizons of startups but also help create synergies that speed up their growth. Moreover, sustainable hubs serve as links between startups and larger ecosystems. By connecting startups with corporations, universities, and government bodies, these hubs allow entrepreneurs to access broader networks for support and growth.

Collaborations with academic institutions, for example, give startups access to cutting-edge research and talent pools, while partnerships with corporations open doors to markets and supply chains (Adler et al., 2019:121–130). This ability to integrate startups into larger ecosystems amplifies the impact of innovation hubs, making them indispensable to the entrepreneurial landscape. The role of sustainable hubs extends beyond merely supporting individual startups; they also contribute to the broader socio-economic development of their regions. In many cases, innovation hubs are positioned as key drivers of local and regional development, particularly in emerging economies.

By nurturing entrepreneurial talent and fostering innovation, these hubs create jobs, stimulate economic activity, and address pressing societal challenges. For example, hubs that focus on addressing local problems, such as access to clean water or affordable healthcare, directly improve

the quality of life in their communities. This dual focus on economic and social impact underscores the transformative potential of sustainable hubs. However, the effectiveness of sustainable hubs depends on their ability to adapt to the unique needs of the communities they serve. While some hubs thrive by focusing on specific sectors, such as technology, agriculture, or healthcare, others adopt a broader approach to accommodate diverse entrepreneurial pursuits. The flexibility to tailor services and programs to local contexts is crucial for ensuring the relevance and sustainability of these hubs. For instance, in regions with limited access to technology, hubs that prioritise digital literacy and low-cost technological solutions are likely to have a more profound impact. Challenges do exist in realising the full potential of sustainable hubs. Despite their efforts, many hubs struggle with sustainability due to a lack of funding and inconsistent support from stakeholders (Jiménez & Zheng, 2021:163–176).

Furthermore, assessing the success of innovation hubs remains a complex challenge, as their influence often extends beyond measurable metrics like the number of startups launched or funds raised. The intangible advantages, such as fostering a culture of innovation and developing resilient entrepreneurial ecosystems, are equally vital but harder to quantify. To address these difficulties, sustainable hubs must adopt innovative operational strategies. Diversifying funding streams, strengthening partnerships, and investing in capacity building can boost the resilience and effectiveness of these hubs. Additionally, regular evaluations and feedback mechanisms can help hubs refine their strategies and align their services with the evolving needs of startups and ecosystems.

Sustainable hubs play a multifaceted role in the startup ecosystem, serving as catalysts for skill development, access to resources, networking, and collaboration. By providing a supportive environment that addresses the diverse needs of entrepreneurs, these hubs lay the groundwork for the emergence and sustainability of startups (Kuckertz et al., 2019:11-38). Additionally, their contributions extend beyond individual ventures, driving socio-economic development and fostering innovation on a broader scale. While challenges persist, the potential of sustainable hubs to transform entrepreneurial landscapes is undeniable, making them a cornerstone of modern startup ecosystems.

It is very important to recognise that there is one significant constraint on the role described in the previous paragraphs. This theoretical model identifies hubs as key mediators; however, the effectiveness of these hubs is dependent on their own level of financial and institutional stability. One of the fundamental assumptions of this study is that all hubs sampled are at least operationally functional. In other words, although stability is recognised as a possible factor in determining whether a given hub will be able to provide adequate mediation to startups, it is not identified in mathematical terms as an independent (control) variable within the present structural model. Therefore, limitations arise when financial instability affects a hub's ability to function effectively as a mediator. The variability in the stability among Ghanaian hubs and the subsequent impact of this variability on the availability of resources to startups represent an area with great potential for additional empirical study.

2.2.6.1 Collaboration and Networking

Innovation hubs are vital for promoting collaboration and networking within entrepreneurial ecosystems, serving as important platforms where diverse stakeholders gather to exchange ideas, resources, and expertise. These hubs connect investors, mentors, entrepreneurs, and other relevant parties, providing a supportive environment that encourages meaningful interactions and partnerships. According to Friederici (2019:9–28), innovation hubs act as idea incubators, offering entrepreneurs a space to network with potential collaborators and build relationships that can advance their ventures. Networking within these hubs not only opens access to new opportunities but also enriches the entrepreneurial journey through collaborations that provide crucial resources and support (Friederici, 2019:9–28; Mwantimwa et al., 2021:39–63).

A key advantage of networking in innovation hubs is the creation of strategic alliances and partnerships, as well as the discovery of co-founders. Entrepreneurs often meet mentors who can offer invaluable guidance, investors ready to fund their projects, or other businesses with complementary technologies and skills. These interactions set the stage for collaborative ventures that combine expertise and resources to address challenges and capitalise on opportunities more effectively. For example, partnerships between startups and larger firms can facilitate knowledge sharing, market growth, and access to innovative technologies. Similarly, collaborations with mentors often lead to improved strategic direction, whereas interactions with investors provide vital financial backing to scale operations. These exchanges, enabled by innovation hubs, are essential for the growth and success of startups (Friederici, 2019:9–28; Mwantimwa et al., 2021:39–63).

Innovation hubs also actively foster collaboration through structured events and programmes. Activities such as pitch nights, hackathons, and networking mixers are integral to the hub ecosystem, designed to unite entrepreneurs, industry leaders, and other stakeholders in an engaging and supportive environment. During pitch nights, for example, startups have the chance to present their ideas to a panel of investors and experts, gaining constructive feedback while also forming valuable connections.

Hackathons, on the other hand, foster collaboration by bringing together diverse teams to address specific problems or develop innovative solutions within a limited timeframe. These events not only showcase the potential of startups but also promote teamwork, creativity, and problem-solving skills. Networking mixers hosted by innovation hubs further strengthen their ability to encourage cooperation. These informal gatherings allow entrepreneurs to interact with potential collaborators and exchange ideas in a relaxed environment, often resulting in mutually beneficial relationships. By enabling these interactions, innovation hubs help establish a thriving, interconnected community that supports cooperation and mutual growth. As Mwantimwa et al. (2021:39–63) and Friederici (2019:9–28) asserted, such initiatives are vital in building an ecosystem where startups and other stakeholders can collaborate seamlessly, driving innovation and economic growth.

Furthermore, the collaborative environment promoted by innovation hubs reaches beyond entrepreneurs and investors. It also includes partnerships with academic institutions, government agencies, and non-profit organisations. These collaborations often lead to the co-creation of innovative solutions to tackle urgent societal issues. For instance, partnerships with universities

give startups access to cutting-edge research, skilled talent, and specialised facilities. Simultaneously, collaborations with government agencies can provide policy support and funding opportunities (Morgeson et al., 2015). By serving as a link among diverse stakeholders, innovation hubs enhance the impact of entrepreneurial endeavours, ensuring that these initiatives contribute to broader economic and social development objectives.

A significant aspect of collaboration within innovation hubs is the exchange of ideas between different industries and sectors. The diverse mix of entrepreneurs, technologists, and business leaders in these hubs creates an environment conducive to interdisciplinary innovation. For instance, a tech startup developing artificial intelligence solutions might collaborate with a healthcare-focused entrepreneur to develop advanced medical diagnostic tools (Kuckertz et al., 2019:11-38). Such cross-sector collaborations, enabled by the open and inclusive atmosphere of innovation hubs, often yield groundbreaking innovations that transcend traditional industry boundaries.

Despite the many benefits of collaboration and networking within innovation hubs, challenges still exist. For example, some hubs find it difficult to create truly inclusive environments where entrepreneurs from diverse backgrounds feel equally valued and supported. Addressing this requires intentional efforts to ensure diversity and fairness in participation and resource distribution. Additionally, while events and programs hosted by hubs are crucial for fostering connections, their success depends on the quality of follow-up and ongoing engagement among participants. Without effective mechanisms to nurture relationships formed during these events, the chance for long-term collaboration may be lost. To maximise their impact, innovation hubs

need to constantly evolve their strategies for collaboration and networking. This includes using digital platforms to connect stakeholders across geographical boundaries, supporting global collaborations that bring together the best minds and resources.

Additionally, hubs can invest in robust mentorship and alumni networks that offer ongoing support to startups beyond their initial stages. By adopting such strategies, innovation hubs can strengthen their role as key facilitators of collaboration and networking within entrepreneurial ecosystems. Innovation hubs play an essential role in encouraging cooperation and networking among stakeholders in the entrepreneurial environment (Khan et al., 2023:166–183). By providing spaces and chances for interaction, they allow entrepreneurs to access resources, build partnerships, and exchange ideas that are vital to their growth and success. Through organised events, informal gatherings, and cross-sector collaborations, these hubs develop lively communities that promote innovation and mutual progress. Although challenges remain, the potential of innovation hubs to transform entrepreneurial ecosystems through collaboration and networking is clear, making them a foundational element of modern startup ecosystems.

2.2.6.2 Access to Resources

One of the most significant advantages provided by innovation hubs is their offering of diverse resources to support startups in their early stages. These resources, including financial support, expert guidance, workspaces, and advanced technology, create an enabling environment that lowers entry barriers for entrepreneurs and promotes the growth of emerging businesses. As highlighted by several studies, these hubs play a vital role in addressing the resource gaps faced

by startups, thereby contributing to their sustainability and success. Access to financial support is among the most crucial services offered by innovation hubs. Many hubs maintain strong links with investors, venture capitalists, and grant programmes, which supply vital funding to entrepreneurs (Jiménez & Zheng, 2021:163–176).

For early-stage startups, securing financial backing is often a significant obstacle, and innovation hubs help bridge this gap by serving as intermediaries. In some cases, the hubs themselves have dedicated funding mechanisms, such as seed capital programmes or investment funds, to support promising ventures. This financial support is crucial in enabling entrepreneurs to develop their products, expand their operations, and enter new markets. Without such assistance, many startups would find it difficult to achieve their goals, especially in competitive and resource-intensive industries (Ziolo et al., 2021:45–70).

In addition to financial resources, innovation hubs offer access to expert mentors, a crucial element in promoting entrepreneurial success. Mentors, often seasoned entrepreneurs or industry specialists, provide valuable insights, guidance, and support to startups navigating the challenges of establishing a business. According to Ziolo et al. (2021:45–70), mentorship is essential in equipping entrepreneurs with the skills and knowledge necessary to make informed decisions and avoid common mistakes. For example, mentors can provide strategic advice on market entry, product development, and customer acquisition, as well as guidance on overcoming operational challenges. Jiménez and Zheng (2021:163–176) also argued that mentorship can significantly increase the likelihood of success for startups by offering practical solutions and tailored advice.

The presence of mentors within innovation hubs encourages a culture of continuous learning and growth, which is vital for long-term development.

Another important resource provided by innovation hubs is physical workspace. For many startups, especially those with limited budgets, renting office space can be a substantial financial burden. Innovation hubs ease this challenge by offering affordable or subsidised office spaces tailored to entrepreneurs' needs. These spaces often include co-working areas, private offices, meeting rooms, and access to amenities such as high-speed internet, printing facilities, and administrative support (Jiménez & Zheng, 2021:163–176). Establishing a dedicated workspace not only boosts productivity but also encourages collaboration and innovation. Shared workspaces, in particular, promote interaction among entrepreneurs, leading to the exchange of ideas and the formation of partnerships. This dynamic environment helps foster a sense of community, which is essential for maintaining motivation and driving entrepreneurial success (Atiase et al., 2020:161).

In addition to financial and physical resources, access to state-of-the-art technology is a significant benefit of innovation hubs. Many hubs are equipped with advanced tools, software, and prototyping facilities that are essential for product development, especially in technology-intensive sectors. These resources include laboratory spaces, 3D printers, and other specialised equipment that allow entrepreneurs to develop and test their products efficiently (Jiménez & Zheng, 2021:163–176). By providing access to such technology, innovation hubs help startups speed up their development timelines and enhance the quality of their offerings. This access also alleviates the financial burden of acquiring costly equipment, making it easier for entrepreneurs to innovate

and compete in the market. The availability of these resources within innovation hubs significantly reduces barriers to entry for startups.

Emerging businesses often encounter numerous challenges, including limited access to funding, infrastructure, and expertise. Innovation hubs address these issues by providing a one-stop solution that enables entrepreneurs to access a comprehensive range of resources. As highlighted by Mwantimwa et al. (2021:39–63), this integrated support system, it is vital to allow startups to overcome initial hurdles and build a strong foundation for growth.

Beyond tangible resources, innovation hubs also foster a culture of sharing and collaboration. Entrepreneurs within these hubs frequently exchange knowledge, tools, and best practices, thereby strengthening the ecosystem's collective capacity. For example, a startup developing a software application might share its coding expertise with another team developing hardware, yielding mutual benefits. This collaborative approach ensures efficient resource use and enables entrepreneurs to harness the community's collective intelligence. Despite these numerous advantages, challenges remain in ensuring equitable access to resources within innovation hubs. For instance, not all entrepreneurs may have equal opportunities for funding or mentorship, especially those from underrepresented groups or disadvantaged backgrounds.

Addressing these disparities requires innovation hubs to implement inclusive policies and practices that foster diversity and equity. Moreover, the sustainability of resource provision remains a concern, as hubs often depend on external funding to sustain their operations. Developing sustainable business models that balance resource supply with financial stability is necessary for

the long-term impact of innovation hubs. These hubs play a transformative role by providing startups with access to essential resources. Offering financial assistance, mentorship, workspaces, and technology, they create an environment that enables entrepreneurs to overcome obstacles and succeed.

The comprehensive support systems provided by innovation hubs not only reduce entry barriers but also cultivate a culture of innovation and collaboration. Although challenges in ensuring equitable access and sustainability continue, the contributions of innovation hubs to the entrepreneurial ecosystem are undeniable, making them vital pillars of startup development and expansion.

2.2.6.3 Skills Development

Innovation hubs play a pivotal role in equipping entrepreneurs with the skills necessary to navigate a dynamic, complex business environment. These hubs offer workshops, training sessions, and tailored programmes that promote the development of technical expertise, business management acumen, marketing proficiency, and entrepreneurial capabilities. The focus on skill development is vital for the long-term sustainability and success of startups, as it provides entrepreneurs with the knowledge and tools needed to run their ventures effectively.

Mwantimwa et al. (2021:39–63) underscored the importance of these initiatives, noting that skill development programmes at innovation hubs typically address a broad spectrum of needs, ranging from technical competencies to strategic business planning. A key area of focus for skill

development in innovation hubs is improving technical skills. Entrepreneurs often require specialised knowledge to create, refine, and market their products, particularly in industries driven by technological advancements. Innovation hubs address this need by offering training in areas such as coding, data analysis, engineering, and design. These skills are vital for entrepreneurs aiming to develop marketable and competitive products. By gaining hands-on experience and technical know-how, entrepreneurs can improve their capacity to innovate, adapt to changing market demands, and deliver high-quality solutions (Friederici, 2019:9–28; Mwantimwa et al., 2021:39–63). The technical training provided by innovation hubs thus serves as a cornerstone for startups seeking to establish a strong presence in their respective industries.

In addition to technical skills, innovation hubs also emphasise business management training, which is fundamental for the sustainability of startups. Managing a business involves a wide range of responsibilities, including operations, human resources, financial management, and strategic planning. Innovation hubs offer specialised programmes that address these areas, equipping entrepreneurs with the skills needed to run their ventures effectively. As Kuckertz et al. (2019:11-38) highlights, strong business management practices are vital for ensuring that startups remain adaptable to market changes, maintain operational efficiency, and achieve their long-term goals. By providing workshops and mentorship in these domains, innovation hubs support entrepreneurs in developing the foundational skills necessary to run successful enterprises.

Marketing strategy training is another vital part of the skill development programmes offered by innovation hubs. Effective marketing is crucial for startups to establish a strong brand presence, attract and retain customers, and grow in the market. Innovation hubs offer training in areas such

as branding, social media strategies, digital marketing, and customer engagement. These programmes aim to help entrepreneurs understand the dynamics of their target markets and develop strategies to communicate their value propositions effectively. Kuckertz et al. (2019:11-38) emphasises the importance of such training, noting that it enables startups to expand their market presence and forge lasting customer relationships. Similarly, Kariv (2022:9) argues that a well-implemented marketing strategy can be a game-changer for startups, allowing them to compete effectively in crowded markets.

Beyond technical, managerial, and marketing skills, innovation hubs also emphasise developing entrepreneurial abilities that are essential for the growth and resilience of startups. These include creativity, problem-solving, leadership, and perseverance. Pyka and Nocoń (2021:34-99) assert that such skills are vital for entrepreneurs to lead their firms effectively, overcome challenges, and foster innovation. Innovation hubs nurture these abilities through workshops, seminars, and mentorship programmes that promote experiential learning and personal development. For example, leadership training sessions can help entrepreneurs build confidence and decision-making skills needed to guide their teams. Meanwhile, problem-solving workshops can provide strategies to tackle unforeseen challenges. By cultivating these entrepreneurial qualities, innovation hubs ensure that startups are not only equipped with the technical and operational skills for success but also possess the resilience and adaptability necessary to thrive in a competitive environment.

Furthermore, innovation hubs promote interdisciplinary learning by exposing entrepreneurs to diverse perspectives and expertise. This exposure enables them to develop a holistic understanding

of the business landscape and identify opportunities for growth and innovation. For example, a tech-focused entrepreneur may benefit from training sessions on financial management, while a marketing-oriented entrepreneur might gain valuable insights into product development. This cross-pollination of knowledge and skills enriches the entrepreneurial journey and boosts the overall competence of startups. The structured learning environment offered by innovation hubs is also complemented by informal learning through peer interactions and community engagement.

Entrepreneurs often learn from one another by sharing experiences, challenges, and solutions. This collaborative environment fosters a culture of continuous improvement and mutual support, further enhancing the impact of skill development initiatives. Despite the many benefits, obstacles remain in ensuring that skill development programmes are accessible to all entrepreneurs. Some hubs may face resource limitations that restrict the scope and quality of their training offerings, while others may struggle to adapt their programmes to meet the diverse needs of entrepreneurs. Overcoming these challenges requires innovation hubs to adopt inclusive and flexible approaches, such as using technology to deliver online training or partnering with external organisations to expand their capacity.

Skill development is a fundamental aspect of the support offered by innovation hubs, playing a crucial role in preparing entrepreneurs to handle the complexities of the business environment. By providing training in technical skills, business management, marketing strategies, and entrepreneurial abilities, innovation hubs enable startups to overcome obstacles, seize opportunities, and achieve sustainable growth. The comprehensive and adaptable nature of these programmes ensures entrepreneurs are well prepared to respond to changing market conditions

and to foster innovation within their industries. Therefore, innovation hubs remain essential to the entrepreneurial ecosystem, supporting the growth and success of startups through focused skill development initiatives.

2.3 SYNTHESIS OF IDENTIFIED RESEARCH GAPS

A systematic analysis of the existing theory and research in this chapter identifies significant research gaps in the theoretical, empirical and methodological literature which justify the need for and originality of this doctoral research. Each gap identified can be categorised into one of three broad areas:

There is a theoretical gap. While current research has explored the dynamics of startups based upon a single theoretical lens (monolithic), there is no established integrated theoretical framework which addresses internal capability building (Resource-Based View) (Foa & Foa, 2012:15–32), external stakeholders' perceptions of the startup (Signalling Theory) (Quatrini, 2021:101-240) and temporal resilience to environmental shocks (System Disruption Theory) (Burt, 2007:731–749). This is specifically pertinent to the area of sustainable finance.

There is also an empirical gap. In terms of empirical assessment of innovation hubs, in particular those located in Africa or Ghana (Mwantimwa et al., 2021:39–63; Muathe et al., 2022:138–146), prior studies have primarily employed descriptive methodologies. Studies have focused on generalised socio-economic outcomes (networking and physical space), while failing to examine empirically the specific, quantifiable, financial mediation processes which are responsible for translating membership of an innovation hub into long-term viability for ventures.

Finally, there is a methodological gap. Current research lacks robust structural modelling to test financial intermediation. More specifically, the mediation process of sustainable finance and the moderating effect of stakeholder pressure on venture performance have not been adequately modelled utilising advanced predictive statistical methods (Structural Equation Modelling, SEM) in the entrepreneurial ecosystem examined by this dissertation.

In addressing each of these theoretical, empirical and methodological deficiencies directly, this dissertation will contribute to the advancement of accounting sciences from speculative/descriptive observation to rigorously tested cause-and-effect relationships.

2.4 CHAPTER SUMMARY

The chapter has provided insight into the complex dynamics of sustainable finance by carefully examining a wide range of theoretical frameworks. In the midst of this academic debate, it is critical to emphasise the role of innovation centres in promoting sustainable finance among Ghanaian startup businesses. Through the lens of the Priority Theory, it was found that the development of sustainable finance depends on its prioritisation by economic agents, presenting both obstacles and opportunities for growing startups. In the meantime, the Peer Emulation Theory emphasises the value of social impact. It proposes that Ghanaian startups could follow the lead of their more successful peers in innovation centres to achieve sustainability objectives.

Furthermore, the Life Span Theory advocates for critical analysis of the longevity of sustainable finance projects within startup ecosystems. This perspective encourages stakeholders, despite potential short-term uncertainties, to plan for long-term sustainability practices. Meanwhile, the System Disruption Theory stresses that to effectively manage the disruptive transition to

sustainable finance, innovation hubs must transparently share information. At the same time, the Positive Signalling Theory highlights how startups could strategically communicate their sustainability commitments to attract external funding and enhance their reputation within Ghana's entrepreneurial community.

Resource Theory underscores the importance of equitably distributing resources among innovation centres to equip Ghanaian startups with the tools needed to advance swiftly toward sustainable finance goals. Combining these theoretical perspectives clearly shows that innovation hubs play a vital role in supporting sustainable financing within Ghanaian startup entrepreneurship. Policymakers, investors, and entrepreneurs can foster an environment conducive to sustainable growth by applying these insights. This approach can lead to positive change and help build a more resilient and equitable future for Ghana's entrepreneurial ecosystem.

Lastly, the literature emphasises the interconnectedness of startups, innovation hubs, sustainable finance, and the issues faced by emerging countries. It is crucial to address these components as a whole to promote a vibrant entrepreneurial ecosystem that can inspire innovation and economic progress. To sustain the success and sustainability of startups, future research and policy initiatives should focus on strengthening support systems for them, particularly in emerging economies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

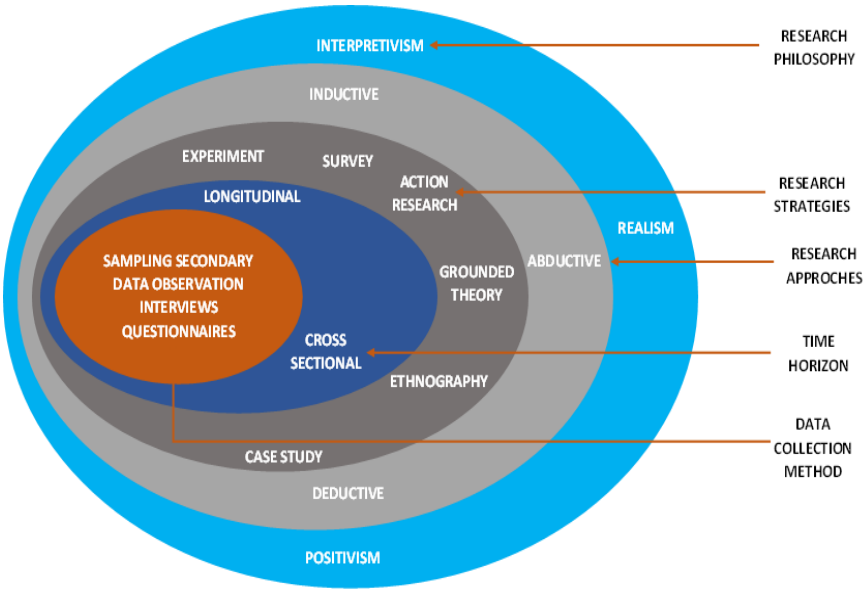
This chapter outlines the methodological basis of the study, offering a detailed account of the processes and decisions that directed the research. It begins with an examination of the underlying research philosophy, which establishes the epistemological and ontological assumptions informing the study. The chapter then discusses the research approach, placing the investigation within broader methodological traditions and justifying the chosen logic of inquiry. This is followed by a description of the research design, specifying the overall strategy for aligning the study's aims with the empirical evidence collected.

Attention is also given to the research methods employed, including the selection of data-collection and analysis techniques, and to the justification of their suitability for addressing the research questions. The research instrument is described in detail, along with the measurement and operationalisation of the constructs. Moreover, the chapter identifies the target population and explains the sampling strategy, including the rationale for the chosen sampling method and the determination of an appropriate sample size. The procedures for data collection are systematically outlined, with a focus on maintaining consistency and minimising potential bias. The methods of data analysis are also presented, highlighting both descriptive and inferential techniques employed to test the hypotheses and answer the research questions outlined in Chapter One of the study. Finally, the chapter discusses ethical considerations, outlining measures taken to protect

participants' rights, ensure confidentiality, and uphold academic integrity throughout the research process.

3.1 THE RESEARCH ONION

In formulating and identifying an effective methodology to achieve the study's objectives and address the research questions, this study adopted the research onion model espoused by Saunders et al. (2009:59–87). This offers an effective way to design and implement a research methodology across various contexts (Bryman, 2016:9). The research onion provides numerous benefits by establishing different stages through which various data collection methods can be understood, along with illustrating how a methodological background can be described. All layers of the research onion are interconnected and interdependent. Therefore, the choice of philosophy influences the research approach, which in turn shapes the selection of a methodological approach, strategy, time horizons, data collection, and data analysis.



Source: Saunders et al. (2009:59-87)

Figure 3.1: Research Onion

3.2 RESEARCH PHILOSOPHY

Research philosophy acts as the overarching framework that shapes the development of knowledge and defines the researcher's assumptions about the nature of reality and the ways through which that reality can be understood (Saunders et al., 2009:59–87). It reflects the fundamental worldview underpinning the study, guiding both its theoretical orientation and the methodological choices made (Paudel, 2024:45–58). Essentially, research philosophy articulates the researcher's stance on what constitutes valid knowledge, how such knowledge can be acquired, and the extent to which it can be generalised or applied to broader contexts (Tamminen & Poucher, 2020:535–549). These philosophical assumptions are not merely abstract ideas; they have direct implications for the selection of research strategies, data collection methods, and analytical tools, ultimately shaping the credibility and interpretation of the study's findings. Research philosophy encompasses the beliefs and assumptions that underpin the approach to inquiry; how the nature of reality (ontology) is perceived, knowledge (epistemology), and the methodological strategies adopted for the study (Saunders et al., 2009:59–87).

The study's perspective on the nature of reality is referred to as ontology (Fleetwood, 2005:197–222). The ontological stance of this research is contextual realism, which recognises that the phenomena studied, such as the activities and effects of innovation hubs, are socially constructed but influenced by economic policies, market dynamics, and cultural practices (Chatzinikolaou, 2025:74). As Friederici (2019:9–28) clarifies, innovation hubs act as intermediaries within entrepreneurial ecosystems and tailor their roles to the specific socio-economic realities of their

environment. This offers a multidimensional understanding of the Ghanaian context, considering the major systemic challenges faced by innovation hubs, including limited financial infrastructure and policy support. Conversely, epistemology pertains to the nature and scope of knowledge and the methods by which such knowledge is acquired (Ghauri et al., 2020:14).

Although other approaches, like positivism and interpretivism, provide alternative approaches to research, both have major limitations when examining this particular topic. Positivism usually involves using deductive logic and quantitative methods to determine an objective truth (Okoli, 2023:302-316), but relying solely on positivism would mean that many of the nuances and social constructions that characterise human interaction in the entrepreneurial systems of Ghana would be lost. On the other hand, interpretivism emphasises subjectively based experiences and qualitatively produces meaning (Saunders et al., 2009:59-87). Although useful for capturing how startups view themselves, interpretivism does not allow for testing statistical structures or generalising conclusions throughout the overall population of innovation hubs. Therefore, pragmatism has been deliberately selected over the above-mentioned alternatives since it allows this study to bridge the gap between qualitative and quantitative methods and thus accommodate the flexibility needed to measure the dynamic ecosystem of entrepreneurship.

Pragmatism as a research philosophy is especially relevant to this study because it closes the gap between theory and practice, as Church et al. (2025:1–20) highlighted that entrepreneurial ecosystems are dynamic and need adaptable methodologies to reflect their changing nature. Pragmatism focuses on practical solutions and actionable knowledge, aligning well with the context of entrepreneurial ecosystems and financial sustainability (Romero-Sánchez et al., 2024:10). The main principle of pragmatism as a research philosophy is the understanding that

value is gained when the research helps solve pragmatic challenges and leads to useful actions (Chatzinikolaou, 2025:74).

In the context of such expectations, understanding how innovation hubs support the sustainability of startup financing in Ghana requires both flexibility and an impact-focused approach. Pragmatism keeps the researcher attentive to the practical implications of the findings and ensures that the research contributes not only to academic literature but also to practical policy recommendations. In this context, Howells (2006:715–728) argues that innovation hubs serve as intermediaries that facilitate knowledge transfer and resource flow within entrepreneurial ecosystems.

The pragmatist approach, therefore, concentrates on studying these functions to ensure that the findings remain relevant to policymakers, hub managers, and entrepreneurs. Pragmatism offers advantages in addressing complex, real-world problems such as sustainable financing, where practical strategies must complement a solid theoretical understanding. As Friederici (2019:9–28) notes, the success of innovation hubs depends on their ability to adapt to the local context and the specific needs of their stakeholders.

With pragmatist philosophy, the present study favours solutions that are sensitive to the context and practically viable (Hampson & McKinley, 2023:124–138). The entrepreneurial ecosystem is dynamic (Cantner et al., 2021:407–423); therefore, a flexible research approach is required. The pragmatist approach also aligns with the goals of innovation hubs (Mohammed, 2023:236–255), which are pragmatic organisations designed to solve real-world problems. By focusing on what

works in Ghana's specific context, this study aims to provide insights directly applicable to stakeholders within the entrepreneurial ecosystem. The adopted pragmatist research philosophy offers a robust framework for examining the role of innovation hubs in sustainable startup financing in Ghana. The study aims to generate actionable insights that consider ontological, epistemological, and methodological perspectives on challenges and opportunities within the Ghanaian entrepreneurial ecosystem.

Furthermore, the philosophy of pragmatism endorses mixed methods, enabling researchers to leverage the strengths of both qualitative and quantitative methods. While qualitative interviews offer detailed insights into the experiences of startup founders, quantitative surveys provide a wider view of trends and outcomes related to the issue at hand. This flexibility is essential for capturing the complex role of innovation hubs within Ghana's entrepreneurial landscape (Chatzinikolaou, 2025:74). According to Bergmann and Utikal (2021:33-37), when exploring sustainable-oriented initiatives, a mixed-methods approach is particularly suitable as it allows for data triangulation across multiple sources. This makes the research findings both robust and reliable, while also accommodating the complexities of the research context.

In addition, the pragmatist philosophy is particularly suited to the specific challenges faced by Ghanaian startups within an ecosystem characterised by limited access to capital, fragmented support networks, and high levels of operational uncertainty (Haukipuro et al., 2024:283–299). Innovation hubs are crucial in alleviating some of these issues, as their potential largely depends on their ability to tailor their services to meet the needs of local entrepreneurs.

Once again, the pragmatist philosophy allows this research to engage with various actors (i.e., entrepreneurs, investors, and policymakers) and to incorporate diverse views, thereby adding genuine value to the study. This highlights the need for a collaborative approach to developing holistic solutions to the systemic challenges facing Ghana's entrepreneurial ecosystem. Innovation hubs are increasingly recognised as catalysts for economic growth and social progress, particularly in regions such as Sub-Saharan Africa. Focusing on the practical implications of their activities, this study addresses the realisation of key SDGs, such as promoting inclusive and sustainable economic growth, employment, and innovation, through SDG 8, and encouraging innovation within SDG 9 (Carlsen & Bruggemann, 2022:219–229). A pragmatist research philosophy is justified by its focus on practical relevance, methodological adaptability, and solutions tailored to specific contexts.

3.3 RESEARCH STRATEGY

A research strategy is the overall plan or systematic approach that guides how a study is conducted to achieve its objectives and answer its research questions (Tajvidi & Karami, 2015:45–78). This also aids in outlining how data will be collected, analysed, and interpreted in relation to the research problem (Johannesson & Perjons, 2021:41–75). The action research strategy was adopted for this study, in which a systematic inquiry was conducted to address the practical problem of sustainability financing faced by startup entrepreneurs in innovation hubs in Ghana, through participation and collaboration with members of the respective hubs. Once again, the case study approach will be used alongside the action research strategy, as this combination will help identify key features of sustainable financing for innovation hubs and enable drawing generalisations (Bryman, 2016:9). This strategy has proven effective in providing specific insights into the

research problem by highlighting the importance of developing a framework for sustainable financing of startups (Silverman, 2013:41–70). Considering the mixed methods approach adopted for this research, both case study and action research were deemed appropriate for use (Saunders et al., 2009:59–87).

3.4 RESEARCH APPROACH

The research approach reflects the logical pathway through which the study progresses from theory to empirical investigation and is typically situated within either an inductive or deductive stance. According to Okoli (2023:302–316) the deductive approach is aligned with the positivist paradigm, as it emphasises the derivation of hypotheses from established theories and the subsequent empirical testing of these hypotheses against observable data at acceptable probability levels. In this approach, the researcher begins with abstract theoretical propositions and logically derives hypotheses that can be subjected to empirical scrutiny (Saunders et al., 2009:59–87). Deduction, therefore, places established theory at the core of the research process, guiding the formulation of hypotheses, the operationalisation of variables, and the selection of appropriate measures.

By contrast, the inductive approach works in the opposite direction, starting with detailed empirical observations and gradually moving towards broader generalisations and theory development. Hyde (2000:82–90) explains that induction depends on recognising patterns, regularities, and relationships in the data, which are then used to create tentative hypotheses and, ultimately, theoretical insights. In this way, induction is often described as a “bottom-up” approach, moving from specific instances to wider conceptual frameworks (Saunders et al., 2009:59–87). While

induction is useful for exploring new phenomena or contexts where existing theory is limited, it is less suitable in studies rooted in well-established theoretical traditions (Kelle, 2007:133–156).

A review of the methodological options reveals that each presents specific advantages and limitations relative to this study. The deductive research design is ideal for establishing an objective framework within which to test existing theoretical knowledge on sustainable finance (Okoli, 2023:302–316), but its inherent rigidity presents a limitation. A purely deductive viewpoint could also miss many of the emerging realities of Ghana's innovative startups that do not fit into pre-existing Western models of sustainability. The inductive research design is effective for generating rich, contextualised insight through the actual experiences of the people involved (startup founders) (Saunders et al., 2009:59–87); however, it lacks the necessary structure to statistically test whether the relationships between the variables identified by the literature exist (Kelle, 2007:133–156). Ultimately, neither approach in isolation can fully capture both the contextual depth and statistical rigour required.

Consistent with the interpretivist philosophy and the pragmatist stance adopted for the research, an abductive approach was employed. The abductive approach was selected because of its flexible nature, which combines elements of both deductive and inductive methods; ideal for exploratory research as it examines new concepts and relationships without bias, allowing researchers to address gaps in knowledge; helps navigate ambiguity and develop plausible explanations where data is lacking; integrates various sources of data and synthesises them holistically when faced with multiple perspectives, and aids in refining emerging relationships and theories to move beyond existing frameworks.

3.5 RESEARCH DESIGN

Research methodology underpins the generation of knowledge in scientific inquiry, linking the purpose of the investigation with appropriate data collection and analysis strategies (Derrick, 2020:133–156). Bryman (2016:9) defines a research design as a detailed plan that guides a study towards achieving its objectives. As Rezigalla (2020:12) explains, choosing a research design is one of a crucial methodological decisions in doctoral research, serving as the fundamental blueprint that directs the entire investigation process.

Research design is vital because it ensures that research is conducted systematically, reproducibly, and in accordance with scientific principles, thereby increasing the likelihood of success (Rindfleisch et al., 2008:261–279).

The study objectives and research questions from Chapter One, together with the integrated theoretical framework presented in Chapter Two, must be utilised to develop a structured research approach which details how these goals and questions can be assessed. To achieve methodological coherence and rigour across all methods, the chosen methodology should specifically address prior empirical gaps, through robust structural modelling of financial mediation, as well as improved understanding of behaviour on the part of resource allocators. Since a study's design determines both the quality and scope of its findings, especially in cases where studies deal with complex systems, such as the development of innovation clusters in developing countries like Ghana, multiple method designs (i.e., combinations of methodologies) may be necessary to provide sufficient detail about these systems. In recent years, there has been an increase in the number of research problems that require multiple methods to effectively assess their complexities. For

example, although quantitative methods (e.g., Structural Equation Modelling) were necessary to evaluate the causal relationships among variables based on the study's theory, it was also important to use qualitative methods to understand how startup entrepreneurs actively navigate their ecosystems, as conceptualised by the priority theory (Wilson, 2010), and the resource-based view (Foa & Foa, 2012). Therefore, this study implemented an exploratory sequential design involving two phases of data collection and analysis.

The study employed an exploratory sequential design comprising two phases of data collection and analysis. Exploratory sequential design (ESD) is a structured mixed methods approach characterised by a three-phase research process that begins with qualitative inquiry followed by quantitative methods (Dawadi et al., 2021:25–36). The design starts with an initial qualitative phase in which the study explores the situation, context, experience, or phenomenon of interest in depth; these findings then inform a subsequent quantitative phase (Wester & McKibben, 2019:1–11). This approach allows the study to first identify themes, ideas, and concepts through qualitative methods before converting them into variables that can be tested on a larger sample to generalise findings (Bai, 2022:3911–3940). It also enables the generation of hypotheses and theories through initial qualitative work that can later be examined quantitatively (Whitley et al., 2020:44). The third phase involves merging and interpreting both qualitative and quantitative results (Guetterman et al., 2015:554–561).

In phase one, the qualitative approach collects data through interviews and focus group discussions to identify key themes and insights regarding the operation of innovation hubs. These qualitative findings guide the development of a quantitative survey instrument, which is used in the second

phase to collect data from a larger sample of stakeholders. This design ensures that the study process is iterative and responsive to emerging insights (Tashakkori & Teddlie, 2010:271–277).

Qualitative data were collected through semi-structured interviews with key stakeholders, including innovation hub managers, startup founders, and investors. These interviews examined practices, challenges, and success factors associated with innovation hubs in Ghana. Quantitative data were gathered through structured surveys administered to a broader group of stakeholders, namely, startup entrepreneurs and investors. The surveys provided key performance indicators data regarding access to finance, business growth metrics, and the effectiveness of hub interventions. This approach ensures that subjective experiences are paired with objective outcomes in the study (Haukipuro et al., 2024:283–299).

3.5.1 Exploring Sequential Mixed-Methods Design – Definition and Characteristics

An exploratory sequential mixed-methods design is a structured approach that follows a specific procedural sequence in data collection and analysis (Bowen et al., 2023:188–199). It begins with an investigative qualitative phase to explore a phenomenon, followed by a quantitative phase that builds on the qualitative findings (Subedi, 2016:570–577). This design is specifically aimed at collecting qualitative data first to explore viewpoints and allow information to emerge naturally, with subsequent quantitative data collection to explain relationships identified in the qualitative data (Subedi, 2016:570–577).

The fundamental purpose of this design is to use initial qualitative insights to inform and shape the subsequent quantitative phase. As Toyon (2021:253–260) notes, the exploratory sequential

approach involves "first gathering qualitative data to explore a phenomenon, and then collecting quantitative data to explain relationships found in the qualitative data". This allows the study to develop a comprehensive understanding of complex phenomena such as innovation hubs and sustainable finance by first establishing rich contextual knowledge before measuring their prevalence and testing their relationships.

Exploratory sequential design typically consists of three main phases: (1) qualitative data collection and analysis to explore the research problem, (2) development of instruments or hypotheses based on qualitative findings, and (3) quantitative testing and validation (Saygili et al., 2023:2063). This three-phase approach allows this study to first explore the topic, then identify features that require testing, and finally draw conclusions based on quantitative verification (Saygili et al., 2023:2063). Some studies, for instance, Moore et al. (2021:9) have expanded this approach to include additional stages such as evidence review, stakeholder consultation, co-production, and prototyping. Two principal alternatives exist within the exploratory sequential design: the theory development alternative, which aims to develop a theory, and the instrument development alternative, which focuses on developing refined instruments to test hypotheses (Koskey et al., 2023:100-117). The latter is beneficial when this study needs to establish context-specific measurement tools based on qualitative insights before conducting quantitative testing.

The exploratory sequential design sets itself apart from other mixed-methods approaches such as explanatory sequential design (which starts with quantitative data then adds qualitative data to clarify results), convergent parallel design (where both types of data are collected simultaneously), embedded design (where one kind of data support another), transformative design (focusing on

value-based issues), and multiphase design (comprising multiple research stages) (Maggetti, 2020:193–210).

Methodologically, the exploratory sequential design follows constructivist principles and can incorporate multiple data-collection strategies from various sources (Polat et al., 2016:1-8). This enables triangulation of results, thereby maximising the validity, reliability, and trustworthiness of the findings, as noted by Koskey et al. (2023:100-117). The design is particularly suitable for studying complex adaptive systems, where understanding the context thoroughly before measurement is essential (Jick, 1979:602–611).

In practice, researchers typically begin with interviews, focus groups, or document analysis to gather qualitative data that offer fresh perspectives on the phenomenon under study (Halim et al., 2015:85). The insights gained from this phase then guide the development or refinement of survey instruments or other quantitative measures tailored to the specific research context. Finally, researchers interpret how the quantitative results build upon and extend the initial qualitative findings (Halim et al., 2015:85).

3.5.2 Rationale for Choosing Exploratory Sequential Design for Innovation Hubs Study

The choice of an exploratory sequential design for examining innovation hubs in emerging economies is justified by several key factors. Primarily, this design is suitable for studying phenomena that are poorly understood or for which limited information is available about similar issues and their solutions (Collins et al., 2016:15–42). Innovation hubs in emerging economies are complex, multilayered ecosystems that demand initial exploration before meaningful measurement

can be conducted (Mwantimwa et al., 2021:39–63). The nature of innovation hubs' ecosystems requires research methods that can capture their complexity from multiple perspectives. As shown in studies of Brazilian innovation ecosystems, exploratory qualitative research has been effective in examining ecosystems at different developmental stages, helping researchers understand the specific contextual factors that influence their evolution (Ward et al., 2018:133–146). This initial qualitative phase allows the study to identify key variables for measurement in later quantitative phases. A fundamental rationale for employing exploratory sequential design is the ability to thoroughly explore a topic before deciding which variables to measure (Wipulanusat et al., 2020:485–495). This approach is advantageous when studying innovation hubs, as it helps establish the unique features of these ecosystems through qualitative methods before developing suitable quantitative tools to test relationships and generalise the findings.

Next, triangulation is especially useful for studying organisational innovations, such as innovation hubs. Triangulation enables researchers to corroborate quantitative findings with qualitative data, enhancing validity when sample sizes might limit statistical power (Donkoh & Mensah, 2023:6–9). This is particularly relevant to research on innovation hubs, where the number of established hubs in a single emerging economy may be limited. Mixed methods research also offers complementary data collection and analysis, providing a more comprehensive understanding of complex phenomena from multiple perspectives (Guest & Fleming, 2015:581–610).

For innovation hub research, this design facilitates the examination of multiple stakeholder perspectives (e.g., government, industry, and academic actors), which is crucial for understanding the governance frameworks and collaborative dynamics that shape these ecosystems (Alkhoraif,

2024:8515). The exploratory sequential design also aligns well with the design science research paradigm used to study organisational interventions in emerging economies. This approach recognises that artefacts emerge from design, use, and ongoing refinement within organisational contexts (du Plooy et al., 2020:1–12). Innovation hubs can be conceptualised as artefact-designed interventions that evolve through interaction with their environments and stakeholders.

Furthermore, an exploratory sequential design enables this study to refine quantitative measures based on qualitative findings, thereby strengthening the credibility of the research (Alkhoraif, 2024:8515). This approach is particularly valuable when studying innovation hubs in emerging economies, where standard innovation metrics developed in Western contexts may not fully capture local realities and nuances.

3.5.3 Implementation Process of Exploratory Sequential Design

The implementation of an exploratory sequential mixed-methods design follows a clear procedural sequence: qualitative data collection and analysis are followed by quantitative data collection and analysis. This approach involves multiple distinct phases that build on one another to create a comprehensive understanding of the phenomenon under investigation. The first phase involves qualitative data collection to explore the research problem thoroughly before proceeding to subsequent quantitative work (Moser & Korstjens, 2018:9–18.).

A standard implementation of the exploratory sequential design comprises three primary stages. Kidwell and Almirall (2023:336–337) describes these stages as: "(i) evidence review and stakeholder consultation through a qualitative exploration of the needs, concerns, motivations, and

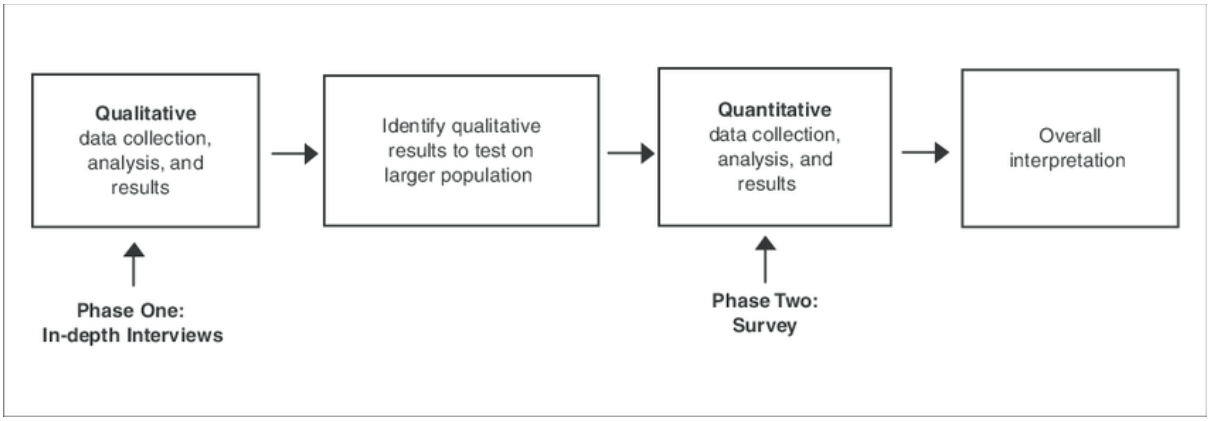
useful strategies...; (ii) co-production for the adaptation and development of new features, and (iii) prototyping, based on quantitative data collected to test usability, quality, understandability and actionability of the resources developed for the program".

During the qualitative phase, researchers collect data through methods such as interviews, focus groups, or case studies to develop a thorough understanding of the phenomenon. For example, Eisenhardt and Graebner (2007:25–32) employed "a mixed methodology, involving expert group input, followed by a multiple case study method" as part of their exploratory design. This initial phase provides the foundation for subsequent quantitative work. The connection between the qualitative and quantitative phases is crucial in this design. Qualitative data were linked to the quantitative results, which further explain the phase I findings. This connection guarantees that quantitative instruments are contextually appropriate and address the key variables identified in the qualitative exploration. In the quantitative phase, this study typically develops and administers instruments, such as surveys (i.e., questionnaires), informed by qualitative findings. As noted by Abu-Bader (2021:25–32), quantitative data were collected through a questionnaire survey, and the data were analysed using AMOS software. This phase allows this study to test relationships and generalise findings from the initial qualitative exploration.

Data integration is a key feature of this design's implementation. Musabayana et al. (2023:65) define mixed methods research as "collecting, analysing, and interpreting quantitative and qualitative data in a single study or a series of studies to investigate the same underlying phenomenon." This integration mainly takes place during the discussion and interpretation of

findings, leading to what Eisenhardt and Graebner (2007:25–32) refer to as meta-inferences, which are developed from both qualitative and quantitative results.

The use of an exploratory sequential design offers benefits for data validation and generalisability. According to Guest and Fleming (2015:581–610), one of the main advantages is the ability to utilise quantitative data analysis to clarify and extend the insights gained from qualitative findings. This approach increases the credibility of the study's results by providing both a detailed understanding and statistical validation.



Source: Author's Own Construct (2025)

Figure 3.2: Exploratory Sequential Mixed Methods Research Design

Throughout the implementation process, this study clearly documented the procedural decisions, particularly how qualitative findings informed quantitative instrument development. This transparency in methodology ensures the study's rigour and enables readers to assess the design's suitability for the specific research context.

3.5.4 Limitations and Considerations of Exploratory Sequential Design

While exploratory sequential design offers notable benefits for innovation hub studies in emerging economies, researchers must also acknowledge several limitations and challenges inherent to this methodological approach. One of the main constraints is the time-consuming nature of conducting two separate research phases sequentially. As Will et al. (2015:6-12) observe, executing two distinct data collection strategies can be labour-intensive and challenging to manage. This extended timeline may create difficulties for research projects with strict deadlines or those examining rapidly changing innovation hub ecosystems, where conditions may shift between qualitative and quantitative phases.

Next, the resource requirements for exploratory sequential design represent another important consideration. Srivastava et al. (2023:88) emphasise that the main drawbacks of the sequential exploratory design include its time-consuming process, high resource needs, and difficulties in interpreting the results. These resource demands can be especially challenging for studies in emerging economies where research funding and institutional support may be limited, potentially creating barriers to implementing this methodologically robust but resource-intensive approach.

Furthermore, the complexities of interpretation pose a third major challenge, particularly during the crucial transition from qualitative to quantitative phases. Researchers need to carefully convert qualitative themes into measurable variables without losing nuance or misrepresenting the original insights. This process requires significant judgment from researchers and can introduce bias, particularly when qualitative data reveal unexpected or complex relationships that resist

straightforward quantification. The integrity of the entire research structure relies on how well researchers manage this integration. Once again, the multidisciplinary nature of exploratory sequential design, while beneficial for gaining a comprehensive understanding, can also pose coordination difficulties.

Hall (2020:25–32) explains that their team mitigated this challenge by assigning anthropologists and sociologists to handle data collection and analysis in the qualitative phase, after which both groups collaboratively transformed the identified themes into measurable variables, which were subsequently integrated into a structured questionnaire. This approach underscores the importance of clear role definition and effective communication across disciplinary boundaries, which may require additional planning and management. Researchers employing this design must also consider the continuity of sampling across phases. Since the qualitative phase typically involves a small, purposively selected sample, whereas the quantitative phase requires a larger, more representative sample, ensuring conceptual consistency between these participant groups requires careful attention. This is particularly relevant to research on innovation hubs, where ecosystem participants may hold widely varying perspectives based on their roles and experiences.

Furthermore, the credibility of findings from exploratory sequential designs can be enhanced by employing specific methodological strategies. Alkhoraif (2024:8515) emphasises that such studies are especially valuable when the research problem allows qualitative insights to refine quantitative measures, thereby strengthening the overall credibility and robustness of the study’s findings. However, this increased credibility depends on the researcher's ability to demonstrate clear links between qualitative insights and quantitative instruments, requiring transparent documentation of

decision-making processes throughout the research. To address these limitations, researchers can adopt several strategies. Srivastava et al. (2023:88) indicate that the researchers mitigated the methodological limitations by assembling a research team with diverse expertise and skill sets, thereby enhancing the study's methodological rigour and balance. This highlights the importance of forming multidisciplinary teams with complementary methodological expertise. Additionally, researchers should clearly document the rationale for transitional decisions between phases and acknowledge any compromises made during instrument development.

Finally, when researching innovation hubs, researchers must carefully consider the temporal aspect of their studies. Innovation hubs' ecosystems evolve -rapidly, especially in emerging economies responding to global technological shifts, so long data collection periods may capture systems at different growth stages. Strategies to address this could include targeted follow-up during the quantitative phase to evaluate any significant contextual changes since the qualitative phase.

3.5.5 Advantages of Exploratory Sequential Design Over Alternatives

When comparing the exploratory sequential design to alternative research approaches for studying innovation hubs in emerging economies, several notable advantages become evident. The exploratory sequential approach enables researchers to first gain a thorough understanding of contextual factors before developing suitable quantitative measures, which is especially valuable when examining complex phenomena in understudied environments (Gunbayi, 2020:41–53). This sequential method ensures that quantitative instruments are grounded in the realities of the research setting rather than imposing preexisting frameworks that may overlook local nuances.

Moreso, unlike explanatory sequential design, which starts with quantitative data collection before seeking qualitative explanations, the exploratory approach enables this study to first identify relevant variables within innovation ecosystems before attempting to measure them (Leedham-Green et al., 2021:11). This sequence is important when analysing innovation hubs in emerging economies, where Western innovation metrics might not adequately reflect local innovation dynamics and contextual factors.

The exploratory sequential design also provides methodological flexibility that convergent parallel designs lack. As highlighted by Leedham-Green et al. (2021:11) the exploratory approach, it begins with qualitative methods to identify and understand key factors relevant to the research problem, followed by creating questionnaires to assess their significance and prevalence in a broader population. This enables researchers to tailor their quantitative tools to qualitative insights, thereby enhancing contextual relevance.

Furthermore, the strength of exploratory sequential design lies in its capacity to integrate diverse data types, yielding a more comprehensive understanding. As shown in Gunbayi (2020:41–53) the analysis of a mixed-methods dissertation, the researcher used the qualitative component to explore *how* school principals developed pedagogical leadership, while the quantitative component was used to assess *the extent* to which these principals practised it. The complementarity between the "how" and "to what extent" questions is valuable for research on innovation hubs, where understanding both the mechanisms and the prevalence of innovation practices is crucial.

The integration between qualitative and quantitative phases is a key advantage of exploratory sequential design. Kagoma et al. (2025:15) emphasise the importance of clearly articulating how themes and insights from the qualitative phase inform the development or refinement of quantitative instruments and the formulation of hypotheses**,** thereby promoting a more cohesive and well-integrated research design. This integration ensures that quantitative measurements are directly informed by qualitative insights, thereby enhancing the validity and relevance of findings in studies of innovation hub ecosystems.

Unlike embedded or transformative designs, which may prioritise addressing specific issues or supporting one data type with another, exploratory sequential design creates a logical progression of understanding that builds from exploration to measurement. This structured design is particularly advantageous for studying innovation hubs, as it enables researchers first to identify key stakeholders, processes, and contextual factors before attempting to measure their relationships and impacts (Gunbayi, 2020:41–53).

While the exploratory sequential mixed-methods design is powerful for comprehensive research exploration and development, it requires a thorough approach to planning and resources to coordinate both phases and achieve cohesive integration (Ahuja et al., 2018:2-10).

In conclusion, the exploratory sequential mixed-methods design offers a structured yet adaptable framework for addressing complex research questions, particularly in areas with limited theoretical foundations. By beginning with qualitative exploration, researchers can gain in-depth insights into the nuances of the research problem, which in turn inform and enrich the subsequent quantitative

analysis. This two-phase approach not only improves the validity and reliability of findings but also encourages the development of new theories and instruments grounded in real-world contexts. However, researchers must be prepared for challenges associated with this design, including longer timelines and the need for substantial resources. Despite these obstacles, the exploratory sequential mixed-methods approach is effective at producing comprehensive and robust results, making it a popular choice among researchers investigating unexplored or emerging fields.

3.6 POPULATION AND SAMPLING

3.6.1 Participants of the Study

The population of a study refers to the complete set of cases, units, or entities from which a sample is drawn and to which the researcher intends to generalise the findings (Saunders et al., 2009:59–87). As Willie (2024:75–79) notes, clearly defining the target population is critical for identifying suitable data sources and ensuring the validity and relevance of empirical analysis. The target population for the study comprises all stakeholders in Ghana's entrepreneurial ecosystem, with an emphasis on individuals and organisations directly and indirectly associated with innovation hubs. The estimated population for this study comprises, but is not limited to, hub managers, startup founders, investors, and policymakers.

According to the NEIP report (2023: 62–70), the number of formally registered youth-led startups that are actively participating in the national entrepreneurship system was set as a defined population at precisely 7,000. In order to establish both methodological rigour and precision for the operationalised definition of the target population, the Registrar General's Department of

Ghana (RGDG) also provided verifiable metrics related to formal enterprise registration activity, including startup density throughout the entire nation.

Hub managers are key actors responsible for managing innovation hub operations and ensuring the provision of services such as mentorship, training, and access to finance. They can provide firsthand information on the challenges and opportunities associated with sustaining innovation hubs within Ghana's entrepreneurial ecosystem.

Haukipuro et al. (2024:283–299) establish that the majority of the population comprises startup founders, as they are the primary beneficiaries of the hub's services. These are entrepreneurs across sectors such as technology, agriculture, health, and education. Through the collection of experiences, this research aims to show how innovation hubs influence startup sustainability and growth. As Chatzinikolaou (2025:74) presents, the founders offer valuable insights into the effectiveness of the hubs' interventions in facilitating access to sustainable finance.

The next significant segment of the study population comprises investors. These includes venture capitalists, agile investors, and other representatives of funds that invest in collaboration with innovation hubs in startups. These respondents provide a comprehensive understanding of the financial mechanisms being developed through the innovation hubs and of the motives underlying particular investors' investments (Bergmann & Utikal, 2021:33-37).

Lastly, policymakers and state-related institutions constitute another significant, albeit small, category within the target group. These are the main actors in determining the shape and form of both the regulatory and institutional environment within which hubs operate (Ripsas et al.,

2018:263–279). The contributions, therefore, shed light on the challenges and opportunities in supporting Ghana's entrepreneurial ecosystem.

The target population was selected to enable a thorough exploration of the research problem and the interactions among various actors within the entrepreneurship ecosystem. Innovation hubs are collaborative spaces where diverse actors convene to promote entrepreneurship and innovation. Involving a broad range of stakeholders helps the study uncover the complex dynamics that influence the success of innovation hubs in fostering sustainable financing. According to Creswell and Creswell (2017:3), hub managers provide strategic and operational insights that are vital to understanding the inner workings of innovation hubs. Their involvement is justified because they play a key role in designing and implementing programmes that meet startups' needs.

Similarly, startup founders should not be overlooked, as they are the primary beneficiaries of the hub's services. They provide firsthand information on how innovation hubs affect business development and financial sustainability. Friederici (2019:9–28) argues that the financial aspect is influenced by investors who offer information about the funding landscape and the criteria used to evaluate a startup's viability. Their insights are crucial in understanding the role of innovation hubs in connecting startups with finance.

Policymakers, however, adopt a broader macro-level perspective on the entrepreneurial ecosystem and concentrate on the regulatory and institutional factors that influence the operation of innovation hubs (Haukipuro et al., 2024:283–299). The chosen target population aligns with the research aim: of identifying and understanding the role of innovation hubs in the sustainable

financing of startups in Ghana. In this context, capturing multiple stakeholder viewpoints enables the study to address specific questions about the effectiveness of hub interventions, the challenges startups face in accessing finance, and the broader impacts of innovation hubs on entrepreneurial ecosystems. For example, hub managers and startup founders have direct knowledge of the operational issues and outcomes of innovation hubs.

Investors and policymakers contribute external perspectives to the analysis to ensure that the research problem is understood from a balanced viewpoint (Silverman, 2013:41–70). The targeted population reflects geographic and sectoral diversity within Ghana's entrepreneurial ecosystem. Innovation hubs in Ghana serve multiple industries, including technology, agriculture, and health. In this study, participants were selected from various sectors to explore industry-specific challenges and opportunities associated with innovation hubs and sustainable financing, as discussed by Chatzinikolaou (2025:74).

3.6.2 Sampling

3.6.2.1 Sample and Sampling Technique for Phase 1: Qualitative Study

For the qualitative phase, purposive sampling was employed to gather rich, context-specific insights from participants directly involved in or impacted by sustainable innovation and finance initiatives. Approximately 20-25 participants were targeted, including innovation hub managers, startup owners, innovation hub representatives, representatives from financial institutions, and policymakers. This range aligns with Creswell and Poth's (2016:23-33) guidance that 20–30 interviews are usually sufficient to achieve thematic saturation in qualitative research. Participant

selection aimed to ensure diversity across sectors, firm sizes, and levels of engagement with sustainability practices, thereby improving the representativeness and transferability of findings (Creswell et al., 2007:236–264). After an 8-week data collection period, 20 participants agreed to be interviewed and were included in the study.

3.6.2.2. Sample and Sampling Technique for Phase 2: Quantitative Study

Turning to the quantitative phase, a power analysis was conducted using G*Power 3.1 software, in accordance with established statistical conventions. The quantitative portion of this study used a stratified random sampling technique in order to select the sample of startup companies that would participate in the study. The stratified random sample was selected due to the heterogeneity of the total population of 7,000 youth-led startups, which were included in the sampling frame. Saunders et al. (2009: 228) point out that through stratifying by structural characteristics such as industry, company size and innovation potential, a representative sample could be obtained with respect to each structural category. Therefore, using a stratified random sample allowed this study to capture the exact structure of Ghana's startup innovation environment and avoid a selection bias. Through these methods, the representativeness of the sample was maximised. The parameters specified included a significance level (α) of 0.05, a desired statistical power of 0.80, and a small effect size ($f^2 = 0.02$), following the recommendations of Serdar et al. (2021:21). These parameters reflect a balanced trade-off between analytical sensitivity and practical feasibility, ensuring that the study is adequately powered to detect meaningful relationships among variables (Creswell & Poth, 2016:23-33).

The selected effect size was informed by previous empirical research on Ghanaian SMEs that used similar regression methods with multiple predictors (Appiah-Kubi, 2025:407–423). Since this study employed multiple regression and structural equation modelling with up to three main predictors, such as innovation hubs, sustainable finance, and stakeholder pressure, the power analysis indicated a minimum sample size of around 550 respondents. This number ensures adequate sensitivity to detect small but statistically significant effects, reduces the risk of Type II errors, and provides a reliable basis for generalising findings to the wider population of Ghanaian innovation hubs (i.e., startups), which is estimated to exceed one million entities (Saunders et al., 2009:59-87).

In order to correctly implement Structural Equation Modelling (SEM), which is a method used in the quantitative part of this research study, this study utilised Covariance-Based Structural Equation Modelling (CB-SEM) via the AMOS software. The advantage of CB-SEM is that it enables the simultaneous estimation of both the reliability of the measurement model as well as the structural paths specified within the conceptual framework (Awang et al., 2015:58; Byrne, 2013:243 – 267). To provide explicit analytical guidance, the structural relationships identified within the conceptual framework were converted into two linear equations incorporating direct, indirect, and interaction effects, as follows:

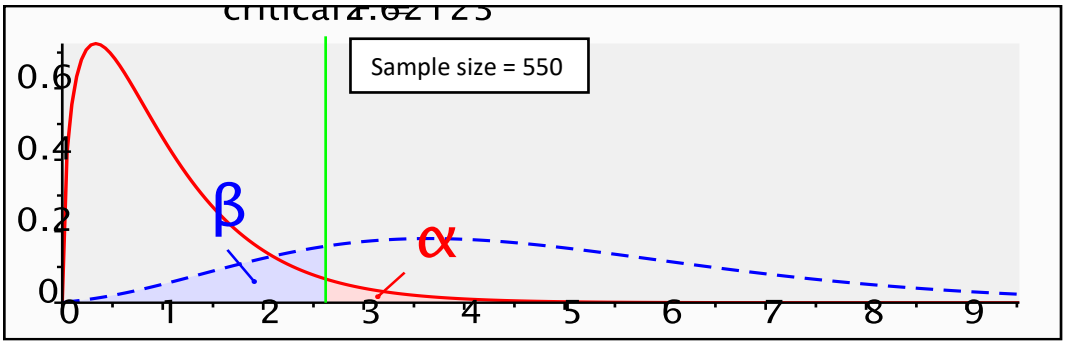
Equation 1 (Mediated Path): $SF = \beta_{10} + \beta_{11}IH + \varepsilon_1$

Equation 2: $SP = \beta_{20} + \beta_{21}IH + \beta_{22}SF + \beta_{23}STP + \beta_{24}(SF \times STP) + \varepsilon_2$

(Where IH = Innovation Hubs, SF = Sustainable Finance, SP = Sustainability Performance, STP = Stakeholder Pressure, β = respective path coefficient(s), and ε = respective error term). This set

of equations provides an exact analytical basis for assessing both the mediating role of sustainable finance and the conditional moderation impact of stakeholder pressure.

Together, these sampling strategies ensure that the study maintains both statistical generalisability and contextual depth, consistent with the principles of mixed-methods design. The large quantitative sample provides empirical reliability for hypothesis testing, while the smaller, carefully selected qualitative subsample offers interpretive insight into the mechanisms underlying the observed statistical relationships. This integrated sampling approach strengthens the internal and external validity of the study, ensuring that both the numerical trends and the lived experiences of startup actors are adequately represented.



Source: Author's Own Construct (2025)

Figure 3.3: Central and Noncentral Distributions

3.7 DATA COLLECTION

3.7.1 Data Collection and Procedures for Phase 1: Qualitative Study

For the qualitative phase, semi-structured interviews were conducted to complement the quantitative results with nuanced, context-rich perspectives. Participants were chosen through purposive sampling, targeting stakeholders directly involved in sustainability-focused initiatives. These included startup executives, innovation hub coordinators, representatives from financial institutions, and government or policy actors supporting innovation hub and startup growth. Interviews were held virtually via Zoom or Microsoft Teams, depending on the participant's preference, with each session lasting around 45 to 60 minutes. This method ensured both flexibility and inclusivity, enabling participation from respondents located in different regions. All interviews were audio-recorded with each respondent's consent, transcribed verbatim, and analysed using NVivo 14 software.

3.7.2 Data Collection and Procedures for Phase 2: Quantitative Study

In the quantitative phase, the principal data collection instrument was a structured questionnaire, which remains one of the most dominant and reliable tools in business and management research (Saunders et al., 2009:59–87). A questionnaire is defined as a systematic technique of data collection in which each respondent is presented with an identical set of questions in a predetermined order, ensuring consistency, comparability, and reliability across responses (de Vaus & de Vaus, 2013:12). Following the classification by Saunders et al. (2009:59–87) questionnaires can either be self-administered (i.e., completed directly by respondents) or interviewer-administered (i.e., completed with research assistance). This study adopted a self-administered approach, allowing respondents to complete the questionnaire at their convenience, while the researcher remained available for clarification as needed.

To improve participation, accessibility, and data accuracy, the survey was designed as an electronic format (e-survey) and distributed to participating startups across various sectors. The questionnaire was carefully organised to align with the study's theoretical framework and divided into five main sections corresponding to the study's key constructs and control variables (Saunders et al., 2009:59–87), which include:

1. Section A – Firm Information: Captured demographic and contextual variables such as firm age, size, and industry.
2. Section B – Innovation Hubs: Measured the independent variable using eight items adapted from Scaringella and Radziwon, (2018:59–87).

3. Section C – Sustainable Finance: Assessed the mediating construct with five items adapted from Appiah-Kubi, (2025:407–423).
4. Section D – Stakeholder Pressure: Captured the moderating construct using five items adapted from Appiah-Kubi, (2025:407–423).
5. Section E – Sustainability Performance: Measured the dependent variable using eight items adapted from Seuring and Müller, (2008:455-466)

An additional section assessed Socially Desirable Responding (SDR) to control for potential common method bias (CMB) using four items adapted from Borah et al. (2023:364–385). All constructs were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), which allowed for transforming subjective perceptions into quantifiable data while keeping respondents clear and engaged. The measurement items for the research instruments are listed in Appendices A and B.

Although the selected constructs offer an effective way to examine the main relationships among the entities examined, it is necessary to note some specific methodological constraints related to the construct choice. For example, in order to keep the model parsimony, several other variables were excluded. First, the model did not take into consideration individual investors' psychological or behavioural characteristics, such as risk aversion or institutional trust. Second, structural control variables, including ownership structure of the hubs (whether they are public or private), and the long-term survival rates of startups after incubation have been excluded from the analysis. Third, while there may be significant macro-economic friction influencing the Ghanaian context, such as regulatory barriers, corruption, and lack of digital infrastructure, none of these macro-economic friction items appears as separate independent or moderator variables in the research model

focusing specifically on the relationship between Hub-Startup Funding. Thus, excluding the micro-behavioural and macro-environmental variables would mean that factors affecting how likely a new company will survive would be out of the measured scope of this study. This provides a key area for expanding upon this baseline model in further studies.

Startups were randomly selected from a comprehensive database obtained from the Registrar General's Department of Ghana, ensuring broad coverage across diverse geographic regions and industrial sectors. The sample selection reflected the structural composition of Ghana's innovation hubs landscape, capturing differences in firm size, ownership, and innovation capacity. Data was collected electronically using a structured questionnaire, distributed via email, LinkedIn, WhatsApp, and Facebook networks focused on innovation hubs. This digital approach enabled cost-effective, efficient engagement with startups and innovation hubs across regions while reducing logistical barriers associated with in-person administration.

The target respondents were managers, owners, and key decision-makers with sufficient operational knowledge to provide reliable insights into firm-level strategic and financial decisions. To improve participation and data quality, respondents were given ample time to complete the questionnaire and were encouraged to seek clarification when necessary. In total, 588 valid responses were received, exceeding the minimum required sample size of 550 established by the power analysis. This strong response rate enhanced the robustness, reliability, and generalisability of the findings, offering a solid empirical foundation for advanced quantitative analyses such as Structural Equation Modelling (SEM).

3.8 DATA ANALYSIS

To ensure strong methodological coherence across all data analysis methods, the qualitative and quantitative analysis approaches for each phase of the study have been carefully connected to the research objective of the project. For this reason, the qualitative approach was strategically developed as an attempt to understand the complexities and contexts within which innovation hubs are located; it addressed the exploratory aspects of the research questions. Similarly, the quantitative strategy was established as a means to provide statistical evidence for the structural relationships, mediation and moderation effects present in the larger population regarding the confirmatory aspects of the research questions. As such, this clear division in qualitative and quantitative analytic techniques has provided a methodologically sound basis to clearly articulate the study's overall objective.

3.8.1 Qualitative Data Analysis

The qualitative corpus of data collected through in-depth interviews conducted on the purposeful sample of participants included youth-led startup founders and key ecosystem stakeholders (such as hub managers, investors, and policymakers) who represent the various actor types within the ecosystem. Therefore, the corpus of qualitative data was created through the transcription of their audio recordings taken during each participant's engagement. The transcription process ensured complete fidelity of the recorded conversations to allow for accurate comparison between the original spoken responses and subsequent interpretations. These qualitative analyses were developed with reference to major conceptual themes identified in the literature base that

corresponded to the primary qualitative research questions. More specifically, a thematic framework was developed based upon repeated patterns related to access to resources, financial accessibility and innovative behaviour; thus providing a systematic way of analysing how these variables interactively impact the sustainable direction of startup firms. Thematic analysis was used as the main qualitative method to identify recurring patterns, emerging themes, and relationships between innovation practices, financing mechanisms, and sustainability outcomes. The analytical process started with familiarisation, where all qualitative responses, interview transcripts, and secondary materials were read multiple times to gain a thorough understanding of the context. During this stage, initial notes were made to capture potential ideas related to innovation strategies, financing behaviours, and sustainability orientations.

Subsequently, coding was performed manually and with the assistance of NVivo to assign descriptive and interpretive labels to key text segments. Each code represented a unit of meaning that highlighted specific aspects of participants' innovative behaviour, sources of financing, or sustainability performance indicators. Following coding, the study engaged in theme generation, where related codes were grouped into broader conceptual categories. For instance, codes such as collaborative R&D, eco-innovation, and process adaptation were grouped under the theme "innovation practices." Items such as access to green credit and public–private financing were grouped under the theme "financing mechanisms." Similarly, concepts such as energy efficiency, waste reduction, and long-term environmental orientation were consolidated under the category of "sustainability outcomes." The emerging themes were then reviewed and refined to ensure internal coherence (logical consistency within each theme) and external distinction (clear differentiation across themes).

This iterative process involved revisiting the raw data to confirm that each theme accurately reflected participants' perspectives and was supported by sufficient evidence. Once finalised, the themes were defined and named to reflect their conceptual essence. Relationships between themes were mapped conceptually to illustrate the dynamic linkages between innovation practices, financing structures, and sustainable performance outcomes. This interpretive phase provided a nuanced understanding of how financing mechanisms support or constrain innovative efforts and how both, in turn, contribute to achieving sustainability goals. Through this rigorous analytical process, the study developed a contextually grounded thematic framework that captures the complex interaction between innovation, finance, and sustainability. Thematic analysis thus functions not only as a descriptive tool but also as an analytical lens for theory development, demonstrating how resource availability, financial accessibility, and innovative behaviour collectively influence the sustainability trajectory of firms.

3.8.2 Quantitative Data Analysis

The analytical process followed for the quantitative phase involved systematic execution of the analytical procedures using the Statistical Package for the Social Sciences (SPSS) Version 23 and AMOS Version 23. Initially, SPSS was used to screen the data for outliers, create demographic profiles and conduct descriptive statistics (frequencies, means and standard deviations). Additionally, preliminary statistical tests were completed in SPSS to establish that the data were suitable for multivariate analysis. These preliminary tests included assessments of normality using skewness and kurtosis, multicollinearity using variance inflation factors (VIF) and common

method bias using Harman's one-factor test. After completion of the preliminary diagnostics, covariance-based structural equation modelling (CB-SEM) was completed by executing AMOS to analyse both the measurement model and structural models. A confirmatory factor analysis (CFA) was initially completed on the measurement model to validate construct reliability, convergent validity (using average variance extracted and composite reliability) and discriminant validity as per the Fornell-Larcker criterion. Following validation of the measurement model based upon standard fit indices (CFI, TLI & RMSEA), estimation of the structural model ensued. The hypothesised structural Paths, representing direct, mediated, and moderated relationships, were evaluated utilising bootstrapping procedure with 5,000 resamples to produce bias-corrected confidence intervals. This non-parametric resampling technique provided assurance regarding the robustness of inferential statistics as well as the precision of hypothesis testing.

3.9 ETHICAL CONSIDERATIONS

Ethical considerations are integral to the research philosophy and methodology of this study. Following the guidelines provided by Bergmann and Utikal (2021:33-37) this study ensured that informed consent, confidentiality, and responsible use of data were obtained from participants up front. This was carried out with principles of cultural sensitivity in mind, taking into account the diverse backgrounds and perspectives of its participants. Ethics underpins research design and is paramount in engaging the target population. The study adhered to the principles of informed consent, ensuring that all participants were fully aware of the research's purpose, scope, and potential implications.

The core of ethical consideration is fundamental and forms the basis of any research, but it is especially crucial when involving human participants with sensitive data (Gostin, 1991:191–201). In the research on the role of innovation hubs in sustainable finance for Ghanaian startups, ethical

safeguards were put in place to ensure integrity and protect all involved. These safeguards were guided by established ethical principles, including informed consent, confidentiality, respect for participants, and minimisation of harm, alongside compliance with institutional and international research ethics protocols. Obtaining informed consent from all participants is a key ethical requirement for this study. Participants, including hub managers, startup founders, and investors, were provided with comprehensive information on the research's purpose, scope, and methodology. This information was communicated in clear and accessible language to ensure participants fully understood their roles in the study (Bryman, 2016:9).

Ethical clearance (i.e., Ref#: 4737, see Appendix C) was received from UNISA's Ethics Committee on 30/09/2024 before distributing and signing consent forms, and prior to data collection. Participants were informed that their involvement was voluntary and they could withdraw at any time without repercussions (Tashakkori & Teddlie, 2010:271–277). Special attention was given to potential power imbalances that may arise during interactions between researchers and participants. For example, some startup founders may feel pressured to participate because they require support from innovation hubs. To ensure fairness, participation or non-participation will not influence their relationship with the hubs or any other stakeholder involved in the study (Haukipuro et al., 2024:283–299). In interviews and surveys, the aims, scope, and potential implications of the research were explained to the respondents, as understanding these factors is crucial for the appropriate use of data collection tools.

Gaining formal entry into your participant pool, especially in situations such as corporate entities or entrepreneurial networks (Saunders et al., 2009:169), is one of the most important

methodological steps you will take. Access to both phases of this study was systematically arranged through established gatekeepers within the Ghanaian entrepreneurial ecosystem before beginning data collection. Letters explaining the research objectives, ethical clearances, and confidentiality agreements were mailed to the boards of directors at the respective innovation hubs. Preliminary access was granted through the hub managers, who acted as the first-level gatekeepers, allowing initial contact with the startup founders and investors to schedule the qualitative interviews. In addition, access to the online survey for the quantitative portion of the study was formally obtained by sending an email to the administrator of each of the online platforms (LinkedIn, WhatsApp, Facebook) providing direct access to entrepreneurs, requesting permission to distribute the electronic survey link to their membership.

Before data collection began, informed consent was obtained, and respondents were reminded that their decision to participate or withdraw from the study would incur no penalty. As suggested by Chatzinikolaou (2025:74), the research is conducted with confidentiality maintained, where identifiable information is removed to ensure respondents' privacy. Ethical considerations are essential to the data collection process. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose and their rights. Confidentiality and anonymity were preserved to protect participants' identities and sensitive information. These ethical safeguards were vital for building trust and ensuring the credibility of the research (Chirchietti, 2017:19–27).

Confidentiality was maintained to protect the privacy of participants, particularly in the case of sensitive financial information shared by startup founders and investors (Bergmann & Utikal,

2021:33-37). Additionally, the study ensured that cultural sensitivity was maintained in its interactions with participants, given the diverse backgrounds and experiences that typify Ghana's entrepreneurial ecosystem. The participants' identities, including names and contact information, were kept confidential; even identifying characteristics were anonymised using pseudonyms. Secure data storage practices were utilised to protect this data.

Data from interviews, surveys, and focus group discussions are digitally stored in encrypted files that are accessible only to members of the research team (Chirchietti, 2017:19–27). This ensured that sensitive information about participants or their businesses was not disclosed to unauthorised parties. Given the competitive nature of startups and the potential risks of sharing financial or strategic information, anonymity is essential in this study.

Moreover, participants were informed that they have the right to withdraw at any time during the study without penalty. The study ensured that hub managers, startup founders, investors, and policymakers were represented to analyse the role of innovation hubs in promoting sustainable financing. This approach aligned with the research objectives, providing a solid foundation for addressing the challenges and opportunities linked to supporting startups in Ghana.

“No harm" was another fundamental principle guiding this research ethically. The research was designed to avoid potential risks to participants, including physical, psychological, and social risks. Sensitive questions, like funding challenges or business failures, should be put in a sensitive and empathetic manner to the interviewee (Bergmann & Utikal, 2021:33-37). Accordingly, it was made clear to all participants that they should not answer any questions if doing so made them

uncomfortable or stressed. This research also does not engage in any activity that could damage the reputation or operations of any of the participating innovation hubs or startups. This includes presenting findings in aggregate form, highlighting trends and observations rather than singling out a particular entity or criticising a specific business. This approach made the participants feel valued and respected during and after the research process.

According to Friederici (2019:9–28) the importance of transparency in the research process, it builds trust and maintains credibility in the research. Informed consent obtained from participants ensures that they are kept abreast of the study's progress and how their contributions are utilised. At the end of the research, results are communicated to interested participants in a way that explains how their contributions influenced the research outcome. According to Chirchietti, (2017:19–27), such a practice indicates respect from the participants, while also adding practical relevance to the study by sharing findings with stakeholders. They are also responsible for ensuring that the data collected is used solely for the research. Any other use, for instance, when writing articles, should also be approved by the ethics review committee, and consent from participants must be reobtained to prevent malpractice with the data and to uphold the integrity of the research process (Bryman, 2016:9).

Given the Ghanaian context of this study, cultural sensitivity is a vital ethical consideration. Researchers actively strive to be informed about and respectful of local customs, traditions, and communication practices (Friederici, 2019:9–28). This involves consulting local experts and stakeholders during the design of research and data collection methods to ensure cultural suitability.

For example, focus group discussions are organised to promote open dialogue while respecting hierarchical and social norms.

Language barriers were addressed by employing translators or research assistants in local languages as needed. This ensured that participants fully engaged in the process without linguistic constraints, making the data collected both inclusive and reliable (Haukipuro et al., 2024:283–299). The study also complied with institutional and international research ethics guidelines, as stipulated by the relevant review boards, and obtained ethical clearance. The process involved scrutinising the research proposal to confirm that all ethical considerations had been addressed.

Additionally, researchers received training in research ethics to equip them with the knowledge and skills needed to address ethical issues (Tashakkori & Teddlie, 2010:271–277). The study examined data protection laws, such as Ghana's Data Protection Act, 2012 (Act 843), which prescribe the criteria for processing personal data. These legal requirements add an extra layer of accountability concerning participants' rights and privacy during the research process (Kapp, 2006:335–339). Ethical considerations underpin the study, which is conducted with integrity, respect, and responsibility. The research addressed issues such as informed consent, confidentiality, cultural sensitivity, and compliance with ethical standards to safeguard participants and enhance the credibility and validity of the findings. Overall, these ethical safeguards fostered stakeholder trust and supported ongoing discussions on innovation hubs and sustainable finance in Ghana.

Finally, the sampling processes raise ethical considerations, given the involvement of diverse stakeholder groups. All interviewees provided informed consent, demonstrating their awareness

of the study's goals, scope, and potential consequences. In this way, participants' confidentiality was protected throughout the research process: "their identity and all information considered sensitive" (Bergmann & Utikal, 2021:33-37). This was also reflected in the sampling process, in which equity across all stakeholder groups was ensured and equal opportunities for participation in this study were maintained.

3.10 VALIDITY AND RELIABILITY OF DATA

Human experiences are rich and diverse, which can make replication challenging (Iso-Ahola, 2020:21-83). To enhance the validity of participants, reflexivity was adopted by the researcher to openly consider participants' influence (Darawsheh, 2014:560–568). Validity and reliability are two essential methodological concepts that greatly affect the overall effectiveness and rigour of research design, especially in mixed-methods studies involving innovation hubs (Liu et al., 2015:146–148). Validity indicates how well a measurement truly reflects the intended construct or concept under investigation. In research methodology, validity includes several aspects, such as construct validity, internal validity, and external validity (Liu et al., 2015:146–148).

Content validity, specifically, focuses on how comprehensively a measure represents all aspects of a given construct within the study (Aryani et al., 2024:3731–3738). Reliability, on the other hand, concerns the consistency and trustworthiness of measurement results; it examines whether measurements yield similar results when repeated under the same conditions, thereby determining the stability of findings across multiple measurements (Aryani et al., 2024:3731–3738). Both validity and reliability considerations are integral components of the research methodology chapter, alongside other elements such as research design, population definition, sampling techniques, and data collection procedures (Abowitz and Toole, 2010:108–116; William, 2024:32-45).

To start with, this study carried out preliminary tests (i.e. pilot testing) with three participants for qualitative analysis and 20 respondents for quantitative analysis. Additionally, three subject experts were involved in refining the measurement items. Their suggestions were incorporated into the final questionnaire, enhancing content validity.

In an exploratory sequential design studying innovation hubs, multiple types of validity must be addressed to ensure research rigour. Construct validity refers to the extent to which measurements accurately represent the intended concepts being studied (Ginty, 2020:538–538; Locke, 2012:146–148). This was enhanced through triangulation of multiple data sources, establishing clear evidence chains, and having key informants review research outputs (Locke, 2012:146–148). As González-Prieto et al. (2023:202) mentioned, validity fundamentally refers to "the trustworthiness of the results, and to what extent the results are true and not biased by the study's subjective point of view".

Furthermore, the generalisability of findings to other contexts and cases (Hays & McKibben, 2021:178–188) is challenging in exploratory research. This was enhanced through representative sampling and theoretical frameworks derived from literature (Scaringella & Radziwon, 2018:59–87). The tension between internal and external validity often necessitates sequential research designs that combine experimental elements (high internal validity) with field studies or observations (enhanced external validity), as argued by Grum et al. (2021:1431–1440).

Additionally, conclusion validity (sometimes called inferential validity) assesses whether statistical conclusions and inferences drawn from data are appropriate (Coe, 2017:44–56). In

mixed-methods studies of innovation hubs, this relates to both quantitative components (statistical conclusion validity) and qualitative elements (analytical and inferential validities) (Coe, 2017:44–56). To maintain these various types of validity in exploratory sequential designs, the study employed strategies such as data triangulation, member checking, detailed descriptions, bias clarification, and reporting discrepant information (González-Prieto et al., 2023:202) coupled with enhancing validity through standardised survey instruments and consistent interview protocols to strengthen both the reliability and validity of findings (Nkwake, 2015:97–110).

3.10.1 Reliability Measures in Exploratory Sequential Design

Reliability in exploratory sequential designs pertains to the degree to which measurement results can be trusted and whether similar outcomes would be attained if the research were repeated under identical conditions (Aryani et al., 2024:3731–3738). For studies of innovation hubs employing exploratory sequential designs, reliability measures must address both qualitative and quantitative research elements to ensure consistency of findings. This can be achieved through standardised survey instruments and consistent interview protocols, which greatly enhance the reliability of both quantitative and qualitative data (Nkwake, 2015:97–110).

Documentation is vital in establishing reliability within exploratory sequential designs. Comprehensive and continuous documentation of interviews, clear transcription guidelines, standardised questionnaires, and audio recordings all contribute to the reliability and reproducibility of results (Warasthe et al., 2020:12).

Internal reliability was enhanced through collaborative approaches to data collection and analysis. For example, involving multiple research assistants during interviews and maintaining consistent

communication among respondents helps ensure coherent interpretation of data (Ranney et al., 2015:1103–1112). Post-interview discussions among research assistants to align their understanding of the collected information and immediate documentation through recordings and transcriptions further strengthen internal reliability (Ranney et al., 2015:1103–1112). In exploratory sequential studies on innovation hubs, reliability is improved by triangulating data across multiple methods, which promotes transparency in the research process and highlights connections between the different methods used (Wulfert, 2023:27). Some researchers also assess data saturation as a reliability indicator, observing when the addition of new data yields diminishing returns, suggesting sufficient data has been collected.

3.10.2 Triangulation Strategies

Triangulation is a vital methodological strategy in exploratory sequential design studies, particularly for research on innovation hubs. It is a key approach to ensure both validity and reliability by cross-verifying findings through multiple perspectives and data sources (Liu et al., 2015:146–148). This study used various forms of triangulation to enhance its rigour, including data triangulation (utilising multiple data sources), investigator triangulation (involving several researchers), methodological triangulation (combining different research methods), environmental triangulation (collecting data in different settings), and theory triangulation (applying various theoretical perspectives) (Abdalla et al., 2018:19). The combined application of these multiple data sources helps establish a robust evidence trail from raw data through analysis to the development of the theoretical model, significantly improving construct validity (Iso-Ahola, 2020:21-83).

Method triangulation, in particular, has proven particularly valuable in innovation hub research because it combines both quantitative and qualitative methods to deliver more comprehensive insights while reducing the biases associated with each approach used individually (Obiora, 2023:45-55). For example, researchers might first employ structured digital questionnaires with innovation hub participants, followed by focus group discussions involving both innovators and regulatory stakeholders (Obiora, 2023:45-55; Schoonenboom & Johnson, 2017:107–131). This sequential use of mixed methods enables a more in-depth exploration of study variables while minimising methodological bias.

In addition to methodological triangulation, researchers studying innovation hubs can enhance validity through participant triangulation by including multiple stakeholder perspectives, such as individuals, incubation hubs as groups, and research communities, to gain a more comprehensive view of the innovation ecosystem (Obiora, 2023:45-55). Member checking, where participants review and provide feedback on the accuracy of data analysis, further reinforces this approach (Denzin, 1977:905–920). For sequential exploratory designs specifically, triangulation strategies align well with the overall methodological approach, as they facilitate initial qualitative investigation of research questions followed by quantitative validation of findings (Alkhoraif, 2024:8515). This approach not only helps researchers identify key features of the research problem but also supports the development of practical recommendations for improving innovation governance and policies within innovation hub environments (Alkhoraif, 2024:8515).

Following Creswell's recommended methodology for improving validity in exploratory case studies, researchers often combine data triangulation with other validation techniques such as

member checking, rich description, bias clarification, and reporting discrepant information (González-Prieto et al., 2023:202). Through triangulation, researchers can ensure that both the quantitative component (measurement and inferential validity) and the qualitative component (design, analytical, and inferential validity) of their mixed-methods research maintain high standards of rigour (Turner et al., 2017:243–267). This comprehensive approach to triangulation ultimately allows for more complete, accurate, and trustworthy findings regarding innovation hubs.

3.11 CHAPTER SUMMARY

This chapter has presented the methodological framework underpinning the study, based on a pragmatic research philosophy. Pragmatism was selected to address the complex, real-world dynamics of innovation hubs, facilitating the integration of qualitative and quantitative methods through a mixed-methods design. An exploratory sequential design was employed, beginning with qualitative inquiry to explore themes, which then informed the subsequent quantitative phase. A stratified sampling strategy was implemented to ensure representation across key categories, including various types of innovation hubs and stakeholder groups. This approach helped maintain both diversity and relevance within the study population, comprising hub managers, entrepreneurs, policymakers, and support actors.

Sample sizes for both phases were determined using established methodological criteria; saturation for qualitative data and statistical power for quantitative analysis, ensuring both depth and reliability of findings. Ethical considerations, pilot testing, and triangulation were employed to support validity and mitigate limitations. Despite constraints such as limited access to certain stakeholders and potential response bias, the chosen methodology provided a robust and flexible approach to understanding the structure, operations, and impact of innovation hubs. Integrating

multiple data sources and methods contributes to a more nuanced and contextually sensitive analysis.

In summary, this chapter justifies the methodological choices made and shows how they align with the research objectives. The findings from this approach are presented in the next chapter.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 INTRODUCTION

In accordance with Creswell et al., 2017:236–264, who formalised the exploratory sequential mixed-methods design as justified in section 3.5.2, this chapter will follow a clear structure to be consistent with this methodology. The chapter has been divided into two sections to provide clarity on the different parts of the methodology used in this study. In order to maintain consistency within the methodologies presented in this section, Part I of this chapter will present the qualitative aspects of the study, including the themes identified from interviews with key individuals involved in the ecosystem being studied. Part II will then describe the quantitative testing section of the study using Covariance-Based Structural Equation Modelling (CB-SEM) to empirically assess the extent to which the theoretical constructs identified during the qualitative aspect of the study were supported by data.

This chapter details the procedures and results of the validity and reliability assessments carried out to ensure the robustness of the measurement model. Specifically, the analyses included confirmatory factor analysis (CFA) to validate the factor structure. Various forms of validity were examined, such as content validity, convergent validity, discriminant validity, and nomological validity, each aimed at confirming the theoretical soundness and empirical adequacy of the constructs. Additionally, tests of normality were conducted to verify the distributional assumptions underlying the statistical techniques used. Potential biases were addressed by assessing common

method bias/variance, ensuring that observed relationships were not artefacts of the data collection process.

Furthermore, this chapter presents and interprets the empirical results derived from the data analysis. It starts with an examination of the demographic characteristics of the respondents, which form the contextual foundation for understanding the dataset and ensuring the sample's representativeness. The demographic variables are summarised and reported using descriptive statistics, specifically frequencies and percentages, to offer a clear profile of the participating firms and decision-makers.

Beyond demographic information, the chapter also provides descriptive analyses of the four main constructs of the study, namely innovation hubs, sustainable finance, stakeholder pressure, and sustainability performance. For each construct, statistical measures such as means, standard deviations, minimum, and maximum values were calculated to capture the central tendency, variability, and distributional properties of the data. These measures help to establish an initial understanding of the dataset and ensure that the constructs are adequately characterised before moving on to more advanced inferential analyses.

To rigorously test the hypothesised relationships and meet the study’s objectives, the analysis employed Covariance-Based Structural Equation Modelling (CB-SEM) in AMOS (Version 23) as the main statistical method. CB-SEM was chosen for its robustness in estimating measurement models and structural paths simultaneously, thereby enabling a thorough evaluation of construct validity and the strength of hypothesised relationships. Additionally, the technique allows for the

management of multiple interconnected dependencies, making it suitable for this study's multidimensional conceptual framework.

Finally, to examine the moderating effect of stakeholder pressure and explore the conditional nature of the relationships among the study's variables, a Two-Way Interaction analysis was performed. The results of this analysis were visualised through interaction plots, which provide additional insights into the nuanced dynamics between sustainable finance, stakeholder pressure, and sustainability performance. These graphical representations deepen the interpretation of findings by illustrating how the effect of one variable on performance outcomes varies across different levels of another variable.

4.1 PHASE I

The following sections present the findings from the initial qualitative phase, which served to contextually explore the mechanisms of sustainable finance and sustainability performance among startups prior to large-scale statistical validation.

4.2 PRELIMINARY ANALYSIS – QUALITATIVE COMPONENT

The preliminary analysis of the qualitative data aimed to provide an interpretive understanding of how innovation hubs, sustainable finance, stakeholder pressure, and sustainability performance are perceived and operationalised by startup managers and key institutional actors. This phase sought to identify emerging patterns, shared meanings, and conceptual linkages that complement and deepen the insights derived from the quantitative results.

Data were collected through semi-structured interviews with 20 participants, including startup managers, financial officers, innovation hub coordinators, and representatives from regulatory and financial institutions. Each interview lasted between 45 and 60 minutes and was conducted either in person or through a virtual platform to promote inclusivity and flexibility. All interviews were recorded with consent, transcribed verbatim, and subsequently imported into NVivo 14 software for systematic coding and analysis (Anas et al., 2025:26–32).

Following the Braun and Clarke, (2006:77–101) six-phase framework for thematic analysis, the qualitative data were analysed through a rigorous and iterative process as outlined below:

4.2.1 Familiarisation with the Data

The researcher immersed themselves in the data by reading and re-reading all transcripts while noting initial ideas and reflections. This stage facilitated a deep understanding of participants' narratives and contextual nuances related to innovation practices, financial accessibility, and sustainability engagement.

4.2.2 Generating Initial Codes

Using NVivo 14, the transcripts were analysed line by line to develop open descriptive codes that identified meaningful data segments. Coding was both inductive (emerging from participants' language) and deductive (informed by the study's conceptual framework). Examples of initial codes included *"innovation networks," "green loan barriers," "regulatory expectations,"* and *"strategic sustainability drivers."*

4.2.3 Searching for Themes

The initial codes were systematically collated into potential themes representing broader patterns of meaning. This process involved clustering related codes under higher-order categories such as *"Innovation Hub Functions," "Sustainable Finance Barriers,"* and *"Stakeholder Influence."*

4.2.4 Reviewing Themes

Each potential theme was examined in relation to the coded data and the entire dataset to ensure internal coherence and external distinction. Themes lacking sufficient supporting evidence were either refined, combined with others, or discarded. This iterative review process improved analytical credibility and minimised researcher bias.

4.2.5 Defining and Naming Themes

Once a stable thematic structure was established, each theme was clearly defined to reflect its core concept. The definitions were refined to clearly express each theme's meaning, its connection to the research objectives, and its role in the wider narrative of SME sustainability and innovation practices.

4.2.6 Producing the Report

Finally, the themes were woven into a coherent narrative, supported by illustrative quotations and conceptually linked to the study's quantitative findings. This phase emphasised the interpretive integration of results, providing a holistic understanding of how digital innovation, financial accessibility, and stakeholder dynamics interact to influence sustainability performance among startups.

Through this process, four overarching themes emerged:

1. Perceived Role of Innovation Hubs: Innovation hubs were identified as catalysts for knowledge exchange, networking, and access to sustainable finance.
2. Financial Accessibility and Barriers: Managers emphasised limited access to sustainable finance, citing a lack of tailored green investment instruments and institutional incentives.
3. Stakeholder Expectations and Compliance Pressure: Participants viewed regulatory and customer-driven pressures as key motivators for adopting sustainability practices.
4. Sustainability as a Strategic Performance Driver: Respondents increasingly recognised sustainability as a source of competitive advantage, although operational and financial challenges persist.

These themes indicate that innovation hubs operate as enabling ecosystems that promote sustainability awareness and facilitate financial connections, while stakeholder pressures strengthen compliance and strategic alignment. Overall, the thematic analysis adds contextual richness and interpretive depth, complementing the quantitative findings from Structural Equation

Modelling (SEM) and providing a nuanced understanding of the links between innovation, finance, and sustainability among startups.

4.3 Qualitative Study

Table 4.1 below displays the descriptive characteristics of the 20 respondents, offering an overview of their age, educational background, work experience, and positions. Concerning age distribution, 5.0% of respondents were aged 18–24 years, while the largest group (75.0%) was aged 25–34 years. Additionally, 15.0% were aged 35–44 years, and 5.0% were 45 years and above. Regarding educational qualifications, 65.0% held a bachelor's degree, 10.0% had a master's degree, 5.0% possessed a doctorate, and 20% reported other qualifications. This suggests that most respondents had a bachelor's degree as their highest level of education.

Table 4.1 Respondents' Demographics

Variable	Responses	Frequency (*N*)	Percentages (*%*)
Age	18-24 years	1	5.0
	25-34 years	15	75.0
	35-44 years	3	15.0
	45 years and above	1	5.0
	Totals	**20**	**100.0**
Qualification	Bachelor's degree	13	65.0
	Master's degree	2	10.0
	Doctorate	1	5.0
	Other	4	20
	Totals	**20**	**100.0**
Experience	Less than 1 year	6	30.0
	1-3 years	6	30.0
	4-6 years	5	25.0
	7-10 years	1	5.0
	More than 10 years	2	10.0
	Totals	**20**	**100.0**
Position	Manager of Innovation Hub	17	85.0
	Innovation hub coordinator	1	5.0
	Financial institution Rep	2	10.0

Totals	**20**	**100.0**

Source: Author's Own Conception, (2025)

Regarding work experience, 13.0% had less than 1 year, 30.0% reported 1–3 years, 25.0% indicated 4–6 years, 5.0% had 7–10 years, and 10.0% had more than 10 years. Therefore, the largest group of respondents had less than 1 year or between 1–3 years of experience. Finally, the position distribution revealed that 85.0% were managers, 5.0% were innovation hub coordinators, and 10.0% were representatives of financial institutions. Consequently, most of the sample were managers. It should be noted that due to the high number (85%) of managers in this study (hub/startup), there is a greater risk of confirmation bias. Due to their position, managers have a natural incentive to present their hub/startup as successful and therefore positively. As such, because we lack diversity of opinion/critical perspectives, and include no opinions from failed startups, or dissenting voices from within the system, the results from this qualitative research need to be viewed cautiously. The results are reflective of the experiences of those who survived and built the current state of the ecosystem, which means they may naturally validate the success of the hubs as opposed to providing a comprehensive or objective analysis of the systemic failures.

4.4 QUALITATIVE ANALYSIS RESULTS

A thematic analysis was conducted of qualitative data from 20 semi-structured interviews with startup managers/owners, innovation hub coordinators, and financial officers. The data were analysed in NVivo 14 using the six-step thematic analysis framework proposed by Braun and Clarke (2006:77–101). While NVivo 14 was utilised for robust data management and initial coding, the abstraction of these codes into themes was a manual, cognitive process performed by the researcher to ensure deep interpretive engagement with the data. This structured approach ensured

transparency, rigour, and coherence throughout the qualitative data analysis process. The six stages are described below.

4.4.1 Familiarisation With the Data

The researcher immersed themselves in the interview transcripts by reading and re-reading them multiple times while listening to the original audio recordings. This phase facilitated a deep understanding of participants' perspectives and helped identify initial impressions, recurring ideas, and potential patterns related to innovation, sustainable finance, and stakeholder engagement. Brief notes and reflections were recorded to inform subsequent analysis.

4.4.2 Generating Initial Codes

In NVivo 14, the data were coded line by line to identify meaningful features and assign descriptive labels, or codes, to relevant text segments. Both inductive codes (which emerged directly from participants' words) and deductive codes (guided by the study's conceptual framework) were developed. For example, codes such as *"access to green loans," "network support,"* and *"compliance pressure"* emerged at this stage.

4.4.3 Developing Initial Themes

Related codes were then organised into broader categories or potential themes that represented shared meanings or concepts. This phase involved clustering similar codes to uncover underlying structures, for example, grouping *"innovation networks"* and *"knowledge sharing"* under a broader theme of *"Role of Innovation Hubs."*

4.4.4 Reviewing Themes

The preliminary themes were systematically reviewed against the coded extracts and the entire dataset to ensure they accurately reflected participants' views and were supported by sufficient evidence. Themes that lacked coherence or distinctiveness were revised, merged, or discarded. This iterative process improved analytical validity and maintained internal consistency.

4.4.5 Defining and Naming Themes

Each refined theme was clearly defined to capture its conceptual boundaries and contribution to the overall narrative. Detailed descriptions were created to explain the essence of each theme and how it related to the research objectives. The naming process ensured that theme titles were concise, representative, and analytically meaningful.

4.4.6 Producing the Report

In the final stage, the themes were woven into a coherent analytical narrative supported by illustrative quotations from participants. The discussion connected these themes to the quantitative findings and the theoretical framework, emphasising how innovation hubs, financing mechanisms, and stakeholder pressures interact to influence startups' sustainability performance.

This six-phase process offered a systematic and iterative pathway from raw qualitative data to meaningful interpretation, ensuring that the analysis was both credible and firmly rooted in the empirical evidence. Figure 4.1 demonstrates an example of the data structure for the main theme "Innovation Hubs as Catalysts for Sustainable Transformation".

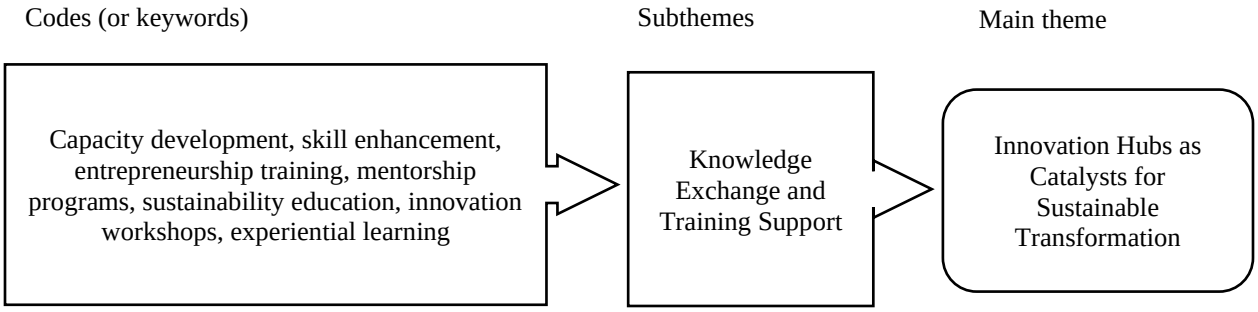
Through inductive and deductive coding, four major themes and associated subthemes emerged, representing participants' perceptions of how innovation hubs, sustainable finance, stakeholder pressure, and sustainability performance interact within Ghana's startup sector.

Theme 1: Innovation Hubs as Catalysts for Sustainable Transformation

Subthemes:

- Knowledge exchange and training support.
- Digitalization and innovation capacity building.

- Networking and collaboration opportunities.



Source: Author's Own Conception (2025)

Figure 4.1. An Example of Data Structure

Respondents consistently regarded innovation hubs as essential for promoting sustainability-focused innovation. Several managers emphasised that participation in hub programmes improved their technical knowledge, provided access to research, and facilitated collaboration with startups. Innovation hubs were described as "learning ecosystems" that accelerate startup adaptation to digital and green business models.

"The innovation hub gave us access to mentors and technology that helped us digitise our operations sustainably." — Participants: R4, R6, R7, R15, R17, R19.

Theme 2: Access to Sustainable Finance and Resource Constraints

Subthemes:

- Limited availability of green finance products.
- Stringent loan requirements.
- Institutional support and financial literacy gaps.

Most respondents identified financing constraints as a key barrier to implementing sustainability projects. While innovation hubs initially provide exposure to sustainability funding opportunities, many startups struggle to secure loans or grants. This highlights the mediating role of sustainable finance between innovation hubs and performance outcomes.

“Even with our sustainability plan, it’s hard to find banks that understand or support green financing.” — Participants: R1, R3, R8, R10, R11.

Theme 3: Stakeholder Pressure as a Driver of Sustainable Behavior

Subthemes:

- Regulatory compliance and reporting requirements.
- Customer expectations for eco-friendly practices.
- Investor and community influence.

Stakeholder expectations emerged as strong motivators for sustainability engagement. Startups facing increased regulatory scrutiny or heightened customer awareness were more proactive in incorporating sustainability into their operations.

“Our clients increasingly ask about environmental certifications. That pressure pushes us to adopt sustainable practices.” — Participants: R2, R5, R12, R14, R20.

Theme 4: Sustainability Performance as a Strategic Outcome

Subthemes:

- Operational efficiency and cost savings.
- Enhanced corporate reputation and competitiveness.
- Employee engagement and innovation culture.

Respondents emphasised that sustainability is now a core strategic priority rather than a peripheral concern. Many associated sustainability practices with enhanced performance, productivity, and long-term market positioning.

“Sustainability helps us cut waste and attract responsible investors—it’s good business, not just a social responsibility.” — Participants: R13, R16, R18.

4.5 CROSS-THEME CONCEPTUAL MODEL FROM THEMATIC ANALYSIS

Table 4.2 provides a comprehensive summary of the thematic analysis results, synthesising the core mechanisms that form the empirical basis for the conceptual model.

Table 4.2 Summary of Thematic Analysis Results (n = 20)

Theme	Subthemes	Illustrative Quotes	Interpretation / Link to Research Constructs
1. Innovation Hubs as Catalysts for Sustainable Transformation	• Knowledge exchange and training • Digitalization and innovation • Networking and collaboration	"The hub gave us access to mentors and technology that helped us digitize sustainably." (R7)	Innovation hubs enhance SMEs' innovation capacity and knowledge sharing, influencing sustainability adoption.
2. Access to Sustainable Finance and Resource Constraints	• Limited green finance • Loan requirements • Financial literacy gaps	"Even with our sustainability plan, it's hard to find banks that support green projects." (R11)	Sustainable finance mediates the link between innovation hubs and sustainability performance.
3. Stakeholder Pressure as a Driver of Sustainable Behaviour	• Regulation and compliance • Customer and investor expectations • Social legitimacy	"Clients ask for eco-certifications; that drives us to improve." (R5)	Stakeholder pressure moderates firm commitment to sustainable finance and innovation.
4. Sustainability Performance as a Strategic Outcome	• Operational efficiency • Competitive advantage • Reputation and innovation culture	"Sustainability helps us cut waste and attract investors." (R18)	Sustainability performance is the cumulative result of innovation, financing, and stakeholder engagement.

Source: Author's Own Conception (2025)

The qualitative findings reveal a dynamic, interconnected system through which innovation hubs, sustainable finance, stakeholder pressure, and sustainability performance interact to drive responsible business transformation among startups. This model synthesises participants' narratives into a unified theoretical framework that complements and enriches the quantitative results.

The study shows that innovation hubs act as catalysts for sustainability-focused innovation by offering startups technical expertise, networking opportunities, and access to collaborative learning spaces. These hubs nurture firms' ability to incorporate sustainability into their business models, serving as the starting point for the transformation process. However, translating innovation capabilities into tangible sustainability outcomes depends heavily on access to sustainable finance. Financial resources enable SMEs to implement innovation-driven sustainability strategies, such as adopting renewable energy, reducing waste, and adopting eco-efficient production practices. Therefore, sustainable finance serves as a mediating mechanism, translating support from innovation hubs into measurable performance improvements.

At the same time, stakeholder pressure from regulators, customers, investors, and communities acts as a moderating force. Firms facing greater external scrutiny tend to adopt sustainable financing more proactively and report stronger sustainability outcomes. As a result, stakeholder influence reinforces the connection between innovation hubs and sustainable finance while ensuring that sustainability practices remain transparent and credible.

Finally, sustainability performance emerges as the strategic outcome of this system, characterised by improved operational efficiency, corporate reputation, and long-term competitiveness. The integration of innovation capability, financial enablement, and stakeholder accountability creates a reinforcing cycle that promotes environmental and social goals alongside business growth.

The qualitative thematic analysis that was conducted in Part I describes the key mechanisms by which innovation hubs stimulate sustainable finance and influence the sustainability performance of youth-led start-ups in Ghana. In line with the integration principles of the exploratory-sequential design (Guetterman et al., 2015:554–561), the qualitative findings generated herein informed the development of the quantitative measurement models. More specifically, the cross-theme conceptual model developed within Section 4.5 formed the empirical basis for the hypotheses regarding the structural relationship. Thus, the study moves from exploring a context to statistically testing an empirically based theory in Part II, quantifying the degree to which these theoretically-based relationships exist.

4.6 PHASE II

Building upon the qualitative foundations established in Part I, this section presents the rigorous statistical testing of the study's structural models using data gathered from 588 respondents.

4.7 DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

4.7.1 Quantitative Study

Table 4.3b below presents a descriptive analysis of the characteristics of the sampled firms, offering a detailed overview of the 588 respondents included in the study. By industry type, the distribution shows that a significant majority (401 firms, 68.2%) operated in the service sector,

whereas 187 firms (31.8%) were classified as manufacturing firms. This distribution aligns with national statistics reported by the Ghana Statistical Service, which indicate that services form the largest portion of startups in Ghana, particularly in trade, hospitality, and professional services (Attrams & Tshehla, 2022:228–236). Although fewer in number, manufacturing startups are key to industrial diversification, employment generation, and Ghana's long-term development goals under the government's "One District, One Factory" policy framework (Mensah et al., 2021:703–721). Therefore, the sample reflects the national startup structure, ensuring it is representative in respect to sectoral distribution.

Firm age, measured by years of operation, was also evaluated. Results indicate that 67 firms (11.4%) had been operating for less than five years, representing relatively young startups, many of which might still be in the survival stage of the business lifecycle. The largest group consisted of firms that had been operational for 5–10 years, accounting for 268 startups (45.6%), suggesting that a significant proportion of Ghanaian startups in the sample are moving from the startup to the growth phase. A total of 106 respondents (18.0%) reported operating for 11–15 years, while 85 startups (14.5%) had been in operation for 16–20 years. Additionally, 62 respondents (10.5%) had existed for over 20 years which resulted in considerable resilience and experiential learning. To provide deeper insight into the structural composition of the sample, a cross-tabulation between Firm-Industry and Firm Age was conducted. As illustrated in Table 4.3a, there is a distinct demographic variance between the sectors. Service-oriented startups are predominantly younger, with 78.9% of all service firms falling in the 'Less than 5 years' category. Conversely, manufacturing firms demonstrate greater longevity within the ecosystem, comprising 47.6% of all firms that have been operational for 'Above 20 years'. This cross-tabulation confirms that while

the service sector drives recent startup proliferation, the manufacturing sector retains a higher proportion of legacy firms.

Table 4.3a Cross-tabulation of Firm-Industry and Firm Age

			Age					
			Less than 5 years	5-10 years	11-15 years	16-20 years	Above 20 years	Total
Firm-Industry	Manufacturing	Count	12	33	28	37	100	210
		% within Firm-Industry	5.7%	15.7%	13.3%	17.6%	47.6%	100.0%
		% within Age	21.1%	47.1%	26.9%	39.8%	38.2%	35.8%
	Service	Count	45	37	76	56	162	376
		% within Firm-Industry	12.0%	9.8%	20.2%	14.9%	43.1%	100.0%
		% within Age	78.9%	52.9%	73.1%	60.2%	61.8%	64.2%
Total		Count	57	70	104	93	262	586
		% within Firm-Industry	9.7%	11.9%	17.7%	15.9%	44.7%	100.0%
		% within Age	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4.3b Startup Characteristics

Firm Characteristics	Response	Frequencies (N)	Percentages (%)
Industry	Manufacturing	187	31.8
	Service	401	68.2
	Total	***588***	***100***
Firm Age	Less than 5 years	67	11.4
	5-10 years	268	45.6
	11-15 years	106	18.0
	16-20 years	85	14.5
	Above 20 years	62	10.5
	Total	***588***	***100***
Firm Size	1-20 employees	197	33.5
	21-40 employees	106	18.0
	41-60 employees	95	16.2
	61-80 employees	66	11.2
	81-100 employees	124	21.1
	Total	***588***	***100***

Source: Author's Own Conception, (2025)

Compared to national startup surveys (Mensah et al., 2024:703–721; Wu et al., 2023), these findings highlight a well-balanced representation across various stages of the business lifecycle, enabling the study to include both emerging and established firms and to explore how organisational maturity influences sustainability adoption and performance outcomes.

In terms of firm size, measured by number of employees, the distribution was as follows: 33.5% of firms employed between 1–20 workers, 18.0% employed between 21–40 workers, 16.2% employed between 41–60 workers, 11.2% employed between 61–80 workers, and 21.1% employed between 81–100 workers. The predominance of firms in the smallest size category (1–20 employees) reflects the structure of Ghana's SME sector, where micro- and small-sized firms as well as startups account for the majority of businesses (Amoah and Amoah, 2018:151–157). At

the same time, the inclusion of firms across the full innovation hubs size spectrum ensures adequate coverage of variability in organisational scale (Appiah-Kubi, 2025407–423). This variation is critical for assessing whether firm size moderates the relationship among innovation hubs, sustainable finance, stakeholder pressure, and sustainability performance, particularly because startups often face greater financial and resource constraints than medium-sized enterprises.

Given the above, the demographic analysis indicates that the sample is broadly representative of the Ghanaian innovation hub landscape with respect to sector, startup age, and size. This representativeness enhances the generalisability of the findings. It provides a robust foundation for examining the dynamics of sustainability performance in a context where innovation hubs play a disproportionately significant role in economic growth, job creation, and environmental impact.

4.8 CONFIRMATORY FACTOR ANALYSIS (CFA)

The quantitative data were analysed using Confirmatory Factor Analysis (CFA) to validate the dimensional structure of the constructs and to confirm the robustness of the factor structure (see Table 4.4 and Figure 4.2 below). This analysis was performed with AMOS (Version 23) statistical software for Structural Equation Modelling (SEM) (Arbuckle, 2014:1-8). CFA offers a more rigorous approach, as it explicitly tests whether the observed variables load onto their hypothesised latent constructs in line with theoretical expectations (Byrne, 2013:243–267). Eight items measured innovation hubs, five items assessed sustainable finance, five items examined stakeholder pressure, and eight items evaluated sustainability performance. These items were grouped into four factors.

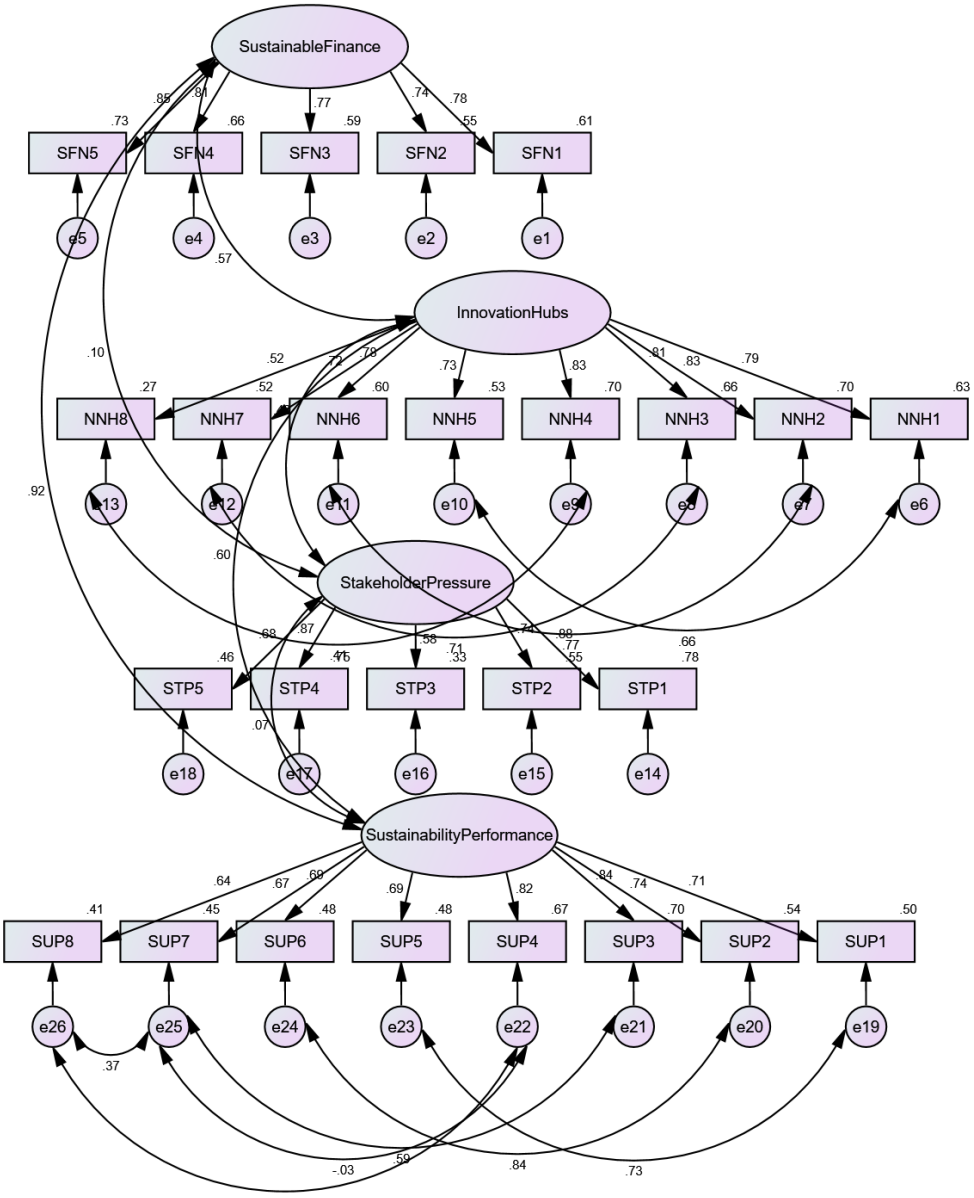
Consistent with the recommended threshold, all standardised factor loadings were expected to exceed 0.50 (Hair et al., 2019: 2–24). The CFA results confirmed that this requirement was satisfied across all constructs, indicating that the observed indicators were strong and significant representations of their respective latent factors. Specifically, the lowest loading recorded under innovation hubs was 0.721, for sustainable finance 0.720, for stakeholder pressure 0.0.567, and for sustainability performance 0.666. Each of these exceeded the 0.50 benchmark, thereby demonstrating convergent validity and construct reliability (Fornell and Larcker, 1981:39–50).

To further evaluate the model's adequacy, several absolute, incremental, and parsimony-based fit indices were examined. The chi-square divided by degrees of freedom (CMIN/DF) fell below the recommended upper limit of 3, suggesting an acceptable level of model parsimony

Table 4.4 Confirmatory Factor Analysis (CFA)

Model Fitness: CMIN=2081.137; DF=783; CMIN/DF=2.658; GFI=0.906; PClose=0.032; TLI=0.912; CFI=0.969; RMSEA=0.043; RMR=0.047; HOELTER=117; ECVI=2.943; AIC=1721.711; AGFI=.804	**Factor Loadings**
Innovation Hubs	
NNH1	.794
NNH2	.834
NNH3	.810
NNH4	.834
NNH5	.726
NNH6	.775
NNH7	.721
NNH8	.794
Sustainable Finance	
SFN1	.818
SFN2	.720
SFN3	.793
SFN4	.831
SFN5	.830
Stakeholder Pressure	
STP1	.890
STP2	.763
STP3	.567
STP4	.894
STP5	.711
Sustainability Performance	
SUP1	.694
SUP2	.748
SUP3	.843
SUP4	.812
SUP5	.683
SUP6	.702
SUP7	.666
SUP8	.635

Source: Author's Own Conception, (2025)



Source: Author's Own Conception (2025)

Figure 4.2. Diagrammatic Presentation of CFA

(Yaşlıoğlu & Yaşlıoğlu, 2020:1–20). The Goodness-of-Fit Index (GFI) exceeded the threshold of 0.80, while the Tucker–Lewis Index (TLI) and Comparative Fit Index (CFI) exceeded 0.90, indicating excellent incremental fit. In addition, the Root Mean Square Error of Approximation

(RMSEA) and the Standardised Root Mean Square Residual (SRMR) were both below the 0.08 cutoff, further supporting the adequacy of the model fit (Hair et al., 2019: 2–24). Furthermore, the model yielded an Adjusted Goodness-of-Fit Index (AGFI) of 0.804, an Expected Cross-Validation Index (ECVI) of 2.943, and an Akaike Information Criterion (AIC) of 1721.711. Hoelter's Critical N was 117. For comprehensive transparency and to satisfy standard Structural Equation Modelling reporting protocols, an extended table of baseline and parsimony fit indices (including NFI, RFI, IFI, PCFI, PNFI, and PGFI), along with the full raw covariance estimates and complete regression weights, are provided in Appendix F.

Overall, these results confirmed that the hypothesised measurement model demonstrated satisfactory construct validity and aligned well with the empirical data. This establishes a solid foundation for subsequent structural modelling and hypothesis testing, ensuring that the relationships among the constructs are based on a dependable and valid measurement framework.

4.9 Reliability and Convergent Validity

The psychometric robustness of the measurement model was further assessed through reliability and convergent validity tests, using three complementary indicators: Cronbach's Alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE). These indices jointly provide assurance that the items reliably represent their underlying constructs and that the latent variables account for sufficient variance beyond measurement error (Hair et al., 2019:2–24). Establishing these qualities is especially important in structural equation modelling, as measurement flaws can compromise the accuracy of hypothesised structural paths.

Cronbach's Alpha, widely recognised as the traditional measure of internal consistency, was initially calculated for all constructs using SPSS (v.23) (Davenport et al., 2015:4–9). Consistent with standard practice, values at or above 0.70 were considered satisfactory, indicating adequate reliability in social science research (Cornelia Dura et al., 2025:1–17). The results showed that all constructs exceeded this threshold, thereby supporting the stability and internal consistency of the measurement scales.

To complement this test, Composite Reliability (CR) was calculated from standardised loadings obtained during the CFA. CR provides a more accurate reliability estimate than Cronbach's Alpha by taking into account the contribution of each indicator, making it particularly suitable for SEM applications. All constructs recorded CR values above the recommended cut-off of 0.70, reinforcing the evidence of strong reliability.

Average Variance Extracted (AVE) was then calculated to evaluate convergent validity. Values of Average Variance Extracted above 0.50 indicate that a construct accounts for more than half of the variance of its indicators, relative to error variance (Fornell & Larcker, 1981:39–50). In this study, all constructs surpassed the 0.50 threshold, providing robust confirmation that the indicators converged meaningfully on their respective latent constructs.

Collectively, the convergence of Cronbach's Alpha, CR, and AVE results confirms the reliability and convergent validity of the instrument. These findings increase confidence that the measures

used were both internally consistent and theoretically sound, thus supporting the empirical adequacy of the measurement model (see Table 4.5 below).

Table 4.5 Convergent Validity

Latent Variable	Number of Items	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Innovation Hubs	8	0.921	0.913	0.574
Sustainable Finance	5	0.892	0.894	0.628
Stakeholder Pressure	5	0.866	0.869	0.575
Sustainability Performance	8	0.918	0.899	0.529

Source: Author's Own Conception (2025)

4.10 DISCRIMINANT VALIDITY AND MULTICOLLINEARITY ASSESSMENT

To complement the assessment of convergent validity, discriminant validity was also evaluated to determine whether the latent constructs in the model were empirically distinct. According to the Fornell–Larcker criterion, discriminant validity is achieved when the square root of the Average Variance Extracted (√AVE) for each construct is greater than its correlations with other constructs (Fornell and Larcker, 1981:39–50). As shown in Table 4.6 below, the lowest √AVE value (0.727) exceeded the highest inter-construct correlation (0.597). This result provides strong evidence that the constructs are sufficiently distinct and that each captures unique variance not accounted for by the others.

Beyond discriminant validity, the study also considered potential multicollinearity, which occurs when predictors in the model exhibit high intercorrelations that may bias parameter estimates and undermine interpretability. Correlations exceeding 0.80 are typically seen as indicative of problematic multicollinearity (Borah et al. 2023:364–385). Since the maximum observed correlation coefficient was 0.597, the data did not exhibit severe collinearity.

In addition, a more formal diagnostic was conducted using the Variance Inflation Factor (VIF). VIF values greater than 10 are conventionally interpreted as problematic, indicating high redundancy among predictors (Hair et al., 2019:2–24). In this study, none of the VIFs approached this threshold, further confirming that multicollinearity was not a concern.

Overall, these tests confirm that the constructs showed adequate discriminant validity and that the data met key assumptions for reliable model estimation. This enhanced confidence that the structural paths in the subsequent SEM analysis were unlikely to be confounded by overlapping constructs or redundancy among predictors.

4.11 NORMALITY ASSESSMENT

Normality is a key assumption in multivariate statistical analysis, as it underpins the robustness of parameter estimates and inferential validity (Oppong & Agbedra, 2016:26–33). In multivariate contexts, normality means that (i) all variables are individually normally distributed (univariate normality), (ii) pairs of variables are jointly normally distributed (bivariate normality), and (iii) scatterplots of paired variables exhibit linearity and homoscedasticity. While evaluating every aspect of multivariate normality is often impractical, diagnostic checks of univariate normality, especially skewness and kurtosis, along with outlier detection, are generally sufficient to detect most violations (Hair et al., 2019: 2–24).

Table 4.6 Discriminant Validity and Multicollinearity Assessment

	Age	Industry	Size	NNH	SFN	STP	SUP	VIF
Age	-							1.204
Industry	-.064	-						1.073
Size	.389**	-.163**	-					1.213
NNH	.076	-.077	.090*	.758				1.678
SFN	.118**	.010	.031	.536**	.792			1.449
STP	-.056	-.206**	.035	.384**	.093*	.758		1.251
SUP	.175**	.019	.053	.561**	.597**	.072	.727	-

Notes: NNH=Nature and Network of Hubs; SFN= Sustainable Finance Networks; STP= Sustainability Transition Practice; SUP= Sustainability Performance; VIF=Variance Inflation Factor
***. Correlation is significant at the 0.01 level (2-tailed).; *. Correlation is significant at the 0.05 level (2-tailed).; √AVEs are bolded, underlined, and italicized.*
Source: Author's Own Conception, (2025)

Although univariate normality does not guarantee multivariate normality, prior studies indicate that when individual variables meet the requirements of skewness and kurtosis, departures from full multivariate normality tend to be negligible and do not materially bias estimation results (Hair et al., 2019:2–24; Oppong & Agbedra, 2016:26–33). Accordingly, this study assessed normality for each observed variable using skewness and kurtosis statistics generated in SPSS (v.23), with results presented in Table 4.7 below.

Skewness indicates how much a distribution skews away from symmetry around the mean. Meanwhile, kurtosis evaluates the peakedness or flatness of the distribution curve (Hatem et al., 2022:7). Both metrics are important because high skewness can weaken correlation coefficients, while extreme kurtosis might distort standard errors and significance tests. To assess whether the distribution is acceptable, the study set thresholds: skewness should be within ±4 and kurtosis within ±8. The results in Table 4.7 demonstrate that all items met these limits at both the individual-item and overall-score levels. This suggests that the data did not show problematic deviations from normality, meeting a crucial assumption for the subsequent use of Structural Equation Modelling (SEM).

Table 4.7 Normality Assessment

	Skewness	Kurtosis
Innovation Hubs	-1.610	2.057
NNH1	-1.183	.854
NNH2	-1.085	.457
NNH3	-1.371	1.536
NNH4	-1.050	.466
NNH5	-1.127	.724
NNH6	-1.094	.445
NNH7	-1.239	.869
NNH8	-1.134	.452
Sustainable Finance	-1.928	3.185
SFN1	-1.623	2.325
SFN2	-1.368	1.444
SFN3	-1.390	1.467
SFN4	-1.333	1.282
SFN5	-1.564	1.685
Stakeholder Pressure	-1.344	1.906
STP1	-1.308	1.601
STP2	-1.292	1.798
STP3	-1.020	.415
STP4	-1.200	1.172
STP5	-1.171	1.131
Sustainability Performance	-2.241	.5.533
SUP1	-1.445	2.099
SUP2	-1.483	2.547
SUP3	-1.489	2.547
SUP4	-1.787	3.019
SUP5	-1.356	1.709

SUP6	-1.436	2.070
SUP7	-1.498	2.904
SUP8	-1.865	3.537

Source: Source: Author's Own Conception, (2025)

4.12 COMMON METHOD BIAS ASSESSMENT

Method bias, often called common method variance (CMV), occurs when variation in measurement is attributable more to the data collection method than to the constructs being studied (Haji-Othman & Yusuff, 2022:378–385). It reflects systematic response patterns that can be caused by similarities in item wording or structure, the sequencing of items within an instrument, or contextual factors like timing, medium, and administration procedures (Edwards, 2008:167–230). Such biases are a major source of measurement error because they can artificially increase or decrease observed relationships among variables, thus threatening the validity and reliability of research results (Podsakoff et al., 2012:539–569).

Given its potential implications, this study carefully addressed CMB both procedurally and statistically, in line with the recommendations of Podsakoff et al. (2012:539–569). Procedurally, the questionnaire was designed to minimise ambiguity, randomise item sequencing where appropriate, and assure respondents of anonymity and confidentiality, thereby, reducing evaluation apprehension and consistency motifs. These measures help limit the likelihood of systematic response tendencies.

Harman's single-factor test was performed to check if a single factor explained most of the variance among items. The emergence of one dominant factor (i.e., explaining more than 50% of

the variance) would indicate significant CMB. The use of both procedural safeguards and robust statistical diagnostics reduced the risk that CMB would affect the study's results.

4.12.1 Procedural Remedies

Following the recommendations of Podsakoff et al. (2012:539–569), various procedural strategies were employed in this study to mitigate the risk of common method bias during the design phase. First, the clarity of the measurement items was improved through a comprehensive pilot test, which identified and eliminated potential ambiguities and double-barreled statements. The pilot test included three participants for qualitative analysis and 20 respondents for quantitative analysis. The pilot test results were similar to those observed in the main study. This ensured that all questionnaire items were unambiguous, precise, and easily interpretable by respondents.

Second, the Likert scale was fully anchored by labelling every response point rather than only the extremes. For instance, response options were presented as: 1 = Strongly Disagree, 2 = Disagree, 3 = Indifferent, 4 = Agree, and 5 = Strongly Agree. This approach minimises respondent uncertainty and reduces the likelihood of random or patterned responses.

Third, respondents were explicitly assured of both anonymity and confidentiality. They were informed that their participation was voluntary, that there were no right or wrong answers, and that their responses would be used solely for academic purposes. Such assurances are known to reduce

evaluation apprehension and discourage socially desirable responding (Börger, 2013:155–165). Finally, specific steps were taken to address the potential influence of social desirability bias, both procedurally and statistically. By combining these design-stage interventions with post-hoc statistical checks, the study enhanced the reliability of its findings and minimised the risk of method variance contaminating observed relationships among constructs.

4.12.2 Harman's One-Factor Test

To statistically assess the potential presence of common method variance (CMV), Harman's one-factor test was conducted following the procedure outlined by Podsakoff et al. (2012:539–569). An exploratory factor analysis (EFA) was conducted in SPSS (Version 23) using the measurement items of all primary constructs in the study. The analysis employed the principal component extraction method with an unrotated solution, restricting the extraction to a single factor.

The results showed that multiple factors emerged from the analysis, with the first unrotated factor accounting for 40.768% of the total variance. This proportion is below the commonly accepted threshold of 50% (Appiah-Kubi, 2025:407–423), indicating that no single factor dominated the variance structure. Consequently, the findings suggest that common method variance is unlikely to pose a significant threat to the validity of the study's results. The detailed results of Harman's one-factor test are presented in Table 4.8 below, further confirming the measurement model's robustness against CMV concerns.

Table 4.8 Harman's One-factor Test

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.600	40.768	40.768	10.600	40.768	40.768
2	3.995	15.365	56.133			
3	1.864	7.170	63.303			
4	1.082	4.161	67.465			
5	1.019	3.918	71.383			
6	.945	3.636	75.019			
7	.795	3.056	78.075			
8	.767	2.950	81.025			
9	.731	2.813	83.838			
10	.677	2.603	86.441			
11	.610	2.346	88.787			
12	.556	2.139	90.925			
13	.408	1.569	92.494			
14	.324	1.245	93.740			
15	.247	.952	94.691			
16	.235	.905	95.596			
17	.205	.788	96.384			
18	.156	.601	96.985			
19	.143	.549	97.534			
20	.133	.511	98.045			
21	.119	.459	98.505			
22	.114	.439	98.943			
23	.111	.426	99.369			
24	.070	.270	99.639			
25	.050	.193	99.833			
26	.043	.167	100.000			
Extraction Method: Principal Component Analysis.						

Source: Author's Own Conception, (2025)

4.13 DESCRIPTIVE ANALYSIS

4.13.1 Innovation Hubs

Table 4.9 displays the descriptive statistics for the innovation hubs construct, measured on a five-point Likert scale from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. For clarity, mean values above 3 indicate positive perceptions (agreement), whereas mean values below 3 indicate negative

perceptions (disagreement) (Corneila Dura et al., 2025: 1–17). The overall mean score for the construct was 3.885, well above the neutral threshold, indicating that respondents generally viewed innovation hubs as vital mechanisms for improving their firms' capabilities and sustainability practices.

A closer examination of the individual measurement items showed that all mean scores surpassed the threshold value of three. This result suggests a broad consensus among startup managers that innovation hubs actively contribute to enhancing organisational performance. Specifically, respondents agreed that their firms participate in programmes organised by innovation hubs, utilise these platforms to access vital resources such as funding, training, and technical assistance, and gain from networking and collaboration opportunities. Moreover, respondents recognised that innovation hubs facilitate valuable partnerships with universities, startups, and industry experts, thereby acting as catalysts for knowledge transfer, co-creation, and technological progress.

These findings reinforce the increasing recognition in the literature that innovation hubs act as strategic intermediaries between startups and external knowledge ecosystems (Brunswicker & Vanhaverbeke, 2015:12-41). They provide startups with access to resources that are otherwise scarce while fostering collaborative ecosystems that promote entrepreneurial learning, capacity development, and sustainable growth. In the Ghanaian context, where resource limitations and institutional gaps frequently constrain innovation capacity, the positive perceptions reported by respondents emphasise the vital role of innovation hubs in bridging capability gaps and supporting startups' transition towards sustainability-oriented business models.

Table 4.9 Innovation Hubs

	Minimum	Maximum	Mean	Std. Deviation
NNH3	1.00	5.00	3.9642	1.07675
NNH7	1.00	5.00	3.9317	1.14822
NNH1	1.00	5.00	3.8891	1.07798
NNH4	1.00	5.00	3.8874	1.12057
NNH5	1.00	5.00	3.8703	1.07190
NNH8	1.00	5.00	3.8549	1.18298
NNH2	1.00	5.00	3.8481	1.16023
NNH6	1.00	5.00	3.8311	1.16668
NNH	**1.00**	**5.00**	**3.8846**	**.90331**

Source: Author's Own Conception, (2025)

4.13.2 Sustainable Finance

Table 4.10 displays the descriptive statistics for the sustainable finance construct, measured on a five-point Likert scale from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. Consistent with the study's interpretive framework, mean values above 3 were regarded as positive responses (agreement), while scores below 3 were seen as negative responses (disagreement) (Cornelia Dura et al., 2025:1–17). The overall mean score for the construct was 4.048, substantially above the neutral threshold, indicating that respondents generally supported the view that their organisations actively engage in sustainable finance practices.

A closer item-level analysis showed that all observed indicators had mean scores above 3, indicating broad consensus among respondents on the importance and implementation of sustainable finance. Specifically, firms acknowledged integrating environmental, social, and governance (ESG) considerations into financial decision-making, allocating funds to projects with long-term sustainability benefits, and adopting policies that promote investment in green and socially responsible initiatives. Respondents also confirmed that sustainable finance practices are

essential in reducing financial risks by fostering transparency, enhancing resource allocation, and aligning financial commitments with long-term sustainability objectives.

These findings reinforce scholarly arguments that sustainable finance is more than just providing capital; it signifies a strategic alignment of financial decision-making with sustainability priorities (Appiah-Kubi, 2025:407–423). For startups in Ghana operating in resource-constrained and volatile environments, the results emphasise that sustainable finance is increasingly seen as a mechanism to balance profitability with resilience, while also demonstrating accountability to stakeholders. By embedding sustainability considerations into their financial strategies, startups can not only bolster their legitimacy but also improve their capacity to adapt amid growing regulatory and market pressures.

Table 4.10 Sustainable Finance

	Minimum	Maximum	Mean	Std. Deviation
SFN1	1.00	5.00	4.1519	1.05691
SFN5	1.00	5.00	4.0973	1.16315
SFN3	1.00	5.00	4.0290	1.08644
SFN4	1.00	5.00	3.9846	1.09299
SFN2	1.00	5.00	3.9761	1.06672
SFN	**1.00**	**5.00**	**4.0478**	**.91381**

Source: Author's Own Conception, (2025)

4.13.3 Stakeholder Pressure

Table 4.11 below presents the descriptive statistics for the stakeholder pressure construct, measured on a five-point Likert scale from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. According to the study's interpretive criteria, mean scores above 3 are considered positive responses (agreement), while scores below 3 are seen as negative responses (disagreement) (Cornelia Dura

et al., 2025:1–17). The aggregate mean score for stakeholder pressure was 4.017, which surpasses the neutral benchmark. This suggests that respondents generally recognised their organisations as being significantly influenced by diverse stakeholder demands concerning sustainability practices.

A detailed item-level analysis revealed that all observed indicators achieved mean scores above 3, signalling a strong consensus among respondents. Specifically, startups recognised increasing customer expectations for adopting environmentally and socially responsible practices, as well as significant regulatory pressures from government policies and compliance requirements. Additionally, respondents emphasised the role of non-governmental organisations (NGOs) and civil society groups in advocating for transparency, accountability, and sustainable operations, thereby intensifying external pressures. These findings align with stakeholder theory, which suggests that organisational behaviour is influenced by the diverse demands of stakeholders whose interests must be balanced to maintain legitimacy and ensure long-term survival (Kalra, 2024:10). In the context of Ghanaian startups, stakeholder pressure emerges as a vital external driver that compels firms to focus on sustainability, often despite resource limitations. This supports the view that stakeholder influence goes beyond mere compliance; it fosters an environment that is both enabling and, at times, coercive, accelerating the adoption of sustainability practices.

Table 4.11 Stakeholder Pressure

	Minimum	Maximum	Mean	Std. Deviation
STP1	1.00	5.00	4.0802	.97422
STP2	1.00	5.00	4.0648	.94057
STP4	1.00	5.00	4.0358	1.00107
STP5	1.00	5.00	4.0085	.99654
STP3	1.00	5.00	3.8976	1.09221
STP	1.00	5.00	4.0174	.80903

Source: Author's Own Conception (2025)

4.13.4 Sustainability Performance

Table 4.12 shows the descriptive statistics for the sustainability performance construct, measured on a five-point Likert scale from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. Consistent with the study's interpretive framework, mean scores above 3 were classified as positive responses (agreement), while scores below 3 were classified as negative responses (disagreement) (Cornelia dura et al., 2025:1–17). The overall mean score for sustainability performance was 4.121, surpassing the neutral threshold of 3. This indicates that, on average, respondents agreed that their firms had made tangible improvements in sustainability-related practices.

At the item level, all indicators recorded mean values above 3, indicating broad consensus among startups about integrating sustainability practices into their operations. Specifically, respondents concurred that their firms actively reduce waste and emissions, adopt energy efficient technologies and practices to enhance environmental sustainability, maintain high standards of employee health and workplace safety, and participate in socially responsible initiatives such as fair labour practices and community engagement.

Table 4.12 Sustainability Performance

	Minimum	Maximum	Mean	Std. Deviation
SUP8	1.00	5.00	4.2782	.98680
SUP4	1.00	5.00	4.2201	1.03495
SUP2	1.00	5.00	4.1229	.94385
SUP6	1.00	5.00	4.1212	.98917
SUP7	1.00	5.00	4.1075	.90980
SUP3	1.00	5.00	4.0631	.95958
SUP1	1.00	5.00	4.0392	.98023
SUP5	1.00	5.00	4.0171	.99900

SUP	**1.00**	**5.00**	**4.1212**	**.77731**

Source: Author's Own Conception (2025)

The consistently high ratings across the measurement items underline the multidimensional nature of sustainability performance, covering environmental, social, and operational dimensions. These findings also indicate that Ghanaian startups are progressively recognising the strategic importance of sustainability, not only as a compliance obligation but also as a route to long-term competitiveness, legitimacy, and stakeholder trust. This observation aligns with previous research (Appiah-Kubi, 2025:407–423), which highlights that both internal commitments often drive sustainability performance of startups to responsible practices and external pressures from stakeholders, markets, and regulatory authorities.

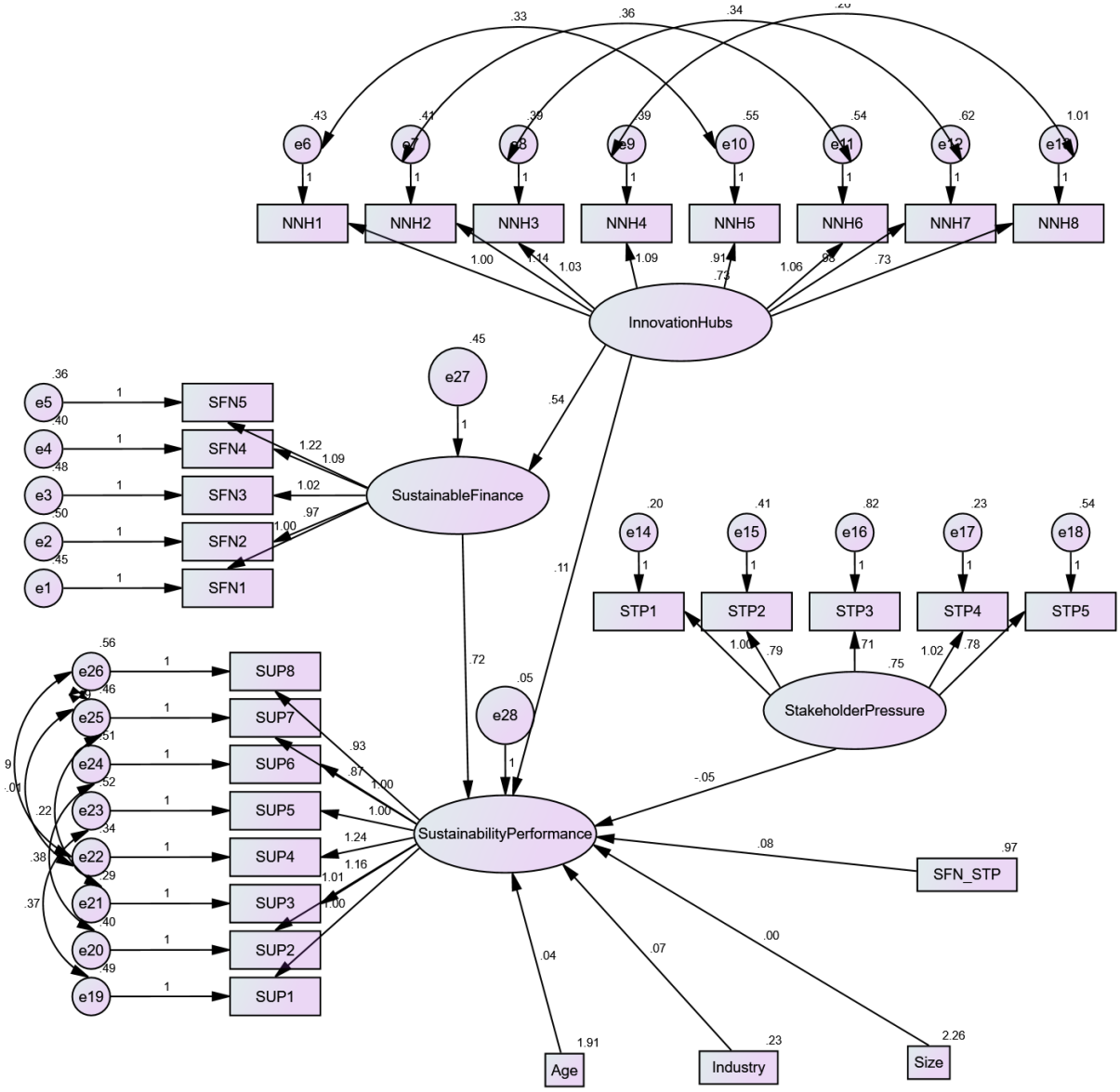
4.14 PATH ANALYSIS

The hypothesised structural relationships were estimated using covariance-based structural equation modelling (CB-SEM) in AMOS (Version 23). To strengthen the robustness of statistical inference, the analysis incorporated a bootstrapping procedure with 5,000 samples, a 95% confidence level, and the Bias-Corrected (BC) percentile method. The use of this non-parametric resampling approach is particularly recommended in SEM to address potential violations of multivariate normality and to provide more reliable confidence intervals for path coefficients (Awang et al., 2015:58). The estimation results are summarised in Table 4.13 and visually depicted in Figure 4.3.

Table 4.13 Path Estimates

Paths	Unst. Est.	S.E.	C.R.
Innovation Hubs → Sustainability Performance	.111	.027	12.646**
Innovation Hubs → Sustainable Finance	.544	.046	11.939**
Sustainable Finance → Sustainability Performance	.716	.047	15.358**
Stakeholder Pressure → Sustainability Performance	-.046	.020	-2.298**
SFN_STP → Sustainability Performance	.080	.017	4.670**
Firm Age → Sustainability Performance	.045	.012	3.713**
Firm Size → Sustainability Performance	-.001	.011	-.123
Industry → Sustainability Performance	.068	.035	1.983*
Indirect Path	**Unst. Est.**	**Lower BC**	**Upper BC**
Innovation Hubs → Sustainable Finance → Sustainability Performance	.390	.014*	.219*

Bias-Corrected (BC) Percentile Method; 5000 Bootstrap sample; 95% Confidence level
** P-value significant at 5% (0.05); ** P-**value significant at 1% (0.01); S.E.=Standard Error; C.R.=Critical Ratio.***
Source: Author's Own Conception (2025)



Source: Author's Own Conception (2025)

Figure 4.3: Path Diagramme

Consistent with established SEM practices, control variables were included to reduce potential confounding influences on the dependent construct, sustainability performance (Hussey & Eagan, 2007:303–312). Specifically, firm age, firm size, and industry type were entered as covariates, given their well-documented role in shaping startups' sustainability practices and outcomes

(Appiah-Kubi, 2025:407–423; Borah et al., 2023:364–385). The results showed that firm age had a positive and statistically significant effect on sustainability performance ($\beta = 0.045$, $p < 0.01$), indicating that as startups grow, their sustainability performance tends to improve. Similarly, industry type was also found to have a significant positive impact on sustainability performance ($\beta = 0.068$, $p < 0.05$). This highlights the importance of sectoral dynamics, as startups in manufacturing and other resource-heavy industries may face stricter regulatory pressures, stakeholder scrutiny, and market incentives to adopt sustainable practices compared to their service-sector counterparts. In contrast, firm size exerted a negative, yet statistically insignificant effect on sustainability performance ($\beta = -0.001$, $p > 0.05$).

Overall, these control-variable results indicate that while firm age and industry context significantly enable sustainability performance, firm size alone does not provide sufficient incentive for startups to improve sustainability outcomes.

4.14.1 Effect of Innovation Hubs on Sustainability Performance (Objective 1)

The analysis showed that innovation hubs exerted a positive and statistically significant impact on sustainability performance ($\beta = 0.111$, $p < 0.01$). This suggests that startups engaging with innovation hubs, through access to resources, training, and collaborative opportunities, are more likely to enhance their environmental and social performance.

4.14.2 Effect of Innovation Hubs on Sustainable Finance (Objective 2)

The results further demonstrated that innovation hubs had a positive and statistically significant effect on sustainable finance ($\beta = 0.544$, $p < 0.01$). This indicates that innovation hubs act as catalysts in facilitating startups access to sustainable financial resources, such as green credit, impact investment, or climate-related funding. By directing financial flows towards sustainability initiatives, innovation hubs enhance firms' ability to adopt responsible practices.

4.14.3 Impact of Sustainable Finance on Sustainability Performance (Objective 3)

Consistent with theoretical expectations, sustainable finance had a positive and statistically significant effect on sustainability performance ($\beta = 0.716$, $p < 0.01$). This result emphasises the vital role of financial resources in helping startups adopt energy-efficient technologies, cut waste, and pursue socially responsible initiatives.

4.14.4. Mediating role of Sustainable Finance (Objective 4)

The mediation analysis confirmed that sustainable finance acts as a significant mediator in the relationship between innovation hubs and sustainability performance. Specifically, innovation hubs positively affected sustainable finance ($\beta = 0.544$, $p < 0.01$), and sustainable finance, in turn, positively affected sustainability performance ($\beta = 0.716$, $p < 0.01$). The bootstrapping process with bias-corrected confidence intervals showed that both the lower bound (0.014) and upper

bound (0.219) were positive and significant at 0.05, thus confirming the significance of the indirect effect (point estimate = 0.390). Since the direct effect of innovation hubs on sustainability performance remained statistically significant after including the mediator, the mediation was classified as partial.

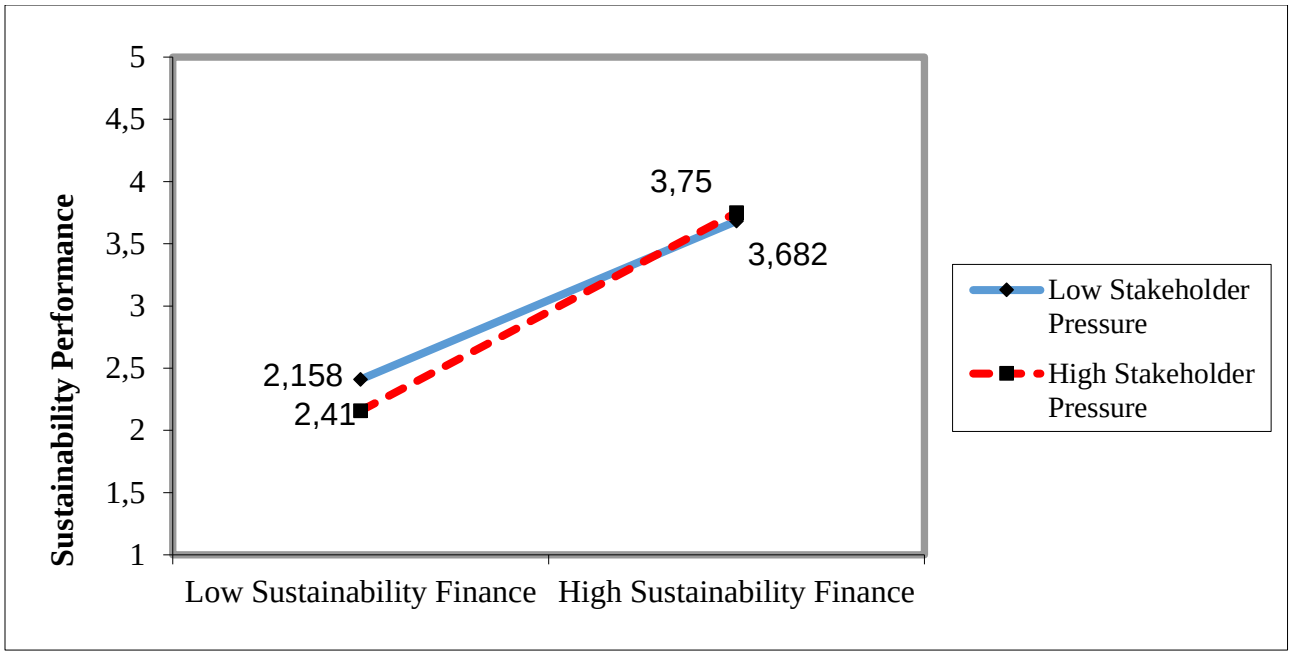
However, in critically analysing the effect size of the partial mediation of the data. The magnitude of the total effect of innovation hubs for sustainability performance, while statistically significant at $\beta = 0.111$, is much smaller than the indirect effect. Therefore, it demonstrates that innovation hubs have an extremely limited capacity to directly affect environmental or social startup performance. Innovation hubs are structurally weak in direct effects and function primarily through access to sustainable financing ($\beta = 0.544$ with SFN) to create their sustainability effects. Hence, qualitative narratives depicting innovation hubs as stand-alone "drivers" of sustainability should be tempered by this empirical reality; absent the financial aspect, the potential of innovation hubs to promote sustainability is greatly diminished.

4.14.5 Moderating Role of Stakeholder Pressure (Objective 5)

The analysis revealed that stakeholder pressure exerted a negative and statistically significant effect on sustainability performance ($\beta = -0.046$, $p < 0.01$). This provides evidence for a major negative dark side impact of external stakeholders on resource-constrained firms, which merits deeper interpretation. The data indicate that in the absence of sufficient financial capital, outside forces (in this case, regulatory requirements, changing consumer needs) can become an obstacle to success, and therefore negatively affect firm performance. Resource-constrained start-ups in

Ghana suffer from the burden of non-financially supported compliance expenses and the stress of meeting high stakeholder expectations without the necessary funds, both of which will reduce their ability to perform. As such, stakeholder pressure has a dual role for resource-constrained firms. It may be negative if there are insufficient financial resources available to support compliance and other stakeholder expectations, but positive when combined with sustainable financing. Beyond the main effect, the interaction analysis provided additional insights into the contingent role of stakeholder pressure. Specifically, the interaction between sustainable finance (SFN) and stakeholder pressure (STP) was found to be positive and statistically significant in predicting sustainability performance ($\beta = 0.080$, $p < 0.01$). This highlights that the effectiveness of sustainable finance is amplified when firms are simultaneously exposed to high levels of stakeholder pressure, suggesting a synergistic relationship between financial enablers and external institutional demands.

The interaction patterns, illustrated in Figure 4.4 below, further substantiate this relationship. Startups that reported both high stakeholder pressure and strong engagement in sustainable finance demonstrated marked improvements in sustainability performance (as indicated by the red line), while those with low levels of both variables (blue line) exhibited declines.



Source: Author's Own Conception (2025)

Figure 4.4: Two-Way Interaction Plot

4.15 CHAPTER SUMMARY

This chapter presented and analysed the empirical findings derived from both the qualitative and quantitative phases of the study. The qualitative results, analysed using Braun and Clarke's, (2006:77–101) six-step thematic analysis in NVivo 14, provided contextual depth and interpretive understanding. Four dominant themes emerged: (1) Innovation Hubs as Catalysts for Sustainable Transformation, (2) Access to Sustainable Finance and Resource Constraints, (3) Stakeholder Pressure as a Driver of Sustainable Behaviour, and (4) Sustainability Performance as a Strategic Outcome. These themes illustrated how innovation ecosystems, financial mechanisms, and stakeholder dynamics collectively shape startups' sustainability orientation and performance.

Additionally, the quantitative analysis, carried out through Structural Equation Modelling (SEM) using AMOS (Version 23), investigated the hypothesised relationships among the study's core

constructs. The analysis found that sustainable finance partially mediates the relationship between innovation hubs and sustainability performance. Stakeholder pressure was also found to strengthen the connection between sustainable finance and sustainability performance.

Overall, the chapter established a clear link between qualitative insights and quantitative outcomes, demonstrating that sustainable finance, supported by innovation hubs and stakeholder pressure, enhances sustainability performance. The combination of the two data strands provided a robust foundation for the subsequent discussion and interpretation of the study's findings in relation to existing theory and prior empirical evidence, as detailed in the next chapter.

CHAPTER FIVE

DISCUSSION OF RESEARCH FINDINGS

5.0 INTRODUCTION

This chapter consolidates the study's main findings by analysing the results in relation to the research objectives, connecting them to the existing literature, and integrating insights from both the quantitative and qualitative components of the mixed-methods design. The chapter discusses the findings, guided by the six specific objectives of the study. The discussion draws on statistical evidence from the previous chapter and offers a comprehensive explanation of how innovation hubs affect sustainable finance and sustainability performance within Ghana's youth entrepreneurship ecosystem.

5.1 Impact of Innovation Hubs on Sustainability Performance

The first objective of the study was to examine the extent to which innovation hubs influence sustainability performance among youth-led startups. The findings indicate that innovation hubs significantly enhance the economic, social, and environmental outcomes of emerging ventures, as evidenced by a strong positive SEM path coefficient ($\beta = .561$). This result supports previous scholarship showing that hubs provide essential support structures, such as mentorship, business development services, access to resources, and networking opportunities, which collectively strengthen the capabilities of young entrepreneurs to operate sustainably (Clarysse et al., 2014:1164–1176; Isenberg, 2010:40–50).

Qualitative insights from the interviews further reinforce this position, revealing that hub-incubated entrepreneurs benefit from strategic guidance that promotes long-term planning, improved financial discipline, and the adoption of sustainability-aligned business models, echoing studies that highlight the role of entrepreneurial support environments in fostering responsible innovation and enterprise resilience (Hackett & Dilts, 2004:55–82; Sohail et al., 2024:2-4). The findings also align with broader literature, suggesting that collaborative ecosystems play a critical role in improving startups' ability to incorporate environmental and social value into core business practices, especially in resource-scarce developing economies where institutional support can significantly influence sustainability behaviour (Clarysse et al., 2014:1164–1176; Jiménez & Zheng, 2021:163–176).

Combined, the evidence demonstrates that innovation hubs are pivotal institutions that shape the strategic orientation of youth-led startups, enabling them to achieve higher sustainability performance and contributing to ongoing scholarly discussions about the importance of ecosystem support in strengthening sustainable entrepreneurship in emerging markets. The statistical significance of this connection is theoretically supported by Peer Emulation Theory (Cowett, 2008). Data supporting the claim that innovation hubs are more than simply a place for youth-led startups to gain access to resources also shows that they create an environment for those same youth-led startups to imitate peer success in terms of sustainability. Consistent with Resource Theory (Foa & Foa, 2012: 15–32), the hubs reduce systemic resource constraints, allowing youth-led startups

to devote new resources (acquired due to their participation in an innovation hub) towards long-term sustainable operations and performance, rather than mere short-term survival.

5.2 Impact of Innovation Hubs on Sustainable Finance

The second objective examined how innovation hubs influence sustainable finance among youth-led startups, and the findings indicate a strong positive relationship, demonstrating that hubs play a critical role in increasing access to long-term, responsible, and resilience-focused financial resources. The significant SEM coefficient confirms that entrepreneurs nurtured within hub environments are more likely to obtain funding that aligns with environmental, social, and governance considerations, a trend supported by studies emphasising hubs as strategic intermediaries that connect startups to investors, financial literacy programmes, and blended financing schemes (Clarysse et al., 2014:1164–1176; Jiménez & Zheng, 2021:163–176).

Interview insights further reinforce this, with several participants noting that innovation hubs enhance their financial preparedness through capacity-building sessions, mentorship on investment pitching, and exposure to donor-funded sustainability initiatives, reflecting prior research that highlights hubs as catalysts for mobilising capital within entrepreneurial ecosystems (Friederici, 2019:9–28; Isenberg, 2010:40–50). These findings also align with broader sustainable finance scholarship, which argues that structured entrepreneurial support systems reduce information asymmetry and boost the credibility of early-stage ventures, thereby increasing their chances of attracting ESG-oriented finance (Ryszawska, 2016:185–194; Schoenmaker, 2018:26). Overall, the evidence suggests that innovation hubs play a transformative role in strengthening the

financial base of youth startups by equipping them with knowledge, networks, and signalling power needed to access sustainable finance channels, ultimately encouraging more stable and socially responsible entrepreneurial growth. This empirically derived finding represents robust validation of Positive Signalling Theory (Quatrini, 2021:101-240) in the context of emerging market economies. The empirical evidence illustrates how formal membership in an innovation hub can serve as a strong signal of credibility to external investors and therefore reduce the traditional asymmetric information barriers faced by youth-led startups when attempting to raise funds through Green Capital Markets.

5.3 Impact of Sustainable Finance on Sustainability Performance

The third objective investigated how sustainable finance influences sustainability performance among youth-led startups, and the results revealed a strong, positive, and significant relationship, demonstrating that access to long-term, ESG-oriented financing directly improves the economic viability, environmental responsibility, and social impact of emerging ventures. This finding is consistent with existing scholarship, which argues that sustainable finance enables businesses to invest in cleaner technologies, adopt resource-efficient processes, and strengthen social governance structures, ultimately enhancing their overall sustainability outcomes (Migliorelli, 2021:975; Ryszawska, 2016:185–194).

Qualitative insights from the study further support this view, as startups highlighted that funding linked to sustainability criteria encourages them to adopt transparent reporting practices, diversify income streams, and incorporate environmentally responsible strategies into their operations. This

reflects broader research that positions sustainable finance as a catalyst for innovation and long-term competitiveness (Fatemi & Fooladi, 2013:101-113; Schoenmaker, 2018:26). Additionally, sustainable finance diminishes the short-termism often associated with traditional funding routes, enabling startups to concentrate on growth models that emphasise durability rather than immediate gains. This pattern is also noted in studies advocating for ESG-linked financial mechanisms in developing economies (Ozili, 2021:1–7; Weber, 2014:1-6). Overall, these findings suggest that sustainable finance not only provides the capital necessary for operational expansion but also serves as a strategic enabler, enhancing a firm's capacity to achieve meaningful sustainability performance across economic, environmental, and social dimensions.

5.4 Sustainable Finance as a Mediator between Innovation Hubs and Sustainability Performance

The fourth objective investigated whether sustainable finance mediates the relationship between innovation hubs and sustainability performance. The results confirmed a significant indirect effect, indicating that part of the influence that innovation hubs exert on startups' sustainability outcomes occurs through their ability to improve access to long-term, responsible funding. This supports theoretical arguments suggesting that supportive entrepreneurial ecosystems create enabling conditions that enhance firms' financial capacity, thereby equipping them to adopt sustainability-oriented practices (Ryszawska, 2016:185–194; Schumacher et al., 2020:13-46).

The qualitative reflections gathered from participants further confirm that innovation hubs often serve as bridges to investors, grant programmes, and impact-finance opportunities that would

otherwise be inaccessible to young entrepreneurs. These insights align with studies emphasising that access to sustainable finance is a key mechanism through which startups convert ecosystem support into improved operational resilience, stronger environmental compliance, and increased social value creation (Ozili, 2021:1–7; Schoenmaker, 2018:26). The mediating effect also resonates with resource-based perspectives arguing that specialised resources such as ESG-linked funding enhance firms' ability to develop capabilities that translate into superior sustainability performance (Hart & Dowell, 2011:14-64; Wernerfelt, 1984:171–180). Overall, the evidence shows that innovation hubs do not influence sustainability performance solely through direct strategic and developmental support; rather, they strengthen startups' capacity to secure sustainable finance, which then acts as the conduit to enable higher levels of sustainability performance.

The findings of this study offer valuable insights into how innovation hubs and stakeholder pressure influence sustainable finance and performance among startups in Ghana. The results show that innovation hubs significantly enhance firms' ability to access sustainable finance, which consequently supports improvements in sustainability performance. At the same time, the findings reveal a more complex pattern regarding stakeholder pressure. This combination of direct, indirect, and interaction effects provides a deeper understanding of how internal hub-based support interacts with external stakeholder expectations to shape firm behaviour in emerging economies.

The strong positive relationship identified between innovation hubs and sustainable finance supports previous research emphasising the central role of hubs in developing entrepreneurial

capabilities (Clarysse et al., 2014:1164-1176; Friederici, 2019:9-28). Innovation hubs offer mentoring, training, technical support, and networking opportunities with investors, all of which enhance startups' ability to identify, pursue, and secure sustainability-oriented funding. This finding aligns with Isenberg's (2010:40-50) argument that ecosystem structures assist early-stage firms by filling capability and resource gaps. From a theoretical perspective, the result strongly confirms Peer Emulation Theory, which proposes that organisations imitate behaviours deemed effective among their peers (Ditlev-Simonsen & Midttun, 2011:25-38). Within innovation hubs, entrepreneurs observe peers who successfully secure green financing, ESG-linked investment, or impact funding and replicate these strategies to boost their own legitimacy and competitiveness. Similar findings have been reported in studies of sustainability-oriented behaviour in entrepreneurial settings, where shared learning accelerates financial adoption (González-Prieto et al., 2022:202).

Unexpectedly, stakeholder pressure had a negative but significant impact on sustainable finance. This contradicts the mainstream sustainability literature, which often presents stakeholder expectations as a positive force for responsible practices (Kalra, 2024:10; Urban & Wójcik, 2019:17-45). However, the result aligns with studies showing that in emerging economies, external demands may surpass the capabilities of startups and instead induce compliance stress or perceived risk (Burt, 2007:731-749; Haukipuro et al., 2024:283-299). For firms with limited financial literacy, weak institutional support, and resource scarcity, increased pressure can seem punitive rather than motivating (Cremasco & Boni, 2024:1018-1036; Darko, 2022:12013).

This indicates that stakeholder pressure is not always beneficial and that its impact depends on whether startups view pressure as supportive or burdensome. The Ghanaian context, characterised by mixed regulatory enforcement and inconsistent investor expectations, may create ambiguity and discourage firms from engaging in sustainability-focused financing. This nuance enhances stakeholder theory by demonstrating that pressure alone is inadequate without capacity-building and supporting mechanisms.

Although stakeholder pressure negatively affected sustainable finance directly, its moderating effect was positive and significant. This indicates that once startups secure sustainable finance, stakeholder pressure helps them maximise their impact on sustainability performance. This aligns with the view that external expectations can boost compliance and reinforce outcome-driven behaviour (Urban & Wójcik, 2019:17-45). Firms under strong stakeholder scrutiny may feel compelled to use sustainable financial resources more effectively to demonstrate accountability and meet ESG expectations. Therefore, stakeholder pressure does not just assist startups in accessing sustainable finance but also enhances their utilisation of it once secured. This supports arguments by Schoenmaker (2018:26) and Migliorelli (2021:975), suggesting that stakeholder-driven expectations increase the strategic value of sustainability-oriented capital. The finding also aligns with literature that indicates external pressures can improve implementation effectiveness in resource-limited environments (Ahlström & Monciardini, 2021:193-212).

The significant impact of sustainable finance on sustainability performance affirms long-standing arguments that sustainable capital is vital for fostering environmental and social improvements

(Ozili, 2021:1-7; Schoenmaker, 2018:26). Access to sustainability-focused finance enables startups to invest in energy-efficient technologies, minimise waste, enhance social welfare practices, and develop competitive advantages grounded in responsible operations. This aligns with Ryszawska's (2016:185-194) perspective that sustainability investments depend heavily on mobilising capital towards socially and environmentally aligned projects. The findings also reinforce the concept of sustainable finance as a crucial mechanism for advancing the Sustainable Development Goals (Ziolo et al., 2021:45-70).

The results for the control variables offer further insight. Firm age showed a positive and significant link with sustainability performance, indicating that older firms are more capable of integrating sustainability into their operations. This supports previous findings that experience and organisational maturity boost firms' absorptive capacities (Borah et al., 2023:364-385). Industry type also had a notable effect, consistent with studies demonstrating that firms in environmentally intensive sectors face stronger regulatory and market-driven sustainability pressures (Metu et al., 2020:3). Firm size, however, was not significant, suggesting that size alone does not determine sustainability outcomes, aligning with findings that capability, rather than scale, drives sustainability adoption in startups.

5.5 Moderating Role of Stakeholder Pressure

The fifth objective examined whether stakeholder pressure moderates the relationship between innovation hubs and sustainable finance. The results revealed a significant interaction effect,

indicating that hubs' influence on sustainable financing outcomes becomes more pronounced when stakeholder pressure is high. This finding supports the view that stakeholders such as investors, regulators, customers, and community actors shape entrepreneurs' financial behaviours by demanding accountability, transparency, and sustainability-oriented practices (Freeman, 2010: 9–28; Mitchell et al., 1997: 853).

Interview insights reinforced this dynamic, showing that many young entrepreneurs feel driven to adopt more responsible financial strategies when investors require ESG compliance, when regulators enforce reporting standards, or when customers increasingly prioritise ethical business practices. These observations align with studies indicating that stakeholder expectations can accelerate the adoption of sustainable finance mechanisms by pushing firms to seek financing that supports long-term environmental and social goals rather than short-term profits (Cunha et al., 2021:3821–3838; Ziolo et al., 2021:45–70).

Once again, the moderating effect aligns with institutional theory, which posits that external pressures from influential actors generate legitimacy incentives that encourage organisations to conform to sustainability norms, ultimately shaping their financial choices and strategic direction (DiMaggio & Powell, 1983:147–160; Scott, 2014:56–58). Overall, the findings suggest that stakeholder pressure not only influences entrepreneurs' behaviour in isolation but also amplifies the role of innovation hubs by emphasising the importance of sustainable finance within the wider entrepreneurial ecosystem. Stakeholder pressure acting as a moderator is supported by Systemic Disruption Theory (Burt, 2007:731-749) and Priority Theory (Wilson, 2010:267-280). The data

indicate that the transition to sustainable operations creates an initial level of system disruption for resource-constrained startups. However, it is at this point that high levels of external stakeholder pressure act as a forcing mechanism which compels those startups to make sustainable financing a primary operational strategy. As such, the positive effect on total sustainability performance is enhanced.

CHAPTER SIX

SUMMARY, CONCLUSION, AND IMPLICATIONS

6.0 INTRODUCTION

The chapter presents the study's conclusions, followed by the theoretical, practical, and policy implications derived from the findings. The aim is to provide evidence-based insights that elucidate the role of innovation hubs in promoting sustainable entrepreneurship within a developing economy context.

6.1 SUMMARY OF FINDINGS

This research was conceptualised as an important link in addressing the relationship between sustainable finance, innovation hubs and youth entrepreneurship in Ghana's economy. Driven by both systemic challenges of youth unemployment and the high number of failures of startup ventures, this research examined how innovation hubs (IHS) affect the sustainability performance (SP) of youth-led entrepreneurial organisations, examining how sustainable financing (SFS) is mediated in this process and whether stakeholder pressure (STP) has an impact on the relationship. In developing a theoretical framework for this research, the study drew upon multiple theories from the literature that provided a lens into understanding the relationships in question, including Priority Theory, Peer Emulation Theory, Life Cycle Theory, System Disruption Theory, Signalling Theory, and the Resource-Based View.

An exploratory sequential mixed-methods design was used in conducting this research, utilising the pragmatist philosophy. The study involved collecting and analysing large-scale, quantitative data using structural equation modelling (SEM) to assess whether the hypothesised causal paths were statistically significant. Additionally, qualitative data were collected and analysed to provide additional interpretation about the quantitative results. Below are the key findings of the study relating to the research objectives.

6.1.1 Impact of Innovation Hubs on Sustainability Performance

In examining the impact of innovation hubs on the sustainability performance of startup companies in Ghana, the quantitative path analysis indicated that there is a statistically significant and positive association between innovation hubs and sustainability performance ($\beta = .111$, $p < .01$), indicating that startups that use innovation hubs will be more likely to create better environmental and social outcomes. The qualitative data also support these quantitative results, specifically within the theme "*Innovation Hubs as Catalysts for Sustainable Transformation*." Interview respondents stated that innovation hubs function as important "*learning ecosystems*," where they can find the support mechanisms needed to grow their businesses, such as mentorship, business development services and access to technology. Overall, the collective findings demonstrate that using the hub's programs provides startup companies with additional technical knowledge, which enhances their ability to implement digital and green business models, resulting in improved overall sustainability performance.

6.1.2 Impact of Innovation Hubs on Sustainable Finance

The second objective investigated how innovation hubs impact the sustainable finance of startups. The SEM model results indicate a strong, positive, and statistically significant relationship ($\beta = .544$, $p < .01$) between innovation hubs and sustainable finance. A path coefficient of .544 suggests that innovation hubs are key facilitators in accessing long-term, resilient, focused financing sources, such as green credits and impact investments. Qualitative thematic insights align with these findings and provide further evidence of how hubs actively address the extreme limitations in terms of resources and funding experienced by young entrepreneurs. Respondents emphasised that innovation hubs helped prepare them financially through targeted training, capacity-building sessions, mentoring on creating successful pitches for investors, and providing direct experience with donor-funded sustainability projects. The findings demonstrate that innovation hubs serve a transformational role in establishing the financial foundation of youth-led startups by enabling them to acquire both the requisite knowledge and network to access sustainable finance opportunities.

6.1.3 Impact of Sustainable Finance on Sustainability Performance

The third research objective investigated the impact of sustainable finance on the sustainability performance of youth-led startups. Path analysis showed a highly statistically significant positive relationship ($\beta = .716$, $p < .01$) between sustainable finance and sustainability performance. Qualitative data from interviews supported the quantitative results. Under Theme 4, "*Sustainability Performance as a Strategic Outcome*", participants indicated that obtaining sustainability-linked funding leads to greater operational efficiency, reduced waste and increased company reputation.

The evidence shows that sustainable finance is an important enabler for youth-led startups to create financial returns and environmental/social benefits.

6.1.4 Sustainable Finance as a Mediator between Innovation Hubs and Sustainability Performance

The fourth research objective examined whether sustainable finance acts as a mediating variable between innovation hubs and sustainability performance. A mediation analysis found a statistically significant indirect effect (.390) where the lower bound of the bias-corrected confidence interval was .014, and the upper bound was .219. Since there was still a direct positive effect from innovation hubs on sustainability performance, this indicates partial mediation. Interviews also highlighted how many innovation hubs serve as linkages to grants and other sources of sustainable or socially responsible funds. Therefore, in addition to improving sustainability performance through training, innovation hubs are enhancing their members' ability to access the sustainable financing needed to achieve higher levels of sustainability.

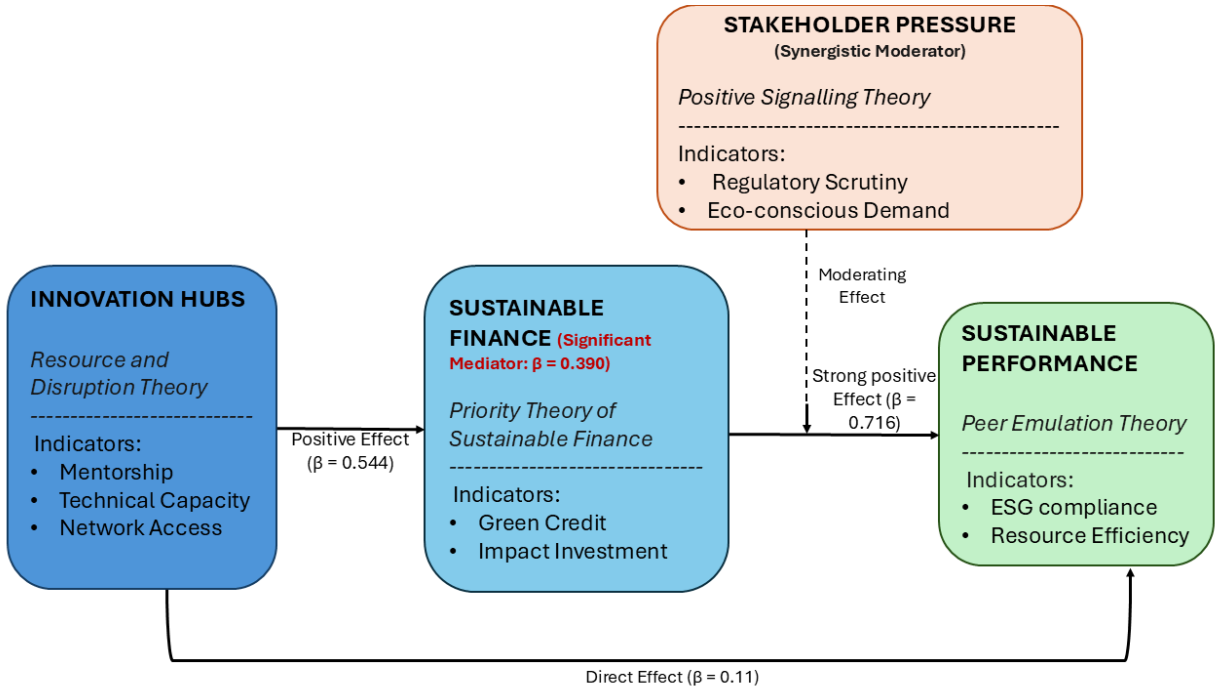
6.1.5 Moderating Role of Stakeholder Pressure

The fifth research objective investigated the potential moderating effects of stakeholder pressure. SEM provided insights into complex dynamics; although stakeholder pressure has a direct negative effect on sustainability performance (-.046, $p < .01$), the interaction term of stakeholder pressure and sustainable finance was positively related to sustainability performance (.08, $p < .01$). The two-way interaction plot indicated that those youth-led startups experiencing high levels of stakeholder pressure along with a strong focus on sustainable finance will show improvements in sustainability performance. In the qualitative findings under Theme 2, "*Stakeholder Pressure as a*

Driver of Sustainable Behaviour," youth-led startups reported that regulatory pressures and consumer demand for environmentally friendly products motivated them to engage in more sustainable behaviours. The overall synthesis suggests that while stakeholder pressure alone may be detrimental to resource-constrained startups, it significantly increases the beneficial effects of sustainable finance by forcing businesses to adhere to ESG standards.

6.2 Empirically Validated Integrated Framework

To advance the discourse both theoretically and practically related to youth entrepreneurship in the Global South, this study used qualitative thematic analysis along with quantitative SEM results to develop an all-encompassing, empirically supported framework (see Figure 6.1). Beyond providing a conceptual model for the positive associations of the causal paths among the variables, this integrated model provides evidence of the actual causal dynamics at work. In addition to embedding the theoretical perspectives which drive these dynamics (Resource-Based View and Priority Theory), the model identifies concrete and quantifiable implementation measures based directly on the study's data. Overall, this framework will serve as a strategic plan for identifying best practices to optimise how innovation support structures can produce tangible Environmental, Social and Governance (ESG) results.



Source: Author's Construct (2025)

Figure 6.1: Empirically Validated Integrated Framework for Sustainable Finance

6.3 Contribution to Knowledge

The key new knowledge contribution from this dissertation is the empirically developed and validated framework for understanding how innovation hubs function as financial intermediaries as well as technical incubators in the entrepreneurial ecosystems of the Global South. The existing body of literature has treated sustainable finance and innovation hubs as separate and largely independent theories, whereas this research adds to the body of literature by establishing statistically significant, quantifiable evidence that sustainable finance is a mediator of the relationship between innovation hubs and sustainability performance.

In addition, this research extends prior work by combining several theoretical frameworks, including Priority Theory, Peer Emulation Theory, and the Resource-Based View, to reveal the specific moderating mechanisms that exist through which stakeholders exert their pressures on innovation hubs. This research provides conclusive evidence that while external pressures impose direct constraints on innovation hubs, they act as a powerful synergy multiplier when combined with sustainable finance to generate improved ESG outcomes for youth-led startups.

Finally, methodologically, by using an exploratory sequential mixed-methods approach and employing structural equation modelling (SEM) in the Ghanaian context, this research develops a new mathematical, qualitative and empirically grounded architectural model that will provide policymakers, investors and innovation hub managers with practical measures to improve sustainability performance in resource-constrained contexts.

6.4 IMPLICATIONS OF THE RESEARCH

6.4.1 Theoretical Implications

The study contributes to theory by demonstrating that the resource-based view, priority theory, and peer emulation theory collectively explain how hubs support sustainable finance adoption. The significant mediation effect empirically validates the theoretical claim that financial sustainability plays a central role in translating hub activities into long-term performance outcomes. The study also extends sustainable finance theory by showing how external stakeholder pressures shape financial decisions in resource-constrained entrepreneurial contexts.

Theoretical confirmation of the mediation role of sustainable finance empirically validates the integration of the Resource-Based View (RBV) and Innovation Ecosystem Theories. Instead of viewing hubs as mere capability creators, this research theoretically positions hubs as intermediary resource acquisition entities. The ability of hub affiliation to secure ESG-linked financing serves as a key theoretical link between hub membership and sustainability performance. This contributes to the body of literature by showing that ecosystems do not provide a direct means to achieve sustainability; they create the institutional legitimacy necessary to obtain the sustainable capital that will lead to subsequent performance.

6.4.2 Practical and Managerial Implications

For innovation hub managers, the findings show the need to strengthen financial training, investor engagement programmes, and sustainability-oriented mentorship. Startups benefit most when hubs provide a blended package of capacity building and access to sustainable finance. Managers should also institutionalise ESG-focused training modules to help entrepreneurs align with global financing standards. Startup entrepreneurs can use these insights to better understand how to position their ventures to attract sustainable finance and leverage hub resources strategically.

The findings of this study present several important implications for practitioners, policymakers, and stakeholders within Ghana's entrepreneurial ecosystem. First, the results demonstrate that innovation hubs play a vital role in boosting both sustainable finance and sustainability performance among youth-led startups. This indicates that hub managers should expand

programmes that improve financial literacy, investment readiness, and ESG-focused business training, as these skills help startups secure sustainability-linked financing. Hubs may also strengthen partnerships with banks, impact investors, donor agencies, and venture capital firms to develop stronger financing channels that support sustainability priorities.

Secondly, the notable influence of sustainable finance on sustainability performance emphasises the need for financial institutions to develop products that support young firms dedicated to responsible growth. Banks and investors can incorporate flexible terms, ESG criteria, and risk-sharing mechanisms to motivate startups to invest in greener technologies and socially beneficial innovations. This approach not only bolsters firm resilience but also helps achieve national sustainability goals.

Third, policymakers can leverage these findings to strengthen Ghana's regulatory environment for sustainable financing. By promoting policies that incentivise ESG reporting, green investment, and public–private collaboration, the government can create a more enabling ecosystem for innovation hubs and startups. Additionally, national entrepreneurship programmes may integrate sustainability-focused financing schemes to ensure that youth enterprises grow responsibly while contributing to job creation and environmental stewardship.

Finally, the mediating role of sustainable finance indicates that startups should focus on developing robust financial management practices and aligning with sustainability-driven funding sources. Companies that establish themselves for this type of financing through transparent governance,

reliable documentation, and sustainable business models are more likely to attain long-term sustainability performance.

6.4.3 Policy Implications

National policymakers should recognise innovation hubs as strategic partners in advancing SDG 8 (Decent Work) and SDG 9 (Industry and Innovation). Policies that subsidise hub operations, incentivise investors to engage with incubated startups, and promote sustainable financing instruments will strengthen national innovation systems. Regulatory agencies should also support the development of blended finance schemes, ESG reporting standards, and youth-focused sustainable finance policies.

6.5 CONCLUSION

This study explored how innovation hubs influence sustainable finance and sustainability performance among youth-led startups in Ghana, emphasising the mechanisms through which entrepreneurial support systems bolster long-term business resilience. The findings indicate that innovation hubs notably improve both sustainable finance and sustainability performance, affirming their role as strategic catalysts for capacity building, financial preparedness, and innovation. Additionally, the results reveal that sustainable finance has a positive and direct impact on sustainability performance, highlighting the importance of aligning financial practices with environmental, social, and governance considerations.

More importantly, the study revealed that sustainable finance mediates the relationship between innovation hubs and sustainability performance. This confirms that the benefits provided by hubs such as mentorship, training, access to networks, and resource mobilisation lead to strong sustainability outcomes, especially when startups secure financing that supports responsible growth. These insights deepen the understanding of entrepreneurial ecosystem dynamics in developing economies and emphasise the central role of sustainable finance within modern innovation-driven ventures.

Overall, the study offers evidence that strengthening innovation hubs and expanding sustainable financing opportunities can greatly improve the sustainability trajectory of young enterprises in Ghana. By combining innovation with responsible financing, startups are better placed to contribute to economic progress, social well-being, and environmental stewardship. The findings provide valuable guidance for hub managers, policymakers, investors, and entrepreneurs aiming to build resilient, competitive, and sustainability-focused ventures within Ghana's fast-changing entrepreneurial landscape.

The results from both quantitative and qualitative analyses show that innovation hubs significantly enhance the sustainability trajectory of startups by improving their performance, increasing their access to sustainable finance, and influencing their strategic behaviour. Sustainable finance acts both as an outcome and a mediating factor, underscoring its crucial role in promoting long-term entrepreneurial success. Stakeholder pressure serves as a catalyst that amplifies the positive

influence of hubs on sustainable financial behaviour. Overall, the study offers strong evidence that innovation hubs are instrumental in fostering sustainable entrepreneurship among Ghanaian youth.

6.6 RECOMMENDATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Although this study provides valuable insights into the role of innovation hubs, sustainable finance, and sustainability performance among youth-led startups in Ghana, several limitations should be recognised. First, the study relied on a cross-sectional research design, which captures responses at a single point in time. This restricts the ability to establish strong causal relationships, as the interactions between innovation hubs and sustainability outcomes may evolve over time. Future research could adopt longitudinal designs to better track changes in firm capabilities, financing patterns, and sustainability performance as startups mature within hub environments.

Furthermore, the study relied on self-reported questionnaire data, which may be affected by social desirability bias or respondents' perceptions. Although measures were taken to reduce common method bias, such as pilot testing and Harman’s one-factor test, objective performance data were not included. Future research could incorporate secondary data, such as audited sustainability reports, financial statements, or independent ESG assessments, to validate and complement self-reported results.

Thirdly, the study focused only on youth-led startups within innovation hubs, which may not fully represent all entrepreneurial groups or sectors in Ghana. Innovation hub startups often benefit from

structured support, digital infrastructure, and networking opportunities, which may not be representative of the experiences of informal or non-hub-based enterprises. Future research could expand the model to include traditional SMEs, rural enterprises, and startups operating outside hub ecosystems to compare how support structures influence sustainability outcomes.

Fourth, the study was conducted within the context of Ghana, a developing economy with distinct entrepreneurial conditions, regulatory frameworks, and financial environments. While this offers strong contextual relevance, it restricts the generalisability of the findings to other countries. Comparative studies across multiple African nations or between developing and developed economies could provide broader insights into how institutional environments influence the relationship between innovation hubs, sustainable finance, and sustainability performance. In addition, there are notable limitations in how sustainable finance has been conceived and measured. The need for the structural model to be mathematically parsimonious required that several forms of funding be combined into one unitary form. In reality, however, a startup's behaviour as well as their financial reporting practice will vary greatly based upon the source and form of financing, including the behaviour of a firm toward a non-repayable governmental grant vs. a rigid and commercial banking loan. The generalisation used here may have masked important differences about what types of financial instruments would best facilitate true sustainability in Ghana.

In the fifth place, the study examined sustainable finance as a single mediating construct. However, firm performance and sustainability outcomes may also be affected by factors such as leadership

style, digital capability, innovation orientation, stakeholder engagement, and regulatory compliance. Future research could explore these additional variables, test moderating effects, or expand the framework to include multi-layered ecosystem components.

Finally, a limitation regarding the target population is the presence of survival bias in the survey results. The survey questions for the most part collected information only from "winners", that is, companies that were successful in gaining entry into an innovation hub and remained operational throughout their participation in the hub. As such, no data exist on startups that were turned down when applying to enter the hub (the rejected) or those that did not survive and therefore left the ecosystem. Consequently, this limitation may influence the generalisability of the findings, since it could create an exaggerated sense of the structural advantages offered by the hubs. Additionally, without including in the sample both unsuccessful and rejected startups, the current findings may present an overly optimistic assessment of how effective these hubs actually are. Therefore, future empirical studies should make an effort to develop sampling methods to include accepted startup applicants, but also startup applications that were rejected or failed.

REFERENCES

Abé Ndjié, A. Atangana Ondoa, H., & Ngoa Tabi, H., 2019. Governance and youth unemployment in Africa. *Labor History* 60:869–882. https://doi.org/10.1080/0023656X.2019.1645320

Abowitz, D.A., Toole, T.M. 2010. Mixed Method Research: Fundamental issues of design, validity, and reliability in construction research. *Journal of Construction and Engineering Management* 136:108–116. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000026

Ackert, L.F. 2014. Traditional and behavioral finance, in H.K. Baker & V. Ricciardi (eds.), *Investor behavior*. New Jersey: John Wiley & Sons. 25–41. https://doi.org/10.1002/9781118813454.ch2

Acs, Z.J. & Audretsch, D.B. 2010. Introduction to the 2nd edition of the handbook of entrepreneurship research, in, Z.J. Acs & D.B. Audretsch (eds.). *Handbook of entrepreneurship research*. New York: Springer 1–19. https://doi.org/10.1007/978-1-4419-1191-9_1

Adler, J., Dewi, S.C. 2019. Web-based business opportunity, in *IOP conference series: Materials science and engineering*. Bristol (UK): IOP Publishing 022006. http://doi.org/10.1088/1757-899X/662/2/022006

Adler, P., Florida, R., King, K., & Mellander, C. 2019. The city and high-tech startups: The spatial organization of Schumpeterian entrepreneurship. *Cities* 87:121–130. https://doi.org/10.1016/j.cities.2018.12.013

Ahlström, H. & Monciardini, D. 2021. Financing the revolution? Paradoxical success and limitations of EU sustainable finance reforms. (June 15, 2021). University of Oslo Faculty of Law. https://ssrn.com/abstract=3867156

Ahuja, G., Capron, L., Lenox, M., & Yao, D.A. 2018. Strategy and the institutional envelope.

Strategy Science 3:ii–x. https://doi.org/10.1287/stsc.2018.0062

Aldianto, L., Anggadwita, G., Permatasari, A., Mirzanti, I.R., & Williamson, I.O. 2021. Toward a business resilience framework for startups. *Sustainability* 13:3132. https://doi.org/10.3390/su13063132

Alfonsi, L., Bandiera, O., Bassi, V., Burgess, R., Rasul, I., Sulaiman, M., & Vitali, A. 2020. Tackling youth unemployment: Evidence from a labor market experiment in Uganda. *ECTA* 88:2369–2414. https://doi.org/10.3982/ECTA15959

Alkhoraif, A., 2024. The impact of innovation governance and policies on government funding for emerging science and technology sectors in Saudi Arabia. J*ournal of Infrastructure, Policy and Development* 8:8515. https://doi.org/10.24294/jipd8515

Amoah, S.K., Amoah, & A.K. 2018. The role of small and medium enterprises (SMEs) to employment in Ghana. *International Journal of Business and Economics Research* 7:151–157. https://doi.org/10.11648/j.ijber.20180705.14

Anas, B., Majda, K., & Ibtihal, L. 2025. NVivo15 and ATLAS. ti 2025: A comparative study of the main features for thematic analysis. *International Journal of Human Post-Edited AI Qualitative Data Analysis* 1:26–32. https://researchpublication.org/index.php/ijhpaqda/article/view/9

Appiah-Kubi, E. 2025. Stakeholder pressure and SMEs sustainability information disclosures: Why perceived benefits and sustainability knowledge matter. *Journal of Accounting & Organizational Change* 21:407–423. https://doi.org/10.1108/JAOC-11-2023-0191

Arbuckle, J.L., 2014. Amos (version 23.0)[computer program]. Chicago: IBM SpSS.

Aryani, S., Novia, H., Setiawan, A. 2024. Development and analysis validation instrument critical thinking heat concept (ctht) using the Rash Model. *Journal Penelitian Pendidikan IPA*

10:3731–3738. https://doi.org/10.29303/jppipa.v10i7.7727

Atake, E.-H. 2018. Health shocks in Sub-Saharan Africa: Are the poor and uninsured households more vulnerable? *Health Econ Rev* 8:26. https://doi.org/10.1186/s13561-018-0210-x

Atiase, V.Y., Kolade, O., Liedong & T.A. 2020a. The emergence and strategy of tech hubs in Africa: Implications for knowledge production and value creation. *Technological Forecasting and Social Change* 161:120307. https://doi.org/10.1016/j.techfore.2020.120307

Atiase, V.Y., Kolade, O., Liedong, & T.A. 2020b. The emergence and strategy of tech hubs in Africa: Implications for knowledge production and value creation. *Technological Forecasting and Social Change* 161:120307. https://doi.org/10.1016/j.techfore.2020.120307

Attrams, A.S. & Tshehla, M. 2022. Challenges of services sector SMEs in a developing country: A case of Ghana. *Journal of the International Council for Small Business* 3:228–236. https://doi.org/10.1080/26437015.2021.1982369

Awad, A. 2019a. Economic Globalisation and Youth Unemployment – Evidence from African countries. *International Economic Journal* 33:252–269. https://doi.org/10.1080/10168737.2019.1604787

Awad, A. 2019b. Economic globalisation and youth unemployment – Evidence from African countries. *International Economic Journal* 33:252–269. https://doi.org/10.1080/10168737.2019.1604787

Awang, Z., Afthanorhan, A., & Asri, M.A.M. 2015. Parametric and non parametric approach in structural equation modeling (SEM): The application of bootstrapping. *Modern Applied Science* 9:58. http://dx.doi.org/10.5539/mas.v9n9p58

Baah-Boateng, W., 2015. Unemployment in Ghana: A cross sectional analysis from demand and supply perspectives. *African Journal of Economic and Management Studies* 6:402–415. https://doi.org/10.1108/AJEMS-11-2014-0089

Bai, Y., 2022. Optimality of matched-pair designs in randomized controlled trials. *American Economic Review* 112:3911–3940. https://doi.org/10.1257/aer.20201856

Bakken, C.A. 2021. Shedding light on sustainable shipping: Examining content and motivations for sustainability reporting along the shipping value chain. Unpublished Master Thesis. Lund: Lund University, International Institute of Industrial Environmental Economics (IIIEE). http://lup.lub.lu.se/student-papers/record/9057340

Baluku, M.M., Matagi, L., Musanje, K., Kikooma, J.F., & Otto, K., 2019. Entrepreneurial socialization and psychological capital: Cross-cultural and multigroup analyses of impact of mentoring, optimism, and self-efficacy on entrepreneurial intentions. E*ntrepreneurship Education and Pedagogy* 2:5–42. https://doi.org/10.1177/2515127418818054

Bayuo, B.B. 2017. Growing technology and innovation in Sub-Saharan Africa through business innovation centres: Case study of Ghana. http://lup.lub.lu.se/student-papers/record/8916142

Bergmann, T. & Utikal, H. 2021. How to support startups in developing a sustainable business model: The case of an European social impact accelerator. *Sustainability* 13:3337. https://doi.org/10.3390/su13063337

Berloffa, G., Matteazzi, E., Şandor, A., & Villa, P. 2016. Youth employment security and labour market institutions: A dynamic perspective. *International Labour Review* 155:651–678. https://doi.org/10.1111/ilr.12034

Borah, P.S., Dogbe, C.S.K., Pomegbe, W.W.K., Bamfo, B.A., & Hornuvo, L.K., 2023. Green

market orientation, green innovation capability, green knowledge acquisition and green brand positioning as determinants of new product success. *European Journal of Innovation Management* 26:364–385. https://doi.org/10.1108/EJIM-09-2020-0345

Börger, T., 2013. Keeping up appearances: Motivations for socially desirable responding in contingent valuation interviews. *Ecological Economics* 87:155–165. https://doi.org/10.1016/j.ecolecon.2012.12.019

Bortolini, R.F., Nogueira Cortimiglia, M., Danilevicz, A. de M.F., & Ghezzi, A. 2021. Lean Startup: A comprehensive historical review. *Management Decision* 59:1765–1783. https://doi.org/10.1108/MD-07-2017-0663

Boudlaie, H., Mahdiraji, H.A., Jirandeh, M.S., & Sadeghi, V.J. 2022. The role of human resource management in the growth of startups: a multiple case study from the perspective of entrepreneurs and employees. *World Review of Entrepreneurship, Management, and Sustainable Development* 18:307. https://doi.org/10.1504/WREMSD.2022.122540

Bowen, J.M., Ouimet, M., Lawarée, J., Bielecki, J., Rhéaume, A., Greenberg, C., Rac, & V.E. 2023. Describing the state of a research network: A mixed methods approach to network evaluation. *Research Evaluation* 32:188–199. https://doi.org/10.1093/reseval/rvac034

Brancu, L., Mintah, R., Işık, D. A., Matemane, R., Mıhladız Oral, D. B., & Şahin, F. 2025. Cultural intelligence and relationship quality in export market ventures in Ghana. *Human Systems Management* 44(2):319-333. https://doi.org/10.3233/HSM-240075

Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3:77–101. https://doi.org/10.1191/1478088706qp063oa

Brunswicker, S., & Vanhaverbeke, W. 2015. Open innovation in small and medium-sized enterprises (SMEs): External knowledge sourcing strategies and internal organizational

facilitators. *Journal of Small Business Management* 53:1241–1263. https://doi.org/10.1111/jsbm.12120

Bryman, A. 2016. Social research methods. Oxford (UK): Oxford University Press.

Buckley, P.J., 2020. The theory and empirics of the structural reshaping of globalization. *Journal of International Business Studies* 51:1580. https://doi.org/10.1057/s41267-020-00355-5

Burt, G. 2007. Why are we surprised at surprises? Integrating disruption theory and system analysis with the scenario methodology to help identify disruptions and discontinuities. *Technological Forecasting and Social Change* 74:731–749. https://doi.org/10.1016/j.techfore.2006.08.010

Byrne, B.M. 2013. Structural equation modeling with Mplus: Basic concepts, applications, and programming. Oxfordshire (UK): Routledge. https://doi.org/10.4324/9780203807644

Cantamessa, M., Gatteschi, V., Perboli, G., & Rosano, M. 2018. Startups' roads to failure. *Sustainability* 10, 2346. https://doi.org/10.3390/su10072346

Cantner, U., Cunningham, J.A., Lehmann, E.E., & Menter, M. 2021. Entrepreneurial ecosystems: A dynamic lifecycle model. *Small Business Economics* 57:407–423. https://doi.org/10.1007/s11187-020-00316-0

Carlsen, L. & Bruggemann, R. 2022. The 17 United Nations' sustainable development goals: A status by 2020. *International Journal of Sustainable Development & World Ecology* 29:219–229. https://doi.org/10.1080/13504509.2021.1948456

Chatzinikolaou, D., 2025. On smart cities and triple-helix intermediaries: A critical-realist perspective. *Smart Cities* 8:74. https://doi.org/10.3390/smartcities8030074

Chesbrough, H.W. 2003. Open innovation: The new imperative for creating and profiting from technology. Cambridge (MA): Harvard Business Press.

Chigunta, F. 2016. Entrepreneurship as a possible solution to youth unemployment in Africa, in *Labouring and Learning*. Singapore: Springer, 1–19. https://doi.org/10.1007/978-981-4585-97-2_19-1

Chirchietti, N. 2017. The role of Innovation Hubs taking startups from idea to business: The case of Nairobi, Kenya. IZNE Working Paper Series (Nr 17/7):1-51. https://doi.org/10.18418/978-3-96043-038-4

Chowdhury, E.H., Fjellström, D., Osarenkhoe, A., Hannadige, S.V.S., & Weerasinghe, D.K.C. 2023. The contribution of innovation hubs towards strengthening the regional development in Sweden. *International Journal of Innovation Technology Management* 20:2350010. https://doi.org/10.1142/S0219877023500104

Church, I.M., McAllister, B., & Spiegel, J.S. 2025. Experimental philosophy and the problem of evil. *Religious Studies* 1–20. https://doi.org/10.1017/S0034412525000125

Claringbould, D., Koch, M., & Owen, P. 2019. Sustainable finance: The European Union's approach to increasing sustainable investments and growth–opportunities and challenges. *Vierteljahrshefte zur Wirtschaftsforschung* 11–27. https://doi.org/10.3790/vjh.88.2.11

Clarysse, B., Wright, M., Bruneel, J., & Mahajan, A. 2014. Creating value in ecosystems: Crossing the chasm between knowledge and business ecosystems. *Research Policy* 43:1164–1176. https://doi.org/10.1016/j.respol.2014.04.014

Cobbinah, P.B., Gaisie, E., Oppong-Yeboah, N.Y., & Anim, D.O. 2020. Kumasi: Towards a sustainable and resilient cityscape. *Cities* 97:102567. https://doi.org/10.1016/j.cities.2019.102567

Coe, R. 2017. Inference and interpretation in research. *Research Methods & Methodologies in Education* 2:44–56.

Collins, A., Joseph, D., & Bielaczyc, K. 2016. Design research: Theoretical and methodological issues in, Design-Based Research. *Psychology Press*, 13:5–42. https://doi.org/10.1207/s15327809jls1301_2

Cornelia Dura, C., Appiah-Kubi, E., Niță, D., Drigă, I., Preda, A., & Cristian Dobre, A. 2025. Modelling the impact of green operations on SMEs' performance: The role of green transaction and artificial intelligence. *Applied Economics* 1–17. https://doi.org/10.1080/00036846.2025.2465844

Cowett, P. 2008. New York's sustainability plan: Trailblazer or copy cat? New York (NY):Hunter College.

Cremasco, C., Boni, L., 2024. Is the European Union (EU) Sustainable Finance Disclosure Regulation (SFDR) effective in shaping sustainability objectives? An analysis of investment funds' behaviour. *Journal of Sustainable Finance & Investment* 14:1018–1036. https://doi.org/10.1080/20430795.2022.2124838

Creswell, J.W., & Creswell, J.D. 2017. Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks (CA):Sage.

Creswell, J.W., Hanson, W.E., Clark Plano, V.L., & Morales, A. 2007. Qualitative research designs: Selection and implementation. *The Counseling Psychologist* 35:236–264. https://doi.org/10.1177/0011000006287390

Creswell, J.W. & Poth, C.N. 2016. Qualitative inquiry and research design: Choosing among five approaches. Thousand Oaks (CA):Sage.

Cunha, F.A.F.D.S., Meira, E., & Orsato, R.J. 2021a. Sustainable finance and investment: Review and research agenda. *Bus Strat Env* 30:3821–3838. https://doi.org/10.1002/bse.2842

Darawsheh, W., 2014. Reflexivity in research: Promoting rigour, reliability and validity in

qualitative research. *International Journal of Therapy and Rehabilitation* 21:560–568. https://doi.org/10.12968/ijtr.2014.21.12.560

Darko, E.M. 2022. Examining the relationship between sustainable finance and green economic progress in Ghana: the stakeholders' perspectives, in *IOP Conference Series: Earth and Environmental Science*. Bristol (UK): IOP Publishing, 012013. https://doi.org/10.1088/1755-1315/1044/1/012013

Davenport, E.C., Davison, M.L., Liou, P., & Love, Q.U. 2015. Reliability, dimensionality, and internal consistency as defined by Cronbach: Distinct albeit related concepts. *Educational Measurement* 34:4–9. https://doi.org/10.1111/emip.12095

Dawadi, S., Shrestha, S., & Giri, R.A. 2021. Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education* 2:25–36. https://doi.org/10.46809/jpse.v2i2.20

de Pádua Pieroni, M., Pigosso, D.C., McAloone, T.C., 2018. Sustainable qualifying criteria for designing circular business models. *Procedia Cirp* 69:799–804. https://doi.org/10.1016/j.procir.2017.11.014

De Vaus, D. & De Vaus, D. 2013. Surveys in social research. Oxfordshire (UK): Routledge. https://doi.org/10.4324/9780203519196

Denzin, N.K. 1977. Notes on the criminogenic hypothesis: A case study of the American liquor industry. *American Sociological Review* 42:905–920. https://doi.org/10.2307/2094576

Derrick, B. 2020. Statistical inference with paired observations and independent observations in two samples. Unpublished doctoral dissertation. Bristol (UK): University of the West of England. https://uwe-repository.worktribe.com/output/3429190

DiMaggio, P.J., Powell, W.W. 1983. The iron cage revisited: Institutional isomorphism and

collective rationality in organizational fields. *American Sociological Review* 48, 147–160. http://www.jstor.org/stable/2095101

Disse, S. & Sommer, C. 2020. Digitalisation and its impact on SME finance in Sub-Saharan Africa: Reviewing the hype and actual developments. Discussion Paper 4/2020:10-18. https://doi.org/doi:10.23661/dp4.2020

Ditlev-Simonsen, C.D. & Midttun, A. 2011. What motivates managers to pursue corporate responsibility? A survey among key stakeholders. *Corp Soc Responsibility Env* 18:25–38. https://doi.org/10.1002/csr.237

Donkoh, S., & Mensah, J. 2023. Application of triangulation in qualitative research. *Journal of Applied Biotechnology and Bioengineering* 10:6–9. https:doi.org/10.15406/jabb.2023.10.00319

Dosso, M., Braoulé Méïté, F., Ametepe, G., Gbogou, C., Guiella, G., & Oulaï, D. 2021. New entrepreneurial narratives in urban West Africa: Case studies of five innovation hubs and communities, in C. Daniels, M. Dosso, & J. Amadi-Echendu (eds.). *Entrepreneurship, Technology Commercialisation, and Innovation Policy in Africa*. Berlin (Germany): Springer International, 169–193. https://doi.org/10.1007/978-3-030-58240-1_8

du Plooy, D.R., Lyons, A., & Kashima, E.S. 2020. Social capital and the well-being of migrants to Australia: Exploring the role of generalised trust and social network resources. *International Journal of Intercultural Relations* 79:1–12. https://doi.org/10.1016/j.ijintrel.2020.07.001

Dzomonda, O. & Fatoki, O. 2019. The role of institutions of higher learning towards youth entrepreneurship development in South Africa. *Academy of Entrepreneurship Journal* 25:1–11.

Ebrahim, A., & Pirttilä, J. 2024. A policy for the jobless youth in South Africa. *Journal of Development Economics*. 172:103394. https://doi.org/10.1016/j.jdeveco.2024.103394

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Eduful, M., Alsharif, K., Eduful, A., Acheampong, M., Eduful, J., & Mazumder, L. 2020. The illegal artisanal and small-scale mining (galamsey) 'menace'in Ghana: Is military-style approach the answer? *Resources Policy* 68:101732. https://doi.org/10.1016/j.resourpol.2020.101732

Edwards, J.R. 2008. 4 Person–Environment Fit in Organizations: An assessment of theoretical progress. *ANNALS* 2:167–230. https://doi.org/10.5465/19416520802211503

Eisenhardt, K.M. & Graebner, M.E. 2007. Theory building from cases: Opportunities and challenges. *AMJ* 50:25–32. https://doi.org/10.5465/amj.2007.24160888

Elbahjaoui, M. & Elabjani, A. 2021. Incubation process: A key innovation lever for successful startup businesses. *International Journal of Research & Review. https://hal.science/hal-03520325*

Etzkowitz, H. 2002. *MIT and the rise of entrepreneurial science*. Berlin (Germany): Routledge.

Farrugia, D. 2019. The formation of young workers: The cultivation of the self as a subject of value to the contemporary labour force. *Current Sociology* 67:47–63. https://doi.org/10.1177/0011392118793681

Fatemi, A.M. & Fooladi, I.J. 2013. Sustainable finance: A new paradigm. *Global Finance Journal* 24:101–113. https://doi.org/10.1016/j.gfj.2013.07.006

Fatoki, O. 2018. The impact of entrepreneurial resilience on the success of small and medium enterprises in South Africa. *Sustainability* 10:2527. https://doi.org/10.3390/su10072527

Feld, B., Hathaway, I., 2020. The startup community way: Evolving an entrepreneurial ecosystem.

Hoboken (NJ): John Wiley & Sons.

Fleetwood, S., 2005. Ontology in organization and management studies: A critical realist perspective. *Organization* 12:197–222. https://doi.org/10.1177/1350508405051188

Flückiger, M., & Ludwig, M. 2018. Youth bulges and civil conflict: Causal evidence from Sub-Saharan Africa. *Journal of Conflict Resolution* 62:1932–1962. https://doi.org/10.1177/0022002717707303

Foa, E.B. & Foa, U.G. 2012. Resource theory of social exchange, in K. Törnblom, A. Kazemi (eds.). *Handbook of social resource theory, critical issues in social justice*. New York (NY): Springer. 15–32. https://doi.org/10.1007/978-1-4614-4175-5_2

Foa, U.G., Converse Jr, J.E., Törnblom, K.Y., & Foa, E.B. 1993. *Resource theory: Explorations and applications.* Washington (D.C.): Academic Press. https://doi.org/10.1037/002643

Fornell, C. & Larcker, D.F. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18:39–50. https://doi.org/10.1177/002224378101800104

Freeman, R.E. 2010. *Strategic management: A stakeholder approach*. Cambridge (UK): Cambridge University Press. https://doi.org/10.1017/CBO9781139192675

Friederici, N. 2019. Innovation hubs in Africa: What do they really do for digital entrepreneurs? in N.D. Taura, E. Bolat, & N.O. Madichie (eds.). *Digital entrepreneurship in Sub-Saharan Africa, Palgrave studies of entrepreneurship in Africa*. Berlin (Germany): Springer International. 9–28. https://doi.org/10.1007/978-3-030-04924-9_2

Gangopadhyay, P., Shankar, S., & Rahman, M.A. 2014. Working poverty, social exclusion and destitution: An empirical study. *Economic Modelling* 37:241–250. https://doi.org/10.1016/j.econmod.2013.11.001

Gerster, R. 2011. Sustainable finance: Achievements, challenges, outlook. Striking a balance ahead of Rio, 20. http://www.gersterconsulting.ch/docs/Sustainable_finance_final_11.02.10.pdf

Ghana, G.S.S. 2021. Population and housing census general report. GSS: Accra, Ghana 1–81. https://census2021.statsghana.gov.gh/gssmain/fileUpload/reportthemelist/Volume%203%20Highlights.pdf

Ghauri, P., Grønhaug, K., & Strange, R. 2020. Research methods in business studies. Cambridge (UK): Cambridge University Press. https://doi.org/10.1017/9781108762427

Ginty, A.T. 2020. Construct validity, in M.D. Gellman (ed.). *Encyclopedia of behavioral medicine*. Berlin (Germany): Springer International. 538–538. https://doi.org/10.1007/978-3-030-39903-0_861

Girma Aragaw, Z., Haag, K., & Baù, M. 2025. Contextualizing corporate entrepreneurship: A systematic review and future research agenda. *Entrepreneurship & Regional Development* 37:1–37. https://doi.org/10.1080/08985626.2024.2341886

González-Prieto, Á., Perez, J., Diaz, J., & López-Fernández, D. 2023. Reliability in software engineering qualitative research through inter-coder agreement: A guide using Krippendorff's $α$ & Atlas.ti. *Journal of Systems and Software* 202, 111707. https://doi.org/10.1016/j.jss.2023.111707

Gorman, M. & Sahlman, W.A. 1989. What do venture capitalists do? *Journal of Business Venturing* 4:231–248. https://doi.org/10.1016/0883-9026(89)90014-1

Gostin, L. 1991. Ethical principles for the conduct of human subject research: Population-based research and ethics. *Law, Medicine and Healthcare* 19:191–201. https://doi.org/10.1111/j.1748-720X.1991.tb01814.x

Granier, C. & Rigot, S. 2021. Sustainable finance. HAL. https://doi.org/10.48611.isbn.978-2-406-12206-6.p.0149

Grum, M., Klippert, M., Albers, A., Gronau, N., & Thim, C. 2021. Examining the quality of knowledge transfers–the draft of an empirical research. *Proceedings of the Design Society* 1:1431–1440. https://doi.org/10.1017/pds.2021.404

Guest, G. & Fleming, P. 2015. Mixed methods research. Public Health Research Methods 1:581–610. https://doi.org/10.4135/9781483398839.n19

Guetterman, T.C., Fetters, M.D., & Creswell, J.W. 2015. Integrating quantitative and qualitative results in health science mixed methods research through joint displays. *The Annals of Family Medicine* 13:554–561. https://doi.org/10.1370/afm.1865

Gunbayi, I. 2020. Knowledge-constitutive interests and social paradigms in guiding mixed methods research (MMR). *Journal of Mixed Methods Studies* 1:41–53. https://doi.org/10.14689/jomes.2020.1.3

Hackett, S.M. & Dilts, D.M. 2004. A systematic review of business incubation research. The *Journal of Technology Transfer* 29:55–82. https://doi.org/10.1023/B:JOTT.0000011181.11952.0f

Hair, J.F., Risher, J.J., Sarstedt, M., & Ringle, C.M. 2019. When to use and how to report the results of PLS-SEM. *European Business Review* 31, 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Haji-Othman, Y. & Yusuff, M.S.S. 2022. Assessing reliability and validity of attitude construct using partial least squares structural equation modeling. *International Journal of Academic Research in Business and Social Sciences* 12, 378–385. http://dx.doi.org/10.6007/IJARBSS/v12-i5/13289

Halim, H.A., Ahmad, N.H., Ramayah, T., Hanifah, H., Taghizadeh, S.K., & Mohamad, M.N. 2015. Towards an innovation culture: Enhancing innovative performance of Malaysian SMEs. *Academic Journal of Interdisciplinary Studies* 4:85. https://doi.org/10.5901/ajis.2015.v4n2p85

Hall, R.P. 2020. Mixing methods in social research: qualitative, quantitative and combined methods. Thousand Oaks (CA): Sage. https://doi.org/10.4135/9781036234263

Hampson, T. & McKinley, J. 2023. Problems posing as solutions: Criticising pragmatism as a paradigm for mixed research. *Research in Education* 116:124–138. https://doi.org/10.1177/00345237231160085

Hart, S.L. & Dowell, G. 2011. Invited editorial: A natural-resource-based view of the firm: Fifteen years after. *Journal of Management* 37:1464–1479. https://doi.org/10.1177/0149206310390219

Hatem, G., Zeidan, J., Goossens, M., & Moreira, C. 2022. Normality testing methods and the importance of skewness and kurtosis in statistical analysis. *BAU Journal-Science and Technology* 3:7. https://orcid.org/0000-0002-6989-7392

Haukipuro, L., Väinämö, S., Virta, V., & Perälä-Heape, M. 2024. Key aspects of establishing research, knowledge, and innovation-based hubs as part of the local innovation ecosystem. *R & D Management* 54:283–299. https://doi.org/10.1111/radm.12584

Hays, D.G. & McKibben, W.B. 2021. Promoting rigorous research: Generalizability and qualitative research. *Journal of Counselling & Development* 99:178–188. https://doi.org/10.1002/jcad.12365

Howells, J. 2006. Intermediation and the role of intermediaries in innovation. *Research Policy* 35:715–728. https://doi.org/10.1016/j.respol.2006.03.005

Hussey, D.M. & Eagan, P.D. 2007. Using structural equation modeling to test environmental performance in small and medium-sized manufacturers: Can SEM help SMEs? *Journal of Cleaner Production* 15:303–312. https://doi.org/10.1016/j.jclepro.2005.12.002

Hyde, K.F. 2000. Recognising deductive processes in qualitative research. *Qualitative Market Research: An International Journal* 3:82–90. https://doi.org/10.1108/13522750010322089

Isenberg, D.J. 2010. How to start an entrepreneurial revolution. *Harvard Business Review* 88:40–50. https://hbr.org/2010/06/the-big-idea-how-to-start-an-entrepreneurial-revolution

Iso-Ahola, S.E. 2020. Replication and the establishment of scientific truth. *Frontiers in Psychology* 11:2183. https://doi.org/10.3389/fpsyg.2020.02183

Jakonen, M., Kivinen, N., Salovaara, P., & Hirkman, P. 2017. Towards an economy of encounters? A critical study of affectual assemblages in coworking. *Scandinavian Journal of Management* 33:235–242. https://doi.org/10.1016/j.scaman.2017.10.003

Jeucken, M. 2010. Sustainable finance and banking: The financial sector and the future of the planet. Oxforshire (UK): Routledge. https://doi.org/10.4324/9781849776264

Jick, T.D. 1979. Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly* 24, 602–611. http://www.jstor.org/stable/2392366 .

Jiménez, A. & Zheng, Y. 2021. Unpacking the multiple spaces of innovation hubs. *The Information Society* 37:163–176. https://doi.org/10.1080/01972243.2021.1897913

Johannesson, P. & Perjons, E. 2021. Research strategies and methods, in An introduction to design science. Berlin (Germany): Springer International. 41–75. https://doi.org/10.1007/978-3-030-78132-3_3

Kagoma, P., Mongi, R., & Kalolo, A. 2025. Exploratory mixed-methods analysis of the determinants of use of health research evidence among planning teams in Tanzania. *BMJ*

Open 15:e099692. https://doi.org/10.1136/bmjopen-2025-099692

Kalra, P. 2024. Corporate social responsibility and stakeholder theory: An integrated review. *Journal of Management & Entrepreneurship* 10. https://doi.org/10.13140/RG.2.2.32886.82243

Kanimozhi, M, N. & Nandhana, M. 2022. Effectiveness of microfinance in poverty alleviation and entrepreneurship opportunities. *Research Hub International Multidisciplinary Research Journal* 9(5):1-6 https://doi.org/10.53573/rhimrj.2022.v09i05.001

Kapp, M.B. 2006. Ethical and legal issues in research involving human subjects: Do you want a piece of me? *Journal of Clinical Pathology* 59:335–339. https://doi.org/10.1136/jcp.2005.030957

Karadağ, H., Sahin, F., & Matemane, R. 2023. Disentangling the innovation orientation, intellectual capital, and dynamic innovation capability relationships in emerging economy startups. *International Journal of Innovation Management* 27(07n08):2350039. https://doi.org/10.1142/S1363919623500391

Kariv, D., 2022. *Startups and crisis management*. Oxfordshire (UK): Routledge. https://doi.org/10.4324/9781003173809

Kelle, U., 2007. “ Emergence” vs." forcing" of empirical data? A crucial problem of "grounded theory" reconsidered. *Historical Social Research/Historische Sozialforschung.* Supplement:133–156. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-288350

Khan, U.U., Ali, Y., Petrillo, A. & De Felice, F. 2023. Macro-environmental factors and their impact on startups from the perspective of developing countries. *International Journal of Sustainable Engineering* 16:166–183. https://doi.org/10.1080/19397038.2023.2238754

Kidwell, K.M. & Almirall, D. 2023. Sequential, multiple assignment, randomized trial designs.

JAMA 329:336–337. https://doi.org/doi:10.1001/jama.2022.24324

Kline, R.B. 2011. 26 convergence of structural equation modeling and multilevel modeling, in *The SAGE Handbook of Innovation in Social Research Methods*. Thousand Oaks (CA): Sage. 562–589. https://doi.org/10.4135/9781446268261.n31

Konsek-Ciechońska, J. 2019. Startup companies, challenges in Poland. Knowledge: *International Journal* 30(6):1621. https://doi.org/10.35120/kij30061621k

Koskey, K.L., May, T.A., Bright, D., Stone, G., Matney, G., & Bostic, J.D. 2023. Flip it: An exploratory (versus explanatory) sequential mixed methods design using Delphi and differential item functioning to evaluate item bias. *Methods in Psychology* 8:100117. https://doi.org/10.1016/j.metip.2023.100117

Krauss, A., Krüger, P. & Meyer, J. 2016. Sustainable finance in Switzerland: Where do we stand? *Swiss Finance Institute*. https://www.sfi.ch/system/tdf/WP_SustainableFinance_WEB_1.pdf?file=1

Kuckertz, A., Berger, E.S., & Gaudig, A. 2019. Responding to the greatest challenges? Value creation in ecological startups. *Journal of Cleaner Production* 230:1138–1147. https://doi.org/10.1016/j.jclepro.2019.05.149

Kuhn, B.M. 2022. Sustainable finance in Germany: Mapping discourses, stakeholders, and policy initiatives. *Journal of Sustainable Finance & Investmen*t 12:497–524. https://doi.org/10.1080/20430795.2020.1783151

Kumar, S., Sharma, D., Rao, S., Lim, W.M., & Mangla, S.K. 2025. Past, present, and future of sustainable finance: Insights from big data analytics through machine learning of scholarly research. Ann Oper Res 345:1061–1104. https://doi.org/10.1007/s10479-021-04410-8

Leedham-Green, K., Knight, A., Reedy, G.B. 2021. Success and limiting factors in health service

innovation: a theory-generating mixed methods evaluation of UK projects. *BMJ Open* 11:e047943. https://doi.org/10.1136/bmjopen-2020-047943

Liu, W., Yuan, S., Wei, F., Yang, J., Zhang, Z., Zhu, C., & Ma, J. 2015. Reliability and validity of the Chinese version appropriateness evaluation protocol. *PloS One* 10:e0136498. https://doi.org/10.1371/journal.pone.0136498

Locke, E.A. 2012. Construct validity vs. concept validity. *Human Resource Management Review* 22:146–148. https://doi.org/10.1016/j.hrmr.2011.11.008

Maggetti, M. 2020. Mixed-Methods Designs, in C. Wagemann, A. Goerres, M.B. Siewert (eds.), Handbuch methoden der politikwissenschaft. Wiesbaden: Springer Fachmedien. 193–210. https://doi.org/10.1007/978-3-658-16936-7_12

Maltais, A. & Nykvist, B., 2020. Understanding the role of green bonds in advancing sustainability. *Journal of Sustainable Finance & Investment* 15:1–20. https://doi.org/10.1080/20430795.2020.1724864

Masipa, T. 2018. South Africa's transition to democracy and democratic consolidation: A reflection on socio-economic challenges. *Journal of Public Affairs* 18:e1713. https://doi.org/10.1002/pa.1713

Matemane, R., Mintah, R., Şahin, F., & Karadağ, H. 2025. A configurational analysis of the impact of entrepreneurial orientation and global mindset on export performance of SMEs. *The International Journal of Entrepreneurship and Innovation* 26(3):197-209. https://doi.org/10.1177/14657503241302308

Megbowon, E.T., Mothae, L., & Relebohile, J.R. 2022. Effect of government agricultural expenditure on economic growth: Evidence from a developing country. *Studia Universitatis Babes-Bolyai Oeconomica* 67:1–20. https://doi.org/10.2478/subboec-2022-

0006

Mensah, C.N., Dauda, L., Boamah, K.B., & Salman, M. 2021. One district one factory policy of Ghana, a transition to a low-carbon habitable economy? *Environ Dev Sustain* 23:703–721. https://doi.org/10.1007/s10668-020-00604-5

Mensah, I., Boohene, R., & Mensah, M.S.B. 2024. Effects of entrepreneurial networking on sustainable growth of small enterprises–the mediating role of innovation. *Benchmarking: An International Journal.* https://doi.org/10.1108/BIJ-04-2024-0276

Metu, A.G., Ajudua, E., Eboh, I., Ukeje, C., & Madichie, C. 2020. Ending youth unemployment in sub-saharan Africa: Does ICT development have any role? *African Development Review* 32. https://doi.org/10.1111/1467-8268.12479

Migliorelli, M. 2021. What do we mean by sustainable finance? Assessing existing frameworks and policy risks. *Sustainability* 13:975. https://doi.org/10.3390/su13020975

Mitchell, R.K., Agle, B.R., & Wood, D.J. 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. T*he Academy of Management Review* 22:853. https://doi.org/10.2307/259247

Mohammed, W.D. 2023. A socio-pragmatic study of satire in english political speeches with reference to its Arabic translations. *Journal of Language Studies* 7:236–255. https://doi.org/10.25130/lang.7.4.12

Molnár, E.M. & Jáki, E. 2020. What qualities do government-owned venture capital investors seek in a new venture? A comparison of investment criteria across pre-seed, seed, and expansion stage startups. *Vezetéstudomány/Budapest Management Review* 51:64–76. https://doi.org/10.14267/VEZTUD.2020.11.06

Moore, K., O'Shea, E., Kenny, L., Barton, J., Tedesco, S., Sica, M., Crowe, C., Alamäki, A.,

Condell, J., & Nordström, A. 2021. Older adults' experiences with using wearable devices: Qualitative systematic review and meta-synthesis. *JMIR mHealth and uHealth* 9:e23832. https://doi.org/10.2196/23832

Morgeson, F.P., Mitchell, T.R., & Liu, D. 2015. Event System Theory: An event-oriented approach to the organizational sciences. AMR 40:515–537. https://doi.org/10.5465/amr.2012.0099

Moser, A. & Korstjens, I. 2018. Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice* 24:9–18. https://doi.org/10.1080/13814788.2017.1375091

Muathe, S., Sang, P., Kosimbei, G., Letema, S., Nyachae, S., Kiriago, S., Chelule, K., Ouko, E., Mutua, M., & Maina, S. 2022. Understanding startups ecosystem in Kenya: Drivers, challenges, and opportunities. *Journal of Business and Management Sciences* 10:138–146. https://doi.org/10.12691/jbms-10-3-5

Musabayana, G.T., Mutambara, E., & Ngwenya, T., 2023. Establishment of a Zimbabwe national SME sector: A major priority to enhance the performance of the national economy. *J Innov Entrep* 12:65. https://doi.org/10.1186/s13731-023-00329-5

Mwantimwa, K., Ndege, N., Atela, J., & Hall, A. 2021. Scaling innovation hubs: Impact on knowledge, innovation and entrepreneurial ecosystems in Tanzania. Journal of Innovation Management 9:39–63. https://doi.org/10.24840/2183-0606_009.002_0005

Nhemachena, C. & Murimbika, M. 2018. Motivations of sustainable entrepreneurship and their impact of enterprise performance in Gauteng Province, South Africa. *Bus Strat Dev* 1:115–127. https://doi.org/10.1002/bsd2.16

Nkwake, A.M. 2015. Validity in analysis, interpretation, and conclusions, in *Credibility, validity,*

and assumptions in program evaluation methodology. Berlin (Germany): Springer. 97–110. https://doi.org/10.1007/978-3-319-19021-1_6

Nnanna, J., Charles, M.B., Noble, D., & Keast, R. 2023. Innovation hubs in Australian public universities: An appraisal of their public value claims. *International Journal of Public Administration* 46:133–143. https://doi.org/10.1080/01900692.2021.1993900

Nyerere, J., Opinde, G., Muthoni, P., & Mutuma, W. 2022. Incubating graduate entrepreneurs in Kenya: Nested case studies of Kenyatta University Chandaria Business Innovation Incubation Centre. *Papers in Education and Development* 40:40–58. https://journals.udsm.ac.tz/index.php/ped/article/view/5058

Obiora, N. 2023. Financial literacy acquisition strategies small business entity owners use for sustainability (PhD Thesis). Unpublished doctoral dissertation. Minneapolis (MN): Walden University.

Okoli, C. 2023. Inductive, abductive and deductive theorising. *IJMCP* 16:302–316. https://doi.org/10.1504/IJMCP.2023.131769

Olaniran, S.O., Mncube & D.W. 2018. Barriers to effective youth entrepreneurship and vocational education. *Academy of Entrepreneurship Journal* 24:1–10. https://www.abacademies.org/articles/barriers-to-effective-youth-entrepreneurship-and-vocational-education-7712.html

Oman, W. & Svartzman, R., 2021. Sustainable finance: Current needs, measures and impact., CESifo Forum 22(3):3. https://hdl.handle.net/10419/250915

Omeje, A.N., Jideofor, A., & Ugwu, M.O. 2020. Youth empowerment and entrepreneurship in Nigeria: Implication for economic diversification. *Sage Open* 10:2158244020982996. https://doi.org/10.1177/2158244020982996

Oppong, F.B. & Agbedra, S.Y. 2016. Assessing univariate and multivariate normality: A guide for non-statisticians. *Mathematical Theory and Modeling* 6:26–33. https://www.iiste.org/Journals/index.php/MTM/article/view/28571

Organization, W.H. 2021. Antimicrobial resistance and the United Nations sustainable development cooperation framework: Guidance for United Nations country teams. World Health Organization. https://iris.who.int/handle/10665/346658

Ozili, P.K., 2021. Digital finance, green finance and social finance: Is there a link? *Financial Internet Quarterly* 17:1–7. https://doi.org/10.2478/fiqf-2021-0001

Paudel, P. 2024. Examining paradigmatic shifts: Unveiling the philosophical foundations shaping social research methodologies. *Journal of the University of Ruhuna* 12:45–58. https://doi.org/10.4038/jur.v12i1.8033

Petrucci, F. 2018. The incubation process of mid-stage startup companies: A business network perspective. *IMP Journal* 12:544–566. https://doi.org/10.1108/IMP-07-2017-0043

Podsakoff, P.M., MacKenzie, S.B., & Podsakoff, N.P. 2012. Sources of method bias in social science research and recommendations on how to control it. *Annu. Rev. Psychol* 63:539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Polat, A., Dogan, S., & Demir, S.B. 2016. The Constructivist Approach? I have heard about it but i have never seen it": An example of exploratory sequential mixed design study. *International Journal of Higher Education* 5:62–82. http://www.sciedupress.com/ijhe

Prohorovs, A., Bistrova, J., & Ten, D. 2019. Startup success factors in the capital attraction stage: founders' perspective. *Journal of East-West Business* 25:26–51. https://doi.org/10.1080/10669868.2018.1503211

Pyka, I. & Nocoń, A. 2021. Banks' capital requirements in terms of implementation of the concept

of sustainable finance. *Sustainability* 13:3499. https://doi.org/10.3390/su13063499

Quatrini, S. 2021. Challenges and opportunities to scale up sustainable finance after the COVID-19 crisis: Lessons and promising innovations from science and practice. *Ecosystem Services* 48:101240. https://doi.org/10.1016/j.ecoser.2020.101240

Rahman, M.M., Dana, L.P., Moral, I.H., Anjum, N., & Rahaman, M.S. 2022. Challenges of rural women entrepreneurs in Bangladesh to survive their family entrepreneurship: A narrative inquiry through storytelling. *Journal of Family Business Management* 13(3):645-664. https://doi.org/10.1108/JFBM-04-2022-0054

Ranney, M.L., Meisel, Z.F., Choo, E.K., Garro, A.C., Sasson, C., & Morrow Guthrie, K. 2015. Interview-based Qualitative research in emergency care Part II: Data collection, analysis and results reporting. *Academic Emergency Medicine* 22:1103–1112. https://doi.org/10.1111/acem.12735

Rezigalla, A.A., 2020. Observational study designs: Synopsis for selecting an appropriate study design. *Cureus* 12. https://doi.org/10.7759/cureus.6692

Rindfleisch, A., Malter, A.J., Ganesan, S., & Moorman, C. 2008. Cross-sectional versus longitudinal survey research: Concepts, findings, and guidelines. *Journal of Marketing Research* 45:261–279. https://doi.org/10.1509/jmkr.45.3.261

Ripsas, S., Schaper, B., & Tröger, S. 2018. A Startup cockpit for the proof-of-concept, in G. Faltin (ed.), *Handbuch entrepreneurship.* Wiesbaden (Germany): Springer. 263–279. https://doi.org/10.1007/978-3-658-04994-2_21

Romero-Sánchez, A., Perdomo-Charry, & G., Burbano-Vallejo, E.L. 2024. Exploring the entrepreneurial landscape of university-industry collaboration on public university spin-off creation: A systematic literature review. *Heliyon* 10(19):e27258.

https://doi.org/10.1016/j.heliyon.2024.e27258

Ryszawska, B. 2016. Sustainability transition needs sustainable finance. *Copernican Journal of Finance & Accounting* 5:185–194. https://doi.org/10.12775/CJFA.2016.011

Sarasvathy, S.D. 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *The Academy of Management Review* 26:243. https://doi.org/10.2307/259121

Sarbah, A. & Quaye, I. 2021. Effects of globalization on small medium-sized enterprise development in Ghana. *African Journal of Business Management* 15:250–264. https://doi.org/10.5897/AJBM2021.9196

Saunders, M., Lewis, & P., Thornhill, A. 2009. Research methods for business students. London (UK): Pearson Education.

Saygili, E., Uye Akcan, E., & Ozturkoglu, Y. 2023. An exploratory analysis of sustainability indicators in Turkish small-and medium-sized industrial enterprises. *Sustainability* 15, 2063. https://doi.org/10.3390/su15032063

Scaringella, L. & Radziwon, A. 2018. Innovation, entrepreneurial, knowledge, and business ecosystems: Old wine in new bottles? *Technological Forecasting And Social Change* 136:59–87. https://doi.org/10.1016/j.techfore.2017.09.023

Schaltegger, S. & Wagner, M. 2011. Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Bus Strat Env* 20:222–237. https://doi.org/10.1002/bse.682

Schmitt, D., Muyoya, C. 2020. Influence in technological innovation spaces: A network science approach to understand innovation for sustainability in the global south. *Sustainability* 12, 1858. https://doi.org/10.3390/su12051858

Schoonenboom, J., Johnson, R.B. 2017. How to construct a mixed methods research design. *Köln*

Z Soziol 69:107–131. https://doi.org/10.1007/s11577-017-0454-1

Schumacher, K., Chenet, H., & Volz, U. 2020. Sustainable finance in Japan. J*ournal of Sustainable Finance & Investment* 10:213–246. https://doi.org/10.1080/20430795.2020.1735219

Scott, J., 2014. Mitigating risk when migrating to the cloud. *Strategic Finance* 96:56–58.

Secundo, G. & Capaldo, G. 2020. Facilitating business startup launch: An Interpretative framework based on project management, in G. Passiante (ed.), *Innovative entrepreneurship in action, international studies in entrepreneurship*. Berlin (Germany): Springer. 55–69. https://doi.org/10.1007/978-3-030-42538-8_5

Serdar, C.C., Cihan, M., Yücel, D., & Serdar, M.A. 2021. Sample size, power and effect size revisited: Simplified and practical approaches in pre-clinical, clinical and laboratory studies. *Biochemia Medica* 31:27–53. https://hrcak.srce.hr/252075

Setyowati, A.B. 2023. Governing sustainable finance: Insights from Indonesia. *Climate Policy* 23:108–121. https://doi.org/10.1080/14693062.2020.1858741

Seuring, S. & Müller, M. 2008. Core issues in sustainable supply chain management – a Delphi study. *Bus Strat Env* 17:455–466. https://doi.org/10.1002/bse.607

Shabb, K., Curtis, S., & Libertson, F. 2021. *Sustainable finance: Investing in our future*. Lund (Sweden): Lund University. The International Institute for Evironmental Economics. https://lup.lub.lu.se/record/9b00b635-9b5e-408b-a52f-5029480408a6

Silverman, D. 2013. A very short, fairly interesting and reasonably cheap book about qualitative research. Thousand Oaks (CA): Sage. https://doi.org/10.1080/14780887.2013.829725

Simuka, J. & Chinakidzwa, M. 2022. A stakeholder founded business model for strategic management of innovation hubs: A case of Zimbabwe universities innovation hubs. *JAE* 3:155–179. https://doi.org/10.31920/2633-2930/2022/v3n2a6

Sivathanu, B. & Pillai, R. 2020. An empirical study on entrepreneurial bricolage behavior for sustainable enterprise performance of startups: Evidence from an emerging economy. *Journal of Entrepreneurship in Emerging Economies* 12:34–57. https://doi.org/10.1108/JEEE-01-2019-0009

Sohail, M., Khan, S., Akbar, A., Hedvicakova, M., & Haider, S.A. 2024. Sustainable development through green finance—An exploratory investigation in the financial industry of France [J]. *Journal of Infrastructure Policy Development* 8:4668. http://hdl.handle.net/20.500.12603/2228

Soomro, B.A., Lakhan, G.R., & Shah, N. 2021. COVID-19 impediments and business start-ups in Pakistan: Evidence from the second wave of the pandemic. *Manage Decis Econ* 42:1909–1918. https://doi.org/10.1002/mde.3445

Srivastava, A., Rastogi, A., Rao, A., Shoeb, A.A.M., Abid, A., Fisch, A., Brown, A.R., Santoro, A., Gupta, A., & Garriga-Alonso, A. 2023. Beyond the imitation game: Quantifying and extrapolating the capabilities of language models. *Transactions on Machine Learning Research. https://doi.org/10.48550/arXiv.2206.04615*

Stojanova, S., Cvar, N., Verhovnik, J., Božić, N., Trilar, J., Kos, A., & Stojmenova Duh, E. 2022. Rural digital innovation hubs as a paradigm for sustainable business models in Europe's rural areas. *Sustainability* 14:14620. https://doi.org/10.3390/su142114620

Subedi, D. 2016. Explanatory sequential mixed method design as the third research community of knowledge claim. *American Journal of Educational Research* 4:570–577. https://doi.org/10.12691/education-4-7-10

Tajvidi, M. & Karami, A. 2015. Research Strategy, in Product development strategy. London (UK): Palgrave Macmillan. 45–78. https://doi.org/10.1057/9781137501394_3

Tamminen, K.A. & Poucher, Z.A. 2020. Research philosophies, in The Routledge International encyclopedia of sport and exercise psychology. Oxforshire (UK): Routledge. 535–549. https://doi.org/10.4324/9781315187259-39

Tashakkori, A. & Teddlie, C. 2010. Putting the human back in "human research methodology": The researcher in mixed methods research. J*ournal of Mixed Methods Research* 4:271–277. https://doi.org/10.1177/1558689810382532

Thavorn, J., Chandrachai, A., Klongthong, W., Thanabodypath, W., & Dhammathattariya, P. 2020. The influence of entrepreneurial self-efficacy and innovation on firm performance: Evidence from Thai startup firms. *Humanities* 8:450–463. https://doi.org/10.18488/journal.73.2020.84.450.463

Thistlethwaite, J. 2014. Private governance and sustainable finance. *Journal of Sustainable Finance & Investment* 4:61–75. https://doi.org/10.1080/20430795.2014.887348

Tokarev, B. 2018. Marketing for seed-stage innovative startup. *Vestnik Universiteta* 2:36–42. https://doi.org/10.26425/1816-4277-2018-2-36-42

Toyon, M.A.S. 2021. Explanatory sequential design of mixed methods research: Phases and challenges. *International Journal of Research in Business and Social Science* 10:253–260. https://doi.org/10.20525/ijrbs.v10i5.1262

Turner, S.F., Cardinal, L.B., & Burton, R.M. 2017. Research design for mixed methods: A triangulation-based framework and roadmap. *Organizational Research Methods* 20:243–267. https://doi.org/10.1177/1094428115610808

Ukil, M.I. & Jenkins, A. 2023. Willing but fearful: Resilience and youth entrepreneurial intentions. *Journal of Small Business and Enterprise Development* 30:78–99. https://doi.org/10.1108/JSBED-03-2022-0154

Urban, M.A. & Wójcik, D. 2019. Dirty banking: Probing the gap in sustainable finance. *Sustainability* 11, 1745. https://doi.org/10.3390/su11061745

Urbano, D., Aparicio, S., & Audretsch, D. 2019. Twenty-five years of research on institutions, entrepreneurship, and economic growth: what has been learned? *Small Business Econnomics* 53:21–49. https://doi.org/10.1007/s11187-018-0038-0

Vernon, R. 1979. The product cycle hypothesis in a new international environment. *Oxford Bulletin of Economics & Statistics* 41(4):255. https://doi.org/10.1111/j.1468-0084.1979.mp41004002.x

Warasthe, R., Schulz, F., Enneking, R., & Brandenburg, M. 2020. Sustainability prerequisites and practices in textile and apparel supply chains. *Sustainability* 12:9960. https://doi.org/10.3390/su12239960

Ward, J.K., Comer, U., & Stone, S. 2018. On qualifying qualitative research: Emerging perspectives and the "Deer" (Descriptive, Exploratory, Evolutionary, Repeat) paradigm. *Interchange* 49:133–146. https://doi.org/10.1007/s10780-018-9313-x

Weber, O. 2014. The financial sector's impact on sustainable development. *Journal of Sustainable Finance & Investment* 4:1–8. https://doi.org/10.1080/20430795.2014.887345

Wernerfelt, B. 1984. A resource-based view of the firm. *Strategic Management Journal* 5:171–180. https://doi.org/10.1002/smj.4250050207

Wester, K. & McKibben, B. 2019. Integrating mixed methods: Approaches in counseling outcome research. *Counseling Outcome Research and Evaluation* 10:1–11. https://doi.org/10.1080/21501378.2018.1531239

Whitley, G.A., Munro, S., Hemingway, P., Law, G.R., Siriwardena, A.N., Cooke, D., & Quinn, T. 2020. Mixed methods in pre-hospital research: understanding complex clinical problems.

British Paramedic Journal 5:44. https://doi.org/10.29045/14784726.2020.12.5.3.44

Widarti, W., Desfitrina, D., & Zulfadhli, Z. 2020. Business process life cycle affects company financial performance: Micro, small, and medium business enterprises during the Covid-19 Period. *International Journal of Economics and Financial Issues* 10:211. https://doi.org/10.32479/ijefi.10516

Will, D.J., Campbell, K.J., & Holmes, N.D. 2015. Using digital data collection tools to improve overall cost-efficiency and provide timely analysis for decision making during invasive species eradication campaigns. *Wildlife Research* 41:499–509. https://doi.org/10.1071/WR13178

William, F.K.A. 2024. Crafting a strong research design: a step-by-step journey in academic writing. *International Journal of Scientific Research and Management* 12:3238–3245. http://dx.doi.org/10.2139/ssrn.4748261

Willie, M.M. 2024. Population and target population in research methodology. *Golden Ratio of Social Science and Education* 4:75–79. https://doi.org/10.52970/grsse.v4i1.405

Wilson, C. 2010. Why should sustainable finance be given priority? Lessons from pollution and biodiversity degradation. *Accounting Research Journal* 23:267–280. https://doi.org/10.1108/10309611011092592

Wipulanusat, W., Panuwatwanich, K., Stewart, R.A., & Sunkpho, J. 2020. Applying mixed methods sequential explanatory design to innovation management, in K. Panuwatwanich, C-H. Ko (eds.), *The 10th International Conference on Engineering, Project, and Production Management, Lecture Notes in Mechanical Engineering*. Singapore: Springer. 485–495. https://doi.org/10.1007/978-981-15-1910-9_40

Wu, Y., Maas, G., Zhang, Y., Chen, F., Xia, S., Fernandes, K., & Tian, K. 2023. The secrets to

successful entrepreneurship: How occupational experience shapes the creation and performance of startups. *International Journal of Entrepreneurial Behavior & Research* 29:354–384. https://doi.org/10.1108/IJEBR-09-2021-0748

Wulfert, T. 2023. Boundary resource management in innovation ecosystems: The case of e-commerce. *Electron Markets* 33:27. https://doi.org/10.1007/s12525-023-00651-6

Yaşlıoğlu, M. & Yaşlıoğlu, D.T. 2020. How and when to use which fit indices? A practical and critical review of the methodology. *Istanbul Management Journal* 88(2020):1–20. https://doi.org/10.26650/imj.2020.88.0001

Zeidan, R. 2025. *The green banking transition manual: Navigating the sustainable finance landscape.* Singapore: Springer Nature. https://doi.org/10.1007/978-981-96-2852-0

Ziolo, M., Bak, I., Cheba, K. 2021. The role of sustainable finance in achieving sustainable development goals: Does it work? *Technological and Economic Development of Economy* 27:45–70. https://doi.org/10.3846/tede.2020.13863

ADDENDA / APPENDICES

APPENDIX A

STRUCTURED QUESTIONNAIRE

This study is for academic purposes only and therefore, any information provided is highly confidential. This questionnaire aims to examine the roles of sustainable finance and stakeholder pressure in influencing the effect of Innovation Hubs on Sustainability Performance. The questionnaire is divided into Five Sections; A, B, C, D and E. Questions should be answered by selecting [√] against the response that best suits your opinion or filling the space where appropriate.

Thank you for taking the time to contribute to this research.

SECTION A: Demographic Information

1. Firm age
    a. Less than 5 years [ ]
    b. 5 – 10 years [ ]
    c. 11 – 15 years [ ]
    d. 16 – 20 years [ ]
    e. Above 20 years [ ]

2. Numbers Employees
    a. 1-20 [ ]
    b. 21 -40 [ ]
    c. 41 -60 [ ]
    d. 61 – 80 [ ]
    e. 81 – 100 [ ]
3. Industry
    a. Manufacturing [ ]
    b. Services [ ]

c. Other [ ] …….

SECTION B: Innovation Hubs

This section contains statements about Innovation Hubs. Please indicate your level of agreement with each statement using the 5-point Likert scale below. Select [√] against the response that best suits your opinion in the space where appropriate.

Likert Scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Code	Statement	1	2	3	4	5
NNH1	Our organization actively participates in programs organized by innovation hubs.					
NNH2	Innovation hubs provide valuable opportunities for networking and collaboration.					
NNH3	Engagement with innovation hubs gives our organization access to new knowledge and resources.					
NNH4	Innovation hubs support experimentation and testing of new solutions.					
NNH5	Innovation hubs facilitate partnerships with universities, startups, and industry experts.					
NNH6	Our organization uses innovation hubs to access funding, training, or technical support.					
NNH7	Innovation hubs play a significant role in strengthening our organizational capacity.					
NNH8	Participation in innovation hubs improves our organization's competitiveness.					

Source: Scaringella & Radziwon (2018:59–87)

SECTION C: Sustainability Performance

This section contains statements about Sustainability Performance. Please indicate your level of agreement with each statement using the 5-point Likert scale below. Select [√] against the response that best suits your opinion in the space where appropriate.

Likert Scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Code	Statement	1	2	3	4	5
SUP1	Our organization reduces waste and emissions in its operations.					
SUP2	We adopt energy-efficient practices that contribute to environmental sustainability.					
SUP3	Our organization ensures responsible use of natural resources.					
SUP4	Sustainability practices in our organization enhance long-term profitability.					
SUP5	We actively invest in corporate social responsibility (CSR) initiatives.					
SUP6	Our organization maintains high standards of employee health and safety.					
SUP7	We promote fair labour practices and community engagement.					
SUP8	Our sustainability initiatives strengthen our reputation and competitiveness.					

Source: Seuring & Müller (2008:455–466)

SECTION D: Sustainable Finance

This section contains statements about Sustainable Finance in your organization. Please indicate your level of agreement with each statement using the 5-point Likert scale below. Select [√] against the response that best suits your opinion in the space where appropriate.

Likert Scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Code	Statement	1	2	3	4	5
SFN1	Our organization integrates environmental, social, and governance (ESG) factors into financial decisions.					
SFN2	We allocate financial resources to projects that promote long-term sustainability.					
SFN3	Sustainable finance practices help reduce financial risks in our organization.					
SFN4	Our organization has policies that encourage investment in green or socially responsible initiatives.					
SFN5	Sustainable finance contributes to both profitability and positive social impact in our organization.					

Source: Friede, Busch & Bassen (2015)

SECTION E: Stakeholder Pressure

This section contains statements about Stakeholder Pressure in your organization. Please

indicate your level of agreement with each statement using the 5-point Likert scale below. Select [√] against the response that best suits your opinion in the space where appropriate.

Likert Scale:
1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Code	Statement	1	2	3	4	5
STP1	Our organization faces pressure from customers to adopt sustainable practices.					
STP2	Government regulations and policies strongly influence our sustainability actions.					
STP3	Non-governmental organizations (NGOs) and civil society groups push us toward responsible practices.					
STP4	Investors and shareholders demand greater attention to environmental and social performance.					
STP5	Employees and internal stakeholders encourage the adoption of sustainable initiatives.					

APPENDIX B

INTERVIEW GUIDE

SECTION A: Demographic Information

1. Age
    a. 18 – 24 years [ ]
    b. 25 – 34 years [ ]
    c. 35 – 44 years [ ]
    d. 45 years and above [ ]

2. Qualification
    a. Bachelor's Degree [ ]
    b. Masters Degree [ ]
    c. Doctorate [ ]
    e. Other [ ]

3. Experience
    a. Less than 1 year [ ]
    b. 1 – 3 years [ ]
    c. 4 – 6 years [ ]
    c. 7 – 10 years [ ]
    d. More than 10 years [ ]

4. Position
    a. Manager [ ]
    b. Innovation hub coordinator [ ]
    c. Financial Institution Representative [ ]

Section B: Innovation Hubs and Business Development

1. Are you familiar with innovation hubs or networks that support startups? If yes, could you describe your interaction with them?
   .....
2. What specific types of support (e.g., funding, training, technology, mentoring, partnerships) have you received from innovation hubs?.....
3. In your view, how have innovation hubs influenced your organization's ability to innovate and adapt to sustainability requirements?.....
4. What challenges have you encountered when engaging with innovation hubs?.....

Section C: Sustainable Finance

1. What does "sustainable finance" mean to your organization?.....
2. Have you accessed any form of sustainable finance (e.g., green loans, ESG-linked investments, or sustainability-focused grants)?.....
3. How do you think access to sustainable finance affects your firm's sustainability performance or innovation capacity?.....
4. What barriers, if any, exist for startups in obtaining sustainable finance?
   .....

Section D: Sustainability Performance

1. How does your organization define and measure sustainability performance?.....
2. Can you share examples of initiatives your firm has undertaken to improve environmental, social, or economic sustainability?.....
3. How has participation in innovation hubs or access to sustainable finance affected your sustainability outcomes? .....

4. What are the main factors that motivate or discourage your organization from pursuing sustainability goals? .....

Section E: Stakeholder Pressure

1. What types of stakeholders (e.g., customers, investors, regulators, suppliers, communities) exert the most pressure on your organization to operate sustainably?
   .....
2. How do you respond to these stakeholder expectations or pressures?
   .....
3. In your opinion, how do stakeholder pressures shape your firm's approach to sustainable finance or sustainability practices?
   .....
4. Do you believe stakeholder influence encourages or constrains innovation for sustainability?
   .....

Section F: Perceived Interrelationships

1. How would you describe the overall relationship between innovation hubs, sustainable finance, and sustainability performance?
   .....
2. Do you think stakeholder pressure strengthens or weakens this relationship? Why?
   .....
   ...

APPENDIX C

UNISA RESEARCH ETHICS 3rd Party Confidentiality Agreement

UNISA RESEARCH ETHICS 3rd Party Confidentiality Agreement (Transcriber, Co-coder, Statistician and/or Fieldworkers)

A. INSTRUCTIONS

Please read through the entirety of this form carefully before signing.

After completing the required fields, please sign the form. After this form has been signed by the transcriber, cocoder, statistician or fieldworker, it should be given to the principal researcher for submission to the relevant UNISA Research Ethics Committee.

The transcriber, co-coder, statistician and/or filedworker should keep a copy of the *Confidentiality Agreement* for their records.

B. CONFIDENTIALITY OF A RESEARCH STUDY

Confidentiality is the treatment and maintenance of information that an individual has disclosed in a relationship of trust and with the expectation that it will not be divulged to others in ways that are inconsistent with the understanding of the original disclosure (the informed consent documentation) without permission. Confidential information relating to human participants in a research study may include, but is not limited to the personal information listed below:

a) information relating to the race, gender, sex, pregnancy, marital status, national, ethnic or social origin, color, sexual orientation, age, physical or mental health, well-being, disability, religion, conscience, belief, culture, language and birth of the person;
b) information relating to the education or the medical, financial, criminal or employment history of the person;
c) any identifying number, symbol, e-mail address, physical address, telephone number, location information, online identifier or other assignment to the person; d) the biometric information of the person;

e) the personal opinions, views or preferences of the person;
f) correspondence sent by the person that is implicitly or explicitly of a private or confidential nature or further correspondence that would reveal the contents of the original correspondence; g) the views or opinions of another individual about the person; and

h) the name of the person if it appears with other personal information relating to the person or if the disclosure of the name itself would reveal information about the person.

As a third party you will have access to research information (e.g. audio or video recordings, DVDs/CDs, transcripts, data, etc.) that include confidential information. Participants have revealed information to the researcher(s) since they have been assured by the researcher(s) that every effort will be made to maintain their privacy throughout the study. That is why it is of the upmost importance to maintain confidentiality when conducting your duties as a transcriber, statistician, co-coder and/or fieldworker during the research study. *Below is a list of expectations you will be required to adhere to in your role as a third party in this study. Review these expectations carefully before signing this form.*

C. THIRD PARTY EXPECTATIONS

To maintain confidentiality, I agree to:

1. Keep all research information that I collect or that is shared with me confidential by not discussing or sharing this information verbally or in any format with anyone other than the principal researcher of this study;

2. Ensure the security of research information (e.g. audio or video recordings, DVDs/CDs, transcripts, data, etc.) while it is in my possession. This includes:
   - Keeping all data and/or transcript documents and digitized interviews on a password protected computer with password-protected files;
   - Closing any programs and documents when temporarily away from the computer; • Keeping any printed transcripts or data in a secure location such as a locked file cabinet;
   - Permanently deleting any digital communication containing the data.

3. Not make copies of research information (e.g. audio or video recordings, DVDs/CDs, transcripts, data, etc.) unless specifically instructed to do so by the principal researcher;

4. Give all research information (e.g. audio or video recordings, DVDs/CDs, transcripts, data, etc.) and research participant information, back to the principal researcher upon completion of my duties as a transcriber;

5. After discussing it with the principal researcher, erase or destroy all research information

(e.g. audio or video recordings, DVDs/CDs, transcripts, data, etc.) that cannot be returned to the principal researcher upon completion of my duties in this study.

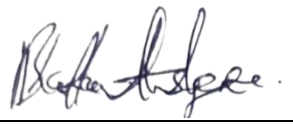
Name of 3rd party involved in research activities: YES

Research activity responsible for (transcribing interviews, co-coding of data, statistical analysis, collecting data, etc.): Collecting data.

Title of Research Study: The role of innovation hubs in sustainable finance of start-ups in Ghana.

Name of Principal Researcher: FRANKLIN RUSSELL NYAMADI

By signing this form, I acknowledge that I have reviewed, understand, and agree to adhere to the expectations described above. I agree to maintain confidentiality while performing my duties as acquired by the principal researcher. I recognise that failure to comply with these expectations may result in legal action.



26th July 2024

Signature of 3rd party Date

Kwame Baffour Asare Anokye

Print Name

APPENDIX D

ETHICS APPROVAL



College of Accounting Sciences_RERC
Date: 30/09/2024

NHREC Registration # : (if applicable)
Ref #: 4737
Name: Mr Franklin Russell Nyamadi
Student #: 58551433
Staff #:

Dear: Mr Franklin Russell Nyamadi

Decision: Ethics Approval from 5 September 2024 to 4 September 2027

Researcher: Mr Franklin Russell Nyamadi

P O Box KS 13631, Adum-Kumasi. Ghana

Kumasi

58551433@mylife.unisa.ac.za +233 202660358 +233 268816900

Supervisor: Professor Matwale Reon Matemane matwalemreon@gmail.com

Co-Supervisor: Professor Faruk Şahin faruksahin@mu.edu.tr

Co-Researcher(s):

Email address:

The role of innovation hubs in sustainable finance of start-ups in Ghana.

Qualification: DOCTOR OF PHILOSOPHY IN ACCOUNTING SCIENCES

Thank you for the application for research ethics clearance by the College of Accounting Sciences_RERC for the above mentioned research study Ethics approval is granted for three years.

The **low risk application** was **reviewed** by College of Accounting Sciences_RERC on 5 September 2024 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College of Accounting Sciences_RERC .

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

7. No field work activities may continue after the expiry date (4 September 2027). Submission of a completed research ethics progress report will constitute an application for renewal, for Ethics Research Committee approval.

Additional Conditions

1. Disclosure of data to third parties is prohibited without explicit consent from Unisa.
2. De-identified data must be safely stored on password protected PCs.
3. Care should be taken by the researcher when publishing the results to protect the confidentiality and privacy of the university.

4. Adherence to the National Statement on Ethical Research and Publication practices, principle 7 referring to Social awareness, must be ensured: "Researchers and institutions must be sensitive to the potential impact of their research on society, marginal groups or individuals, and must consider these when weighing the benefits of the research against any harmful effects, with a view to minimising or avoiding the latter where possible." Unisa will not be liable for any failure to comply with this principle.

Note

The reference number 4737 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



Prof Lourens Erasmus
Chair of College of Accounting Sciences_RERC
E-mail: erasmlj1@unisa.ac.za



Executive Dean / By delegation from the Executive Dean of College of Accounting Sciences_RERC E-mail: chikucn@unisa.ac.za
Page 2 of 2

APPENDIX E

CERTIFICATE OF LANGUAGE EDITING

30 December 2025

Attention: Professor Reon Matemane

Dear Professor,

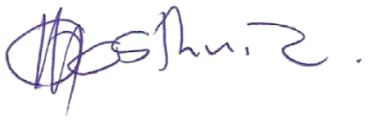
RE: CERTIFICATE OF LANGUAGE EDITING

I, Marita (Ariel) Oosthuizen, hereby confirm that I edited the following document:

THE ROLE OF INNOVATION HUBS IN SUSTAINABLE FINANCE OF STARTUPS IN GHANA

This document was submitted to me by Mr. Franklin Russell Nyamadi on 18 December 2025.

Kind regards,



MARITA (ARIEL) OOSTHUIZEN

Cell: +27 (0) 82 378 4903
Email: ariel.oosthuizen@gmail.com

APPENDIX F

EXTENDED SEM COVARIANCE AND BASELINE ESTIMATES

Regression Weights

			Estimate	S.E.	C.R.	P	Label
SFN1	<---	F1	1.000				
SFN2	<---	F1	.879	.048	18.388	***	par_1
SFN3	<---	F1	.986	.056	17.556	***	par_2
SFN4	<---	F1	1.040	.054	19.123	***	par_3
SFN5	<---	F1	1.104	.043	25.649	***	par_4
NNH1	<---	F2	1.000				
NNH2	<---	F2	1.131	.052	21.861	***	par_5
NNH3	<---	F2	1.020	.048	21.109	***	par_6
NNH4	<---	F2	1.092	.050	21.858	***	par_7
NNH5	<---	F2	.909	.029	31.494	***	par_8
NNH6	<---	F2	1.057	.053	19.849	***	par_9
NNH7	<---	F2	.967	.053	18.178	***	par_10
NNH8	<---	F2	.715	.058	12.307	***	par_11
STP1	<---	F3	1.000				
STP2	<---	F3	.828	.042	19.504	***	par_12
STP3	<---	F3	.714	.048	15.024	***	par_13
STP4	<---	F3	1.032	.041	25.122	***	par_14
TP5	<---	F3	.814	.048	17.019	***	par_15
SUP1	<---	F4	1.000				
SUP2	<---	F4	1.037	.061	16.919	***	par_16
SUP3	<---	F4	1.188	.063	18.717	***	par_17
SUP4	<---	F4	1.235	.068	18.104	***	par_18

			Estimate	S.E.	C.R.	P	Label
SUP5	<---	F4	1.002	.033	30.288	***	par_19
SUP6	<---	F4	1.020	.065	15.652	***	par_20
SUP7	<---	F4	.886	.059	14.992	***	par_21
SUP8	<---	F4	.924	.064	14.342	***	par_22

Model Fit Indices

Fit Index	Value	Threshold	Interpretation
PCFI	0.72	≥ 0.50	Acceptable fit
IFI	0.93	≥ 0.90	Good fit
RFI	0.91	≥ 0.90	Good fit
NFI	0.92	≥ 0.90	Good fit
PNFI	0.68	≥ 0.50	Acceptable fit
PGFI	0.66	≥ 0.50	Acceptable fit

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
F1	<-->	F4	.551	.045	12.147	***	par_23
F2	<-->	F4	.350	.036	9.760	***	par_24
F3	<-->	F4	.040	.027	1.475	.140	par_25
F1	<-->	F3	.071	.033	2.137	.033	par_26
F2	<-->	F3	.310	.038	8.212	***	par_27

			Estimate	S.E.	C.R.	P	Label
F1	<-->	F2	.420	.042	10.033	***	par_28
e25	<-->	e26	.198	.015	13.168	***	par_29
e22	<-->	e26	.313	.025	12.641	***	par_30
e21	<-->	e24	-.009	.008	-1.225	.221	par_31
e15	<-->	e18	.124	.030	4.092	***	par_32
e14	<-->	e18	-.124	.024	-5.201	***	par_33
e19	<-->	e23	.381	.029	12.943	***	par_34
e21	<-->	e25	.207	.019	11.043	***	par_35
e20	<-->	e24	.370	.027	13.637	***	par_36
e20	<-->	e25	.004	.007	.472	.637	par_37
e9	<-->	e13	.260	.034	7.658	***	par_38
e8	<-->	e12	.354	.031	11.237	***	par_39
e7	<-->	e11	.364	.032	11.215	***	par_40
e6	<-->	e10	.321	.029	10.922	***	par_41
e23	<-->	e24	.062	.024	2.589	.010	par_42
e19	<-->	e24	-.012	.023	-.503	.615	par_43
e19	<-->	e20	.004	.021	.173	.863	par_44
e20	<-->	e23	.005	.021	.242	.809	par_45
e1	<-->	e3	-.203	.023	-8.987	***	par_46
e1	<-->	e4	-.163	.021	-7.612	***	par_47
e1	<-->	e5	.085	.029	2.942	.003	par_48
e16	<-->	e18	-.043	.030	-1.453	.146	par_49
e15	<-->	e17	-.127	.021	-5.937	***	par_50