

# An investigation of the Impact of Postgraduate research studies in higher Education institutions on innovative industry models in Zambia

**Research conducted on behalf of the School of Business**

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VanArsdel, Ltd.

# PHOTO GALLERY











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| | | | | |
|---|---|---|---|---|
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# Abstract

Postgraduate research within higher education institutions plays an important role in knowledge creation and skills development. However, in developing economies such as Zambia, concerns persist regarding the extent to which postgraduate research contributes to innovation within industry. Although postgraduate programmes and research activity have expanded across higher education institutions, much of this research remains within academic environments and is rarely translated into practical business solutions or innovative industry practices.

The purpose of this study is to evaluate the influence of postgraduate research in higher education institutions on innovation within industry in Zambia. Specifically, the study seeks to determine whether academic research contributes to the development of innovative business models across different sectors and to identify factors that influence the utilisation of postgraduate research by industry stakeholders. The study also examines existing interactions

between higher education institutions and industry in relation to research utilisation and innovation outcomes.

The study adopts a mixed methods research approach to provide a comprehensive understanding of the research problem. Quantitative data will be collected from industry stakeholders to assess the extent to which postgraduate research is accessed, applied, or considered relevant in business decision making and innovation processes. Qualitative data will be gathered through interviews with academic staff, postgraduate students, and industry representatives to explore experiences, perceptions, and challenges related to research utilisation and collaboration. Data will be analysed using appropriate statistical and thematic analysis techniques.

The study is expected to generate empirical evidence on the relationship between postgraduate research and industry innovation in Zambia. In addition, the study seeks to propose a practical framework for enhancing the accessibility and application of postgraduate research through the development of an online consultancy portal. This platform is intended to support improved research relevance, stronger university industry engagement, and increased contribution of postgraduate research to economic and industrial development.

# RESEARCH FINDINGS DASHBOARD

*An Investigation of the Impact of Postgraduate Research on Innovative Industry Models in Zambia*

n = 392 postgraduate students | 30 industry & academic stakeholders | 4 provinces | Mixed Methods Study

| 64.3% | 47.5% | 94.1% | 80.1% | 93.8% |
|---|---|---|---|---|
| Research Utilised by Industry | Innovation Variance Explained ($R^2$) | Students Choose Own Title | Report Funding Constraints | Willing to Use Online Portal |

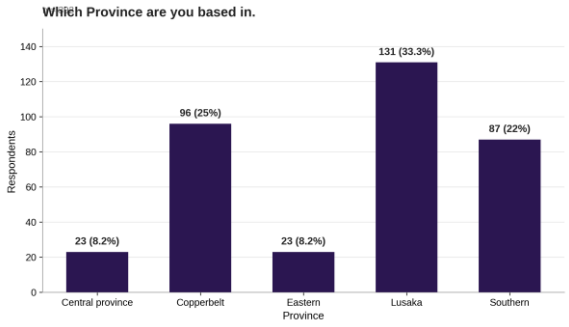



**Figure 4.1: Responses by Province (n = 392)**

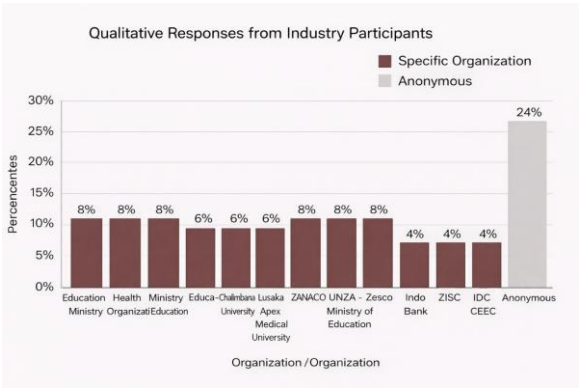



**Figure 4.2: Industry Participants (n = 20)**

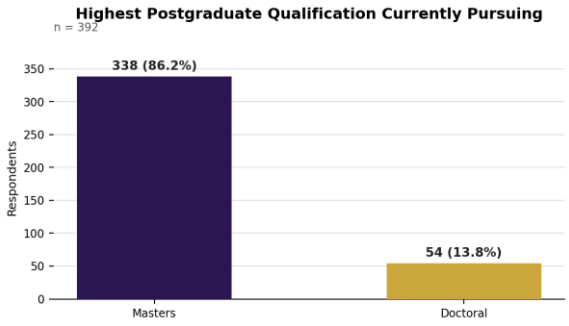
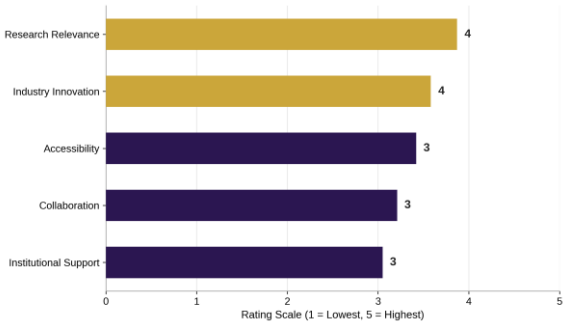



**Figure 4.7: Postgraduate Qualification Profile (n = 392)**




**Descriptive Ratings by Construct (Scale 1-5)**

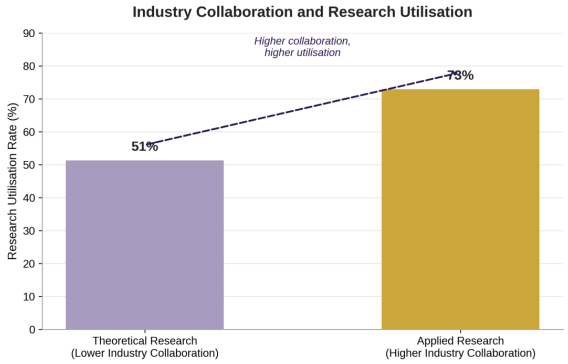



**Figure: Industry Collaboration and Research Utilisation**

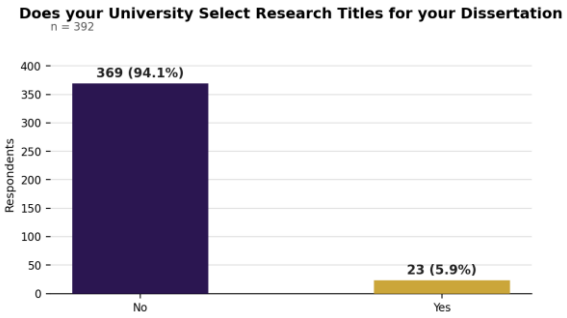



**Figure 4.8: University Selection of Research Titles (n = 392)**

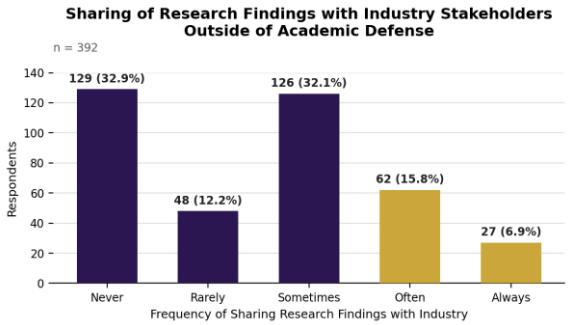



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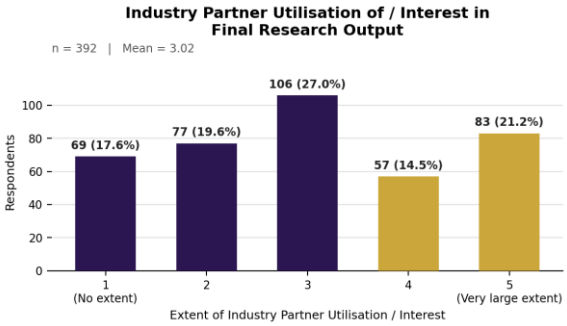



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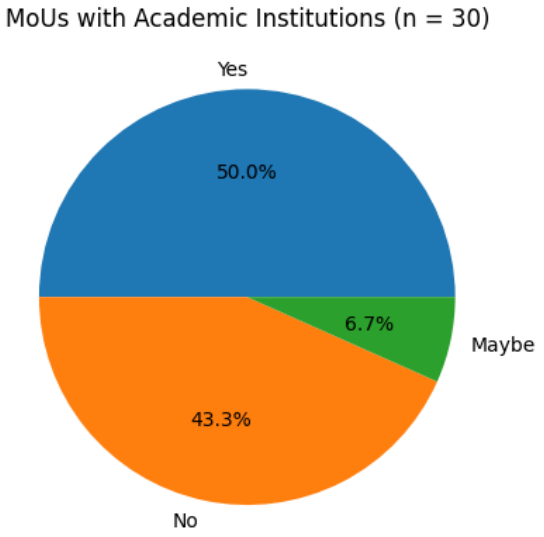



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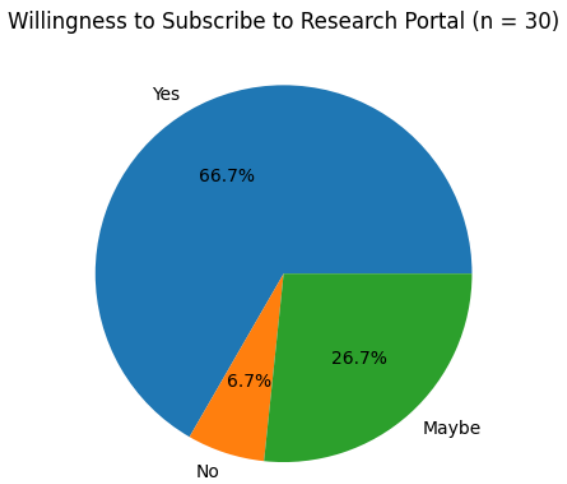



**Figure 4.12: Willingness to Subscribe to Online Portal (n = 30)**

# Preamble and Context of the Study

## 1.1 Introduction

Postgraduate research conducted within higher education institutions is increasingly recognised as an important contributor to innovation, economic development, and industrial competitiveness. Universities are expected not only to generate academic knowledge, but also to support the application of research outputs in ways that address industry challenges, improve organisational practices, and contribute to national development agendas (Etzkowitz & Leidesdorff 2019).

In Zambia, the higher education sector has expanded steadily over the past two decades, with an increasing number of universities offering postgraduate programmes across disciplines such as business, technology, and the social sciences (Higher Education Authority 2024). As postgraduate enrolments have grown, so too has the volume of research produced in the form of dissertations, theses, and institutional research projects. However, concerns remain regarding the extent to which this research influences innovation within industry or contributes to the development of practical business models.

This study therefore seeks to evaluate the influence of postgraduate research in higher education institutions on innovation within industry. In doing so, it examines whether academic research contributes to innovative business practices across different sectors and explores mechanisms through which postgraduate research can be made more accessible and relevant to industry stakeholders.

## 1.2 Background of the Study

Globally, postgraduate research plays a central role in national innovation systems by supporting knowledge creation, skills development, and collaboration between universities and industry (OECD, 2019). Countries that demonstrate strong linkages between academic research and industry tend to experience higher levels of innovation and productivity, as research findings are more effectively translated into commercial and organisational applications.

In Zambia, empirical evidence suggests that postgraduate research output and its utilisation remain limited. A national survey conducted by the Higher Education Authority reported that

more than 75 percent of the 60 universities that participated in the 2019 assessment did not produce any peer reviewed publications during that year (HEA, 2019). Only about 25 percent of institutions recorded at least one publication, with most producing between one and forty publications annually. Furthermore, only approximately 5 percent of institutions reported publication outputs exceeding forty documents in that period (HEA, 2019). These figures point to generally low levels of research output across much of the higher education sector.

Further institutional evidence highlights similar challenges. Data from Zambia's public university system indicate that while a substantial proportion of academic staff report engagement in research activities, publication output and citation impact remain modest when measured against international benchmarks (Scimago Journal Rank, 2022). In addition, institutional strategic documents acknowledge challenges related to weak and inconsistent engagement between universities and industry, which limits the translation of postgraduate research into applied industrial or commercial outcomes (University of Zambia, 2021).

Alongside public universities, private higher education institutions such as ZCAS University have expanded postgraduate offerings with an emphasis on professional and applied learning. While these institutions may differ in mandate and orientation, references to them in this study are used only to illustrate the broader national context within which postgraduate research is produced. They are not intended to suggest differences in performance or to form the basis of comparative analysis, but rather to highlight the diversity of institutional environments in which postgraduate research takes place in Zambia.

## 1.3 Context of the Study

Zambia's industrial sector continues to be characterised by limited technological intensity and relatively low levels of innovation. Studies indicate that industrial growth remains constrained by weak mechanisms for knowledge transfer between higher education institutions and industry (Oxford Academic, 2023). Although postgraduate research is conducted across universities, much of this research is not disseminated in formats that are accessible or useful to industry practitioners.

Reports further indicate that collaborations between universities and industry are often informal, short term, or inactive, with limited implementation of research findings in business settings (Zambia Monitor, 2024). As a result, postgraduate research outputs frequently remain

confined to academic repositories, institutional libraries, or examination records rather than being transformed into business cases, consultancy tools, or innovation frameworks.

Within this context, there is growing interest in alternative mechanisms for improving the accessibility and practical application of postgraduate research. Digital platforms that link academic research to industry needs, such as online consultancy portals, present opportunities for improving research visibility and facilitating engagement between postgraduate researchers, academic staff, and industry stakeholders.

## 1.4 Statement of the Problem

In Zambia, postgraduate research activity within higher education institutions has expanded, yet its contribution to innovation within industry remains limited. Despite the presence of more than 60 registered universities and over 5,000 academic staff, a significant proportion of postgraduate research outputs remain within academic environments and are rarely transformed into practical business or industrial solutions (HEA, 2024).

The industrial sector continues to exhibit low levels of innovation and limited adoption of research-based business models, reflecting weak knowledge transfer from universities to industry (Oxford Academic, 2023). Although postgraduate students regularly conduct research across various disciplines, few studies are systematically aligned with industry priorities or actively utilised by businesses. Existing reports suggest that many university industry collaborations lack sustained implementation and measurable innovation outcomes (Zambia Monitor, 2024).

The central problem addressed by this study is therefore the underutilisation of postgraduate research outputs by industry, resulting in weak innovation linkages and a limited contribution of academic research to economic growth and industrial development in Zambia.

## 1.5 Purpose of the Study

The purpose of this study is to evaluate the influence of postgraduate research in higher education institutions on innovation within industry. Specifically, the study seeks to determine whether academic research contributes to the development of innovative business models across different sectors. The findings from this study will support the development of an online consultancy portal through which corporate organisations can subscribe to practical business

cases, research outputs, and applied solutions generated through postgraduate research, particularly from ZCAS University. The portal will also feature short academic videos explaining key business concepts aligned with the professional training needs of industry.

## 1.6 Objectives of the Study

i. Assess the extent to which postgraduate research outputs from higher education institutions contribute to innovation within Zambian industries.
ii. Identify factors that influence the utilisation of postgraduate research by industry stakeholders in Zambia.
iii. Examine the nature of existing interactions between higher education institutions and industry in relation to research utilisation and innovation.
iv. Propose a framework or model, such as an online consultancy portal, for enhancing the accessibility and practical application of postgraduate research in industry.

## 1.7 Significance of the Study

The findings of this study will contribute empirical evidence on the relationship between postgraduate research and industry innovation in Zambia. The study will be of value to higher education institutions by informing strategies for improving the relevance and application of postgraduate research. Industry stakeholders may benefit from insights into how academic research can support innovation and business development. Policymakers may also draw on the findings to strengthen frameworks for university industry engagement. For ZCAS University, the study provides a basis for developing structured mechanisms that align postgraduate research with industry needs and enhance the practical impact of academic work.

# 2.1 Literature Review

This section reviews and synthesises literature relevant to the influence of postgraduate research on innovation within industry, with specific attention to factors that affect the utilisation of postgraduate research by industry stakeholders, the nature of collaboration between higher education institutions and industry, and mechanisms for enhancing research accessibility and application. The literature review is organised thematically in line with the objectives of the study, enabling a structured examination of existing knowledge while identifying gaps that justify the present research.

The chapter draws on international and regional literature, including studies from developed economies such as Australia, the United States, and the United Kingdom, where higher education institutions play a central role in industry-oriented research and innovation. These experiences are used as benchmarks to contextualise the Zambian situation, without implying direct comparability. The chapter concludes with a synthesis of literature that informs the development of a conceptual framework underpinning the proposed ZCAS University industry innovation model for postgraduate research.

# UTILISATION OF POSTGRADUATE RESEARCH BY INDUSTRY

The literature reviewed under this section demonstrated that utilisation of postgraduate research by industry is influenced by multiple interrelated factors, including relevance, accessibility, credibility, timeliness, skills orientation, and institutional support. In developing contexts such as Zambia, these challenges are compounded by weak innovation systems and limited university industry engagement. The literature therefore supports the need for innovative mechanisms that enhance the translation of postgraduate research into practical industry applications.

## 2.2 Conceptualising Postgraduate Research and Knowledge Utilisation

Postgraduate research refers to advanced academic inquiry undertaken at master's and doctoral levels, typically aimed at generating new knowledge, refining existing theories, or addressing complex problems within specific disciplines. Traditionally, postgraduate research has been classified into basic research, applied research, and practice-based research, each differing in purpose, scope, and intended audience (OECD, 2019).

Basic research is primarily theory driven and seeks to expand foundational knowledge, often without immediate application. Applied research, by contrast, is problem oriented and seeks to address specific practical challenges, frequently within industry or policy contexts. Practice based research emphasises professional application and reflection, particularly within business, management, and professional disciplines (Creswell & Plano Clark, 2018). In the context of industry innovation, applied and practice based postgraduate research are generally considered more likely to influence business practices due to their problem solving orientation.

Knowledge utilisation refers to the process through which research outputs are interpreted, adapted, and applied by end users such as industry stakeholders. According to Weiss (1979), knowledge utilisation does not occur automatically upon the production of research, but is shaped by social, institutional, and contextual factors. Subsequent studies distinguish between instrumental use, where research directly informs decisions, conceptual use, where research shapes understanding, and symbolic use, where research is cited to legitimise decisions already made (Nutley, Walter, & Davies, 2007).

Within industry contexts, instrumental use of postgraduate research is often limited due to misalignment between academic outputs and business needs. This has led scholars to argue that utilisation is less dependent on research quality alone and more influenced by accessibility, relevance, timing, and communication mechanisms (Perkmann et al., 2013).

## 2.3 Factors Influencing the Utilisation of Postgraduate Research by Industry

A growing body of literature identifies multiple factors that influence whether and how industry stakeholders utilise postgraduate research outputs. These factors can be broadly categorised into research related factors, institutional factors, industry related factors, and relational factors.

### 2.3.1 Relevance and Alignment with Industry Needs

One of the most consistently cited determinants of research utilisation is the degree to which research topics align with industry needs. Studies indicate that industry stakeholders are more likely to engage with and apply research that addresses clearly defined business problems, operational challenges, or strategic priorities (Cohen, Nelson, & Walsh, 2002). Postgraduate research that is highly theoretical or disconnected from organisational realities is less likely to be utilised, regardless of methodological rigour.

In developing economies, misalignment between postgraduate research topics and industry priorities is often exacerbated by weak engagement during research design stages. Without early involvement of industry stakeholders, research questions may reflect academic interests rather than practical concerns, limiting subsequent uptake (Ankrah & Al Tabbaa, 2015).

### 2.3.2 Accessibility and Communication of Research Outputs

Accessibility refers not only to physical access to research documents, but also to the clarity, format, and language in which findings are presented. Research indicates that industry stakeholders often find academic outputs difficult to interpret due to technical language, lengthy documents, and limited emphasis on actionable insights (Bansal, Bertels, Ewart, MacConnachie, & O'Brien, 2012).

Postgraduate theses and dissertations are typically stored in institutional repositories with limited visibility beyond academic circles. Even where industry actors are aware of their existence, time constraints and lack of synthesis discourage engagement. Studies therefore emphasise the importance of translating research into concise formats such as executive summaries, case studies, policy briefs, and digital content to enhance utilisation (Davies, Nutley, & Walter, 2008).

### 2.3.3 Research Quality and Credibility

Research quality and perceived credibility also influence utilisation, particularly in contexts where trust between academia and industry is weak. Industry stakeholders may question the practical validity of postgraduate research due to perceptions of limited experience among student researchers or insufficient understanding of business realities (Perkmann et al., 2013).

However, empirical studies suggest that credibility is enhanced when postgraduate research is supervised rigorously, methodologically sound, and conducted in collaboration with industry partners. Quality assurance mechanisms within higher education institutions therefore play an indirect but important role in promoting research utilisation (OECD, 2019).

### 2.3.4 Timeliness and Responsiveness

The pace of industry decision making often contrasts with the extended timelines associated with postgraduate research. Businesses frequently require timely insights to respond to market changes, whereas postgraduate research projects may take one to three years to complete. This temporal mismatch reduces the perceived usefulness of research outputs, particularly in fast moving sectors (Ramos-Vielba, Sánchez-Barrioluengo, & Woolley, 2016).

Scholars argue that more flexible research models, including shorter applied projects, iterative research designs, and ongoing engagement between researchers and industry, can help mitigate this challenge.

### 2.3.5 Skills Orientation of Postgraduate Researchers

The skills and competencies of postgraduate researchers also affect research utilisation. Studies highlight the importance of analytical, communication, and problem solving skills in enabling researchers to engage effectively with industry stakeholders (Jackson, 2016). Where postgraduate training emphasises theoretical competence without corresponding professional skills, research outputs may lack practical orientation and relevance.

This has led to calls for postgraduate programmes that integrate research training with professional development, industry exposure, and applied learning experiences.

### 2.4 Utilisation of Postgraduate Research in Developing Economies and Zambia

In Sub Saharan Africa, the utilisation of academic research by industry remains limited, reflecting broader structural and institutional constraints. Empirical studies indicate that weak innovation systems, limited research funding, and fragmented policy environments hinder effective knowledge transfer (Arocena & Sutz, 2010).

In Zambia, available evidence suggests that postgraduate research utilisation is constrained by similar factors. Reports from the Higher Education Authority indicate that although postgraduate research activity has increased, mechanisms for disseminating and applying research outputs remain underdeveloped (HEA, 2024). Industry stakeholders often rely on internal experience or external consultants rather than academic research when addressing business challenges.

Furthermore, weak university industry linkages and limited platforms for engagement reduce opportunities for postgraduate research to inform innovation. As a result, research outputs remain largely academic, contributing minimally to business model development or industrial innovation (Oxford Academic, 2023).

These findings highlight the need for structured mechanisms that mediate between postgraduate research and industry practice, creating pathways for accessibility, relevance, and application.

## 2.6 University Industry Collaboration and Innovation

The literature reviewed in this section demonstrated that university industry collaboration plays a critical role in promoting innovation and enhancing the utilisation of postgraduate research.

However, the effectiveness of such collaboration depends on institutional support, alignment of incentives, and the presence of mechanisms that facilitate engagement. In the Zambian context, weak collaboration structures and limited platforms for engagement constrain the contribution of postgraduate research to industry innovation. This gap highlights the need for models that enhance accessibility and practical application of postgraduate research.

Collaboration between higher education institutions and industry has been widely recognised as a key mechanism through which academic research contributes to innovation, economic development, and societal impact. University industry collaboration refers to structured or informal interactions through which knowledge, skills, and resources are exchanged between academic institutions and business organisations for mutual benefit (Perkmann et al., 2013). Such collaborations may involve joint research projects, consultancy arrangements, internships, technology transfer initiatives, and co creation of knowledge.

In the context of postgraduate research, collaboration with industry provides opportunities for aligning academic inquiry with real world problems, enhancing research relevance, and improving the likelihood that research outputs will be utilised in practice. The literature suggests that effective collaboration can strengthen innovation capacity by integrating theoretical knowledge with practical expertise, thereby supporting the development of new products, services, processes, and business models (Etzkowitz & Leydesdorff, 2000).

## 2.7 Theoretical Perspectives on University Industry Collaboration

Several theoretical frameworks have been used to explain the role of universities in innovation systems and their interactions with industry. Among the most influential is the Triple Helix model, which conceptualises innovation as an outcome of dynamic interactions between universities, industry, and government (Etzkowitz & Leydesdorff, 2000). Within this model, universities are no longer viewed as passive knowledge producers, but as active participants in economic development through research, entrepreneurship, and collaboration.

Closely related to the Triple Helix is the National Innovation Systems perspective, which emphasises the institutional and policy environments that shape knowledge production and diffusion within a country (Lundvall, 1992). From this perspective, the effectiveness of

university industry collaboration depends on factors such as regulatory frameworks, funding mechanisms, institutional incentives, and cultural norms.

Knowledge transfer and co creation models further highlight the importance of interaction and mutual learning between academia and industry. Rather than viewing knowledge as flowing unidirectionally from universities to firms, these models emphasise collaborative processes through which knowledge is jointly developed and adapted to specific contexts (Perkmann et al., 2013). This perspective is particularly relevant to postgraduate research, where students and supervisors engage with industry stakeholders throughout the research process.

## 2.8 Forms and Nature of University Industry Collaboration

The literature identifies multiple forms of collaboration between higher education institutions and industry, varying in intensity, formality, and purpose. Common forms include contract research, consultancy services, joint research projects, student placements, and informal networking activities (Ankrah & Al Tabbaa, 2015). In some cases, collaboration is driven by industry demand for specific solutions, while in others it is initiated by academic researchers seeking access to data, funding, or practical contexts.

Postgraduate research often occupies an intermediate position within these collaborative arrangements. On one hand, postgraduate students may conduct research independently with limited industry interaction. On the other hand, research may be embedded within organisational settings through industry sponsored projects or work based research designs. Studies suggest that embedded and collaborative research arrangements are more likely to generate outcomes that are relevant and applicable to industry (Borrell Damiani, 2019).

However, the nature of collaboration is influenced by institutional incentives and constraints. Where academic reward systems prioritise publications over applied impact, collaboration may remain limited or symbolic. Conversely, institutions that recognise and reward industry engagement tend to foster more sustained and meaningful partnerships (OECD, 2019).

## 2.9 Effectiveness of Collaboration in Promoting Innovation

Empirical evidence from developed economies indicates that university industry collaboration can contribute positively to innovation outcomes. Studies in the United States and Europe have shown that firms engaged in academic collaboration report higher levels of product innovation, process improvement, and technological capability compared to those without such links (Cohen et al., 2002; Perkmann et al., 2013).

However, the effectiveness of collaboration is not uniform and depends on several factors. These include the clarity of collaboration objectives, mutual trust between partners, alignment of expectations, and the presence of intermediary structures that facilitate communication and coordination (Ankrah & Al Tabbaa, 2015). Where collaborations lack clear governance or shared goals, innovation outcomes may be limited.

In relation to postgraduate research, collaboration is most effective when students are actively supported by both academic supervisors and industry mentors. Such arrangements enhance learning, ensure contextual relevance, and increase the likelihood that research findings will be implemented (Jackson, 2016).

## 2.10 International Experiences of University Industry Collaboration

In Australia, universities play a central role in applied research and industry engagement through structured mechanisms such as Cooperative Research Centres. These centres bring together universities, industry partners, and government agencies to address sector specific challenges, with postgraduate research embedded within collaborative projects (Australian Government, 2020). Evidence suggests that such arrangements enhance research utilisation and innovation outcomes by aligning academic inquiry with industry priorities.

In the United States, university industry collaboration is often facilitated through research parks, technology transfer offices, and industry funded research centres. Postgraduate students frequently participate in applied research projects linked to commercialisation and entrepreneurship, contributing to innovation ecosystems that support startups and established firms alike (Perkmann et al., 2013).

In the United Kingdom, knowledge exchange frameworks emphasise the societal and economic impact of academic research. Universities are encouraged to demonstrate how research contributes to industry and public value, with postgraduate research increasingly incorporated into impact pathways (UK Research and Innovation, 2021). These experiences highlight the importance of institutional support structures and policy alignment in promoting effective collaboration.

While these models provide useful insights, the literature cautions against direct replication in developing contexts. Differences in institutional capacity, funding, and industrial structure necessitate context specific approaches that reflect local realities (Arocena & Sutz, 2010).

## 2.11 University Industry Collaboration in Developing Economies and Zambia

In developing economies, university industry collaboration faces additional challenges related to limited research funding, weak institutional incentives, and fragmented innovation systems. Studies indicate that collaborations are often project based, donor driven, or informal, with limited continuity and impact (Arocena & Sutz, 2010).

In Zambia, available evidence suggests that collaboration between higher education institutions and industry remains underdeveloped. Reports indicate that partnerships are often ad hoc and lack structured mechanisms for sustained engagement and implementation (Higher Education Authority, 2024). As a result, postgraduate research is rarely integrated into industry innovation processes, limiting its practical impact.

These challenges underscore the need for alternative collaboration models that are flexible, accessible, and aligned with both academic and industry priorities.

## 2.13 Mechanisms for Enhancing Accessibility and Application of Postgraduate Research

A central concern emerging from the literature is that the limited utilisation of postgraduate research by industry is not solely a function of research quality or relevance, but also of weak mechanisms for accessibility, translation, and engagement. Scholars increasingly argue that improving the interface between academia and industry requires deliberate structures that

facilitate the movement of knowledge from research environments into practice (Davies, Nutley, & Walter, 2008).

Accessibility in this context extends beyond physical access to research documents. It includes the ability of industry stakeholders to identify relevant research, interpret findings, and apply insights within organisational settings. Without appropriate mediation, even high quality postgraduate research is unlikely to influence innovation or business decision making (Perkmann et al., 2013).

### 2.14 Knowledge Translation and Research Mediation

Knowledge translation refers to processes through which research findings are synthesised, communicated, and adapted for use by non-academic audiences. The literature distinguishes knowledge translation from traditional dissemination, arguing that passive dissemination through theses, journals, or repositories is insufficient to drive utilisation (Nutley et al., 2007).

Effective knowledge translation involves active engagement with end users, simplification of complex findings, and presentation of research outputs in formats that emphasise practical implications. In industry contexts, this may include case studies, executive summaries, decision tools, training materials, and digital content (Bansal et al., 2012).

Postgraduate research often lacks structured knowledge translation pathways. Students are typically assessed on academic criteria, with limited incentives or guidance to package findings for industry audiences. As a result, research outputs remain academically rigorous but practically inaccessible. Scholars argue that intermediary mechanisms are therefore essential to bridge this gap (Davies et al., 2008).

## 2.15 Digital Platforms and Research Accessibility

Advances in digital technology have created new opportunities for enhancing the accessibility and utilisation of academic research. Digital platforms enable the aggregation, categorisation, and dissemination of research outputs to broader audiences at relatively low cost. Studies indicate that online knowledge platforms can improve visibility of research, facilitate engagement, and support collaboration between academia and industry (Meyer, 2010).

In higher education contexts, digital repositories have traditionally focused on archiving research outputs rather than promoting active utilisation. More recent approaches emphasise interactive platforms that curate research based on industry needs, enable direct engagement with researchers, and provide applied interpretations of findings (OECD, 2019).

Empirical evidence from developed economies suggests that digital knowledge hubs linked to universities can enhance research uptake by industry, particularly when content is tailored to practitioner needs and supported by expert facilitation (UK Research and Innovation, 2021). However, the effectiveness of such platforms depends on governance, quality control, and sustained engagement.

## 2.16 Consultancy Models within Higher Education

Consultancy has long been recognised as a mechanism through which academic expertise is applied to industry challenges. University based consultancy allows academic knowledge to be translated into actionable solutions while generating practical insights that inform teaching and research (Parkman & Walsh, 2007).

Traditional consultancy models, however, often rely on senior academic staff and exclude postgraduate research outputs. This limits opportunities for postgraduate students to contribute to industry problem solving and reduces the visibility of postgraduate research. Recent studies advocate for inclusive consultancy models that integrate postgraduate research into advisory and problem-solving services (Borrell Damiani, 2019).

Such models position postgraduate research as a resource for industry innovation rather than solely an academic requirement. When appropriately mediated, postgraduate research can provide evidence-based insights, diagnostic tools, and strategic recommendations relevant to organisational contexts.

## 2.17 Online Consultancy Platforms as Innovation Intermediaries

Online consultancy platforms represent an emerging model for mediating between academic research and industry practice. These platforms combine elements of digital knowledge

repositories, expert networks, and consultancy services, enabling organisations to access research based insights on demand (Meyer, 2010).

Within higher education, online consultancy platforms can serve as intermediaries that translate postgraduate research into practical outputs, such as business cases, solution briefs, and training resources. Short explanatory videos, webinars, and interactive content further enhance accessibility and engagement, particularly for industry stakeholders with limited time or academic background.

The literature suggests that such platforms are most effective when they are institutionally supported, quality assured, and aligned with industry needs. They also require clear governance structures to manage intellectual property, confidentiality, and researcher participation (OECD, 2019).

## 2.18 Relevance of an Online Consultancy Portal in the Zambian Context

In Zambia, the absence of structured mechanisms for translating postgraduate research into industry relevant formats represents a significant gap. Existing university industry interactions are often limited to ad hoc engagements, with minimal use of digital platforms to facilitate sustained knowledge exchange (Higher Education Authority, 2024).

An online consultancy portal offers a context appropriate mechanism for enhancing research accessibility and application. By curating postgraduate research outputs and presenting them in practitioner-oriented formats, such a platform can reduce barriers to utilisation while preserving academic rigour. The inclusion of academic explanations through short videos further supports understanding and application of research insights.

Importantly, this approach aligns with resource constraints commonly faced by developing economies, as digital platforms require lower physical infrastructure investment while offering scalability and flexibility.

## 2.19 Synthesis of Literature and Research Gap

The literature reviewed in this chapter highlights several key insights. First, utilisation of postgraduate research by industry is influenced by factors including relevance, accessibility,

communication, credibility, and institutional support. Second, while university industry collaboration has demonstrated potential to promote innovation, its effectiveness depends on structured engagement mechanisms and supportive institutional environments. Third, existing dissemination practices are insufficient to ensure practical application of postgraduate research.

Despite growing international literature on university industry collaboration and innovation, limited empirical research examines postgraduate research specifically as a driver of industry innovation in developing economies such as Zambia. Moreover, there is a lack of context specific models that address accessibility and utilisation challenges through practical mediation mechanisms.

This gap justifies the present study and supports the development of a structured framework that positions postgraduate research as an accessible resource for industry innovation.

## 2.20 Conceptual Framework and Foundation for the ZCAS University Industry Innovation Model

Drawing from the reviewed literature, this study proposes a conceptual framework in which postgraduate research influences industry innovation through mediating mechanisms that enhance accessibility, relevance, and engagement. Key elements include postgraduate research outputs, intermediary platforms such as an online consultancy portal, and industry utilisation processes leading to innovation outcomes.

This framework forms the basis for the development of the ZCAS University Industry Innovation Model for postgraduate research. The model emphasises structured mediation between academia and industry, positioning postgraduate research as applied knowledge that supports innovation, business model development, and organisational learning.

The conceptual framework also informs the methodological choice of a mixed methods approach, as both quantitative assessment of utilisation patterns and qualitative exploration of experiences and perceptions are required to fully understand the research problem.

### 2.21 Conceptual Framework

The conceptual framework illustrates a three dimensional model of collaboration between academic research and industry, showing how postgraduate research can influence innovation outcomes through structured mediation and engagement mechanisms. The model positions

academic research and industry as two interconnected domains that interact through a central collaboration and mediation platform.

At the base of the framework are academic research and industry, representing the primary knowledge producers and knowledge users respectively. Academic research consists of postgraduate research outputs generated at master's and doctoral levels, shaped by research quality, relevance, and academic supervision. Industry represents organisations with practical needs for innovation, influenced by factors such as absorptive capacity, innovation demand, and organisational readiness.

At the centre of the framework is the mediation and collaboration layer, represented by the ZCAS University Industry Innovation Hub. This layer functions as the critical interface between academia and industry, facilitating knowledge translation, digital dissemination, and interaction through an online consultancy portal. It is through this mediation process that postgraduate research is transformed into accessible and practically relevant outputs for industry stakeholders.

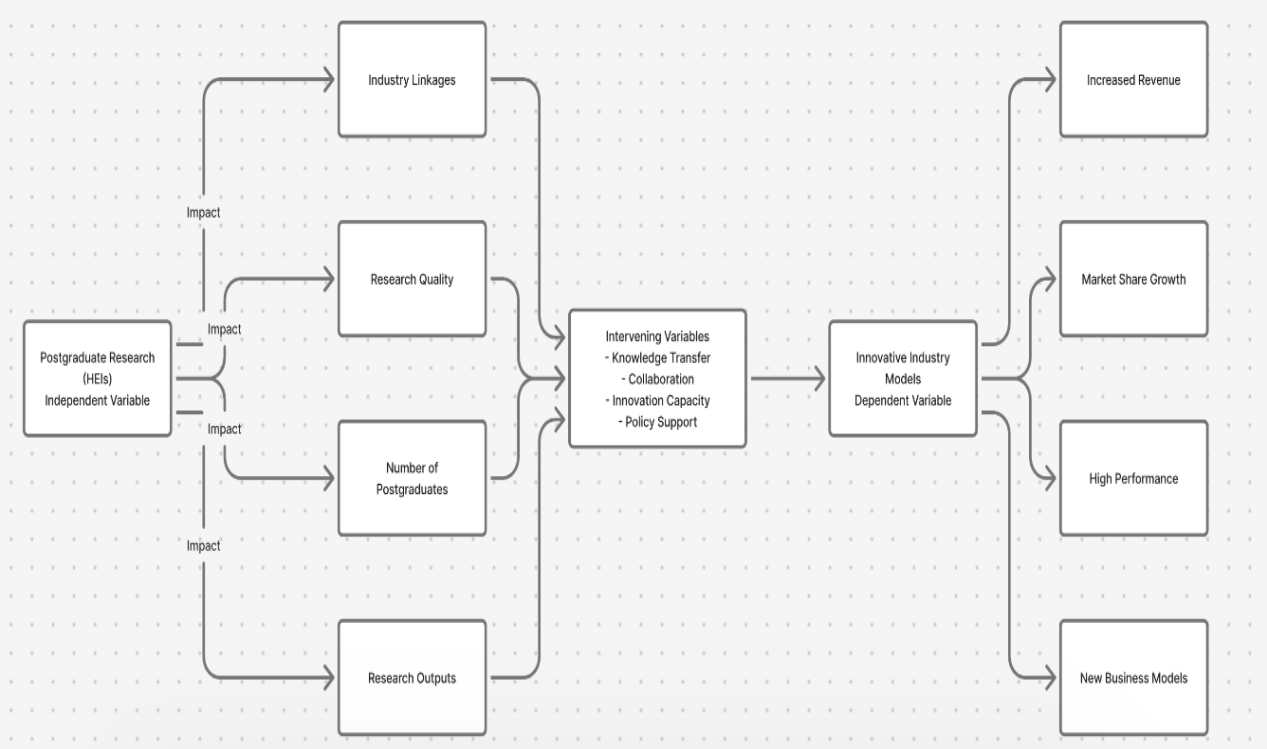
The framework further shows that effective mediation leads to industry utilisation, where research insights are applied in business decision making, strategy formulation, and operational improvement. This utilisation ultimately results in innovation outcomes, including the development of innovative business models, improved organisational practices, and enhanced competitiveness.

Surrounding and influencing all components of the framework is the national context, which includes policy environment, institutional incentives, and industry readiness. These contextual factors shape the effectiveness of collaboration and the extent to which postgraduate research contributes to industry innovation.

Overall, the framework demonstrates that postgraduate research influences industry innovation not directly, but through structured collaboration and mediation mechanisms that enhance accessibility, relevance, and application.

### 2.21.1 Conceptual Framework Diagram

*Figure 2.1: Conceptual framework diagram*




The conceptual framework illustrates how postgraduate research influences innovation within industry through mediating and contextual factors. The framework positions postgraduate research as the primary input, industry innovation as the outcome, and intermediary mechanisms as the key pathway through which influence occurs.

### 2.21.2 Narrative Explanation of the Conceptual Framework

The conceptual framework presents a three-dimensional model of collaboration between academic research and industry, illustrating how postgraduate research can influence innovation outcomes when supported by effective mediation mechanisms. The framework positions postgraduate research and industry as interconnected but distinct domains that require structured interaction to enable knowledge utilisation and innovation.

At the academic research dimension, postgraduate research outputs generated at masters and doctoral levels form the primary source of knowledge. These outputs are shaped by factors such as research relevance, methodological quality, supervision, and the skills orientation of postgraduate researchers. While these research outputs possess potential value, the literature indicates that they do not automatically translate into industry innovation.

The industry dimension represents organisations and stakeholders seeking solutions to practical business challenges. Industry demand for innovation is influenced by factors such as organisational readiness, absorptive capacity, and strategic priorities. Without effective access to relevant academic research, industry stakeholders often rely on internal experience or external consultants rather than postgraduate research.

The central dimension of the framework is mediation and collaboration, represented by the ZCAS University Industry Innovation Hub. This dimension functions as an interface between academia and industry, facilitating structured interaction, knowledge translation, and engagement. The proposed online consultancy portal operates within this space by curating postgraduate research outputs, translating them into practitioner oriented formats, and enabling direct engagement between academic experts and industry stakeholders through digital platforms.

Through this mediation process, postgraduate research becomes accessible and applicable, leading to industry utilisation. Industry utilisation refers to the application of research insights in business decision making strategy development, operational improvement, and problem solving. Utilisation may be conceptual or instrumental, depending on the nature of engagement.

The final dimension of the framework is innovation outcomes. These outcomes include innovative business models, improved organisational practices, enhanced competitiveness, and continuous organisational learning. Innovation outcomes emerge when academic knowledge and industry practice interact effectively through structured collaboration.

The framework also recognises the influence of the national and institutional context, including policy frameworks, incentive structures, and industry readiness, which shape all stages of the collaboration process. These contextual factors justify the adoption of a mixed methods research approach, as understanding collaboration dynamics requires both quantitative assessment of utilisation patterns and qualitative exploration of experiences and perceptions.

Overall, the conceptual framework provides a foundation for analysing industry–academic research collaboration and informs the development of the ZCAS University Industry Innovation Model for postgraduate research.

## 3.1 Methodology

This chapter outlines the research methodology adopted to evaluate the influence of postgraduate research in higher education institutions on innovation within industry in Zambia. It describes the research design, study population, sampling procedures, data collection methods, instruments, data analysis techniques, validity and reliability considerations, and ethical issues. The methodological choices are aligned with the conceptual framework and objectives of the study.

## 3.2 Research Design

The study adopts a mixed methods research design, specifically a convergent parallel design.

This design allows for the simultaneous collection of quantitative and qualitative data, followed by separate analysis and integration of findings during interpretation. The mixed methods approach is appropriate because:

Quantitative data is required to measure the extent of postgraduate research utilisation by industry and its perceived impact on innovation. Qualitative data is necessary to explore experiences, perceptions, institutional dynamics, and contextual factors influencing research utilisation and collaboration.

The combination of both approaches enables a comprehensive understanding of the relationship between postgraduate research and industry innovation.

## 3.3 Research Philosophy

The study is guided by post positivism as the underlying research philosophy. Post positivism supports the use of both quantitative and qualitative methods where necessary to address the research problem effectively.

This philosophy is appropriate because the study seeks practical solutions particularly the development of an online consultancy portal rather than purely theoretical explanations.

## 3.4 Study Population

The study targets three main participant groups: Industry Stakeholders, Academic Staff, and Postgraduate Students. These groups were selected because they represent the key actors within the university–industry innovation ecosystem. Industry stakeholders represent the users of research outputs, academic staff represent the producers and supervisors of postgraduate research, and postgraduate students represent the primary generators of research knowledge within higher education institutions. The table below summarises the study population categories and their relevance to the research.

**Table 3.1: Target Study Population**

| Main Category | Sub-Category | Description and Relevance to the Study |
|---|---|---|
| **Industry Stakeholders** | Business Owners | Business owners are included because they make strategic decisions regarding innovation adoption, business model transformation, and external partnerships. Their perspectives help determine whether postgraduate research informs entrepreneurial growth and competitiveness. |
| | Senior Managers | Senior managers influence organisational strategy, resource allocation, and innovation direction. Their views provide insight into whether academic research contributes to operational improvements and strategic decision-making. |
| | Innovation Managers | Innovation managers are directly responsible for research uptake, product development, and process improvement. Their participation is critical in assessing how postgraduate research influences innovation practices within firms. |
| | Strategy and Operations Managers | These managers oversee implementation of organisational strategies and operational systems. Their input helps evaluate whether research findings translate into measurable operational or business model improvements. |
| | Sector Representation: Finance, Manufacturing, Mining, ICT, Education, Services | These sectors are included to ensure cross-industry representation and to assess whether research utilisation differs across sectors with varying levels of technological intensity and innovation capacity. |
| **Academic Staff** | Supervisors of Postgraduate Research | Supervisors guide research design, methodology, and quality assurance. Their perspectives help evaluate how research topics are aligned with industry needs and how supervision influences practical relevance. |
| | Heads of Departments | Heads of Departments shape institutional research priorities and collaboration strategies. Their views provide insight into structural support mechanisms for university–industry engagement. |
| | Research Coordinators | Research coordinators manage research activities and partnerships. They offer information on institutional frameworks, dissemination practices, and support systems for research commercialisation. |
| **Postgraduate Students** | Master's Students | Master's students frequently conduct applied and practice-oriented research. Their responses help assess the extent of |

| | | |
|---|---|---|
| | | industry engagement during research and perceived research impact. |
| | Doctoral Students | Doctoral students typically undertake advanced research with potential theoretical and applied contributions. Their inclusion allows evaluation of higher-level research outputs and their potential influence on industry innovation. |

The inclusion of industry stakeholders ensures that the study captures perspectives from organisations that are potential users of postgraduate research outputs. Since innovation occurs primarily within firms, their participation is essential in assessing whether academic research influences business model development, operational efficiency, and competitive advantage. The representation of multiple sectors allows for comparative analysis and enhances the generalisability of findings across different industry contexts.

Academic staff are included because they play a central role in shaping the relevance, quality, and direction of postgraduate research. Supervisors influence research design and methodological rigour, while Heads of Departments and Research Coordinators determine institutional research priorities and collaboration mechanisms. Their perspectives are essential for understanding structural enablers and constraints within higher education institutions.

Postgraduate students form a critical population because they generate the research outputs under investigation. Master's and Doctoral students are included to capture variation in research scope, complexity, and applied orientation. Their responses will provide insight into the nature of research conducted, the extent of industry engagement during the research process, and perceptions regarding the practical impact of their work.

Together, these three groups provide a comprehensive representation of the knowledge production, mediation, and utilisation chain within the university–industry innovation system.

# 3.5 Sample Size Determination

### (a) Quantitative Sample (Postgraduate Students)

The sample size for postgraduate students was determined using **Yamane's (1967) formula**:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- $N = 20{,}854$(population size)
- $e = 0.05$(5% margin of error)

Calculation:

- $e^2 = 0.0025$
- $N(e^2) = 52.135$
- $1 + 52.135 = 53.135$
- $20{,}854 \div 53.135 \approx 392.49$

Therefore, the required sample size is **393 postgraduate students**.

This sample ensures representation at a 95% confidence level with 5% precision.

### (b) Qualitative Data Collection

The qualitative component of the study will comprise a total of thirty participants. This will include ten academic and administrative staff members drawn from higher education institutions, as well as twenty industry participants consisting of research and development officers and corporate executives. These individuals will be selected using purposive and convenience sampling techniques to ensure that participants possess relevant knowledge and experience related to the research objectives.

Selection will be based on specific criteria, including experience in postgraduate research supervision, active involvement in innovation processes within organisations, and prior or ongoing engagement in university–industry partnerships. This approach ensures that

participants are well positioned to provide informed and meaningful insights into the dynamics of research utilisation and collaboration.

The qualitative sample size is guided by the principle of data saturation rather than statistical representation. Interviews will be conducted until no new themes or significant insights emerge from the data, thereby ensuring sufficient depth and richness of information to support comprehensive analysis.

**Table 3.2: Qualitative Sample Composition**

| Participant Category | Number of Participants | Description |
|---|---|---|
| Academic and Administrative Staff | 10 | Includes postgraduate research supervisors, research coordinators, and administrative staff involved in research management within higher education institutions. |
| Industry R&D Officers and Corporate Executives | 20 | Includes research and development officers, innovation managers, and corporate executives involved in organisational innovation and strategic decision-making. |
| **Total Qualitative Participants** | **30** | Total number of respondents to be interviewed under the qualitative strand of the study. |

The qualitative sample presented in Table 3.2 outlines the composition of participants selected for the in-depth interview component of the study. A total of thirty respondents will participate, comprising ten academic and administrative staff from higher education institutions and twenty industry professionals, including research and development officers and corporate executives. This distribution ensures balanced representation between knowledge producers within universities and knowledge users within industry. By engaging both groups, the study captures diverse but complementary perspectives on postgraduate research utilisation, university–industry collaboration, and innovation processes. The selected participants possess relevant experience in research supervision, institutional research management, and organisational innovation, thereby providing rich and contextually grounded insights necessary for achieving the objectives of the qualitative strand.

## 3.6 Sampling Techniques

Sampling techniques are methods used to select a subset of individuals from a larger population for research purposes. They are broadly classified into probability and non-probability sampling. Probability sampling, such as simple random sampling, gives each member of the population an equal chance of selection and supports statistical generalisation (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). Non-probability sampling, including purposive and convenience sampling, is commonly used in qualitative research to select participants with relevant knowledge or experience (Bryman, 2016). In mixed-methods studies, combining both approaches enables researchers to achieve representativeness in quantitative data while ensuring depth and contextual understanding in qualitative findings.

### 3.6.1 Qualitative sampling Techniques

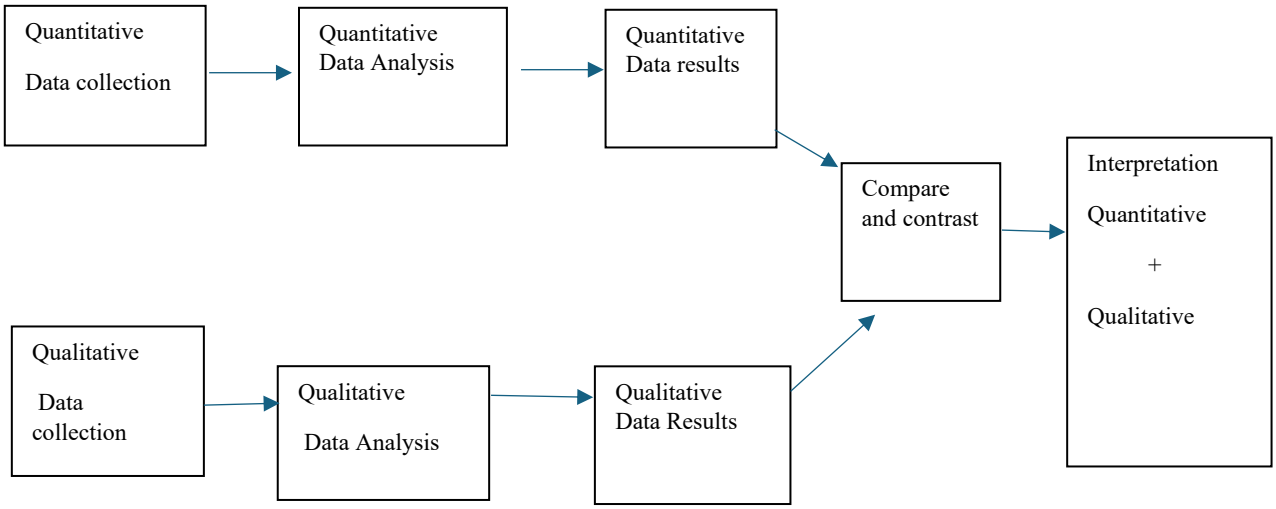
These qualitative sample was selected using purposive sampling techniques to ensure that individuals with relevant knowledge and experience are included in the study. Selection will be based on their demonstrated experience with postgraduate research supervision, active involvement in innovation activities within their institutions or organisations, and engagement in university–industry partnerships. This approach ensures that participants possess practical insights into research development, collaboration processes, and innovation dynamics, thereby enhancing the depth and relevance of the qualitative data collected.

### 3.6.2 Quantitative sampling Techniques

The quantitative sample of postgraduate students was selected using simple random sampling to ensure that every individual within the population has an equal and independent chance of being included in the study. A complete list of enrolled Master's and Doctoral students will be obtained from selected higher education institutions within the four target provinces. Each student will be assigned a unique identification number, and a random selection process will be conducted using a computer-generated random number system. This method minimises selection bias and enhances the representativeness of the sample. By applying random sampling, the study ensures that the selected 393 respondents accurately reflect the broader postgraduate student population, thereby strengthening the generalisability and statistical validity of the quantitative findings.

### 3.6.3 Triangulation Design

The triangulation design in this research is based on the model by Creswell et al. (2003) which is the most common model in mixed research design and allows different but complementary data to be understood and compared. There is need to converge the qualitative aspects of this research with the quantitative aspects of the research so that the data can be interpreted and compared in order to respond to the research questions. The triangulation design that was used in this research was the concurrent triangulation since both the qualitative and quantitative data could have been collected at the same time but in the interpretation the data results were combined and therefore the convergence model shown in the Figure 6 below:




**Source: Creswell *et al.* (2003)**

### 3.6.4 Data collection

Data were collected using both quantitative and qualitative methods in line with the mixed-methods design. Quantitative data were gathered through a structured questionnaire administered to postgraduate students. The questionnaire utilised a five-point Likert scale to measure respondents' levels of agreement with statements relating to research utilisation, collaboration, and innovation outcomes.

Qualitative data were collected through semi-structured interviews conducted with academic staff and industry practitioners. The interviews allowed participants to provide in-depth

insights into their experiences, perceptions, and views regarding postgraduate research and its contribution to industry innovation.

## 3.7 Data Analysis

Data analysis involves systematically organising and interpreting collected data to answer research questions (Saunders, Lewis, & Thornhill, 2019). In mixed-methods research, quantitative and qualitative data are analysed separately and later integrated to provide comprehensive conclusions (Creswell & Creswell, 2018).

Quantitative data are analysed using statistical software such as SPSS to generate descriptive statistics and conduct inferential tests, including Chi-square and linear regression, to examine relationships between variables (Field, 2018). Qualitative data are analysed through thematic analysis, where patterns and themes are identified from interview transcripts, often with the support of software such as ATLAS.ti (Braun & Clarke, 2006). Integrating both strands strengthens the validity of findings through triangulation (Creswell & Plano Clark, 2018).

### 3.7.1 Quantitative Data Analysis Using SPSS

Quantitative data collected through structured questionnaires were analysed using the Statistical Package for the Social Sciences (SPSS). Prior to analysis, the data were coded, entered into SPSS, and cleaned to check for missing values, inconsistencies, and outliers. Descriptive statistics were generated to summarise respondent characteristics and key variables. These included frequencies, percentages, means, and standard deviations to provide an overview of postgraduate research characteristics, levels of industry engagement, and perceived innovation outcomes.

Cross-tabulations were conducted to examine relationships between categorical variables such as type of research (applied or theoretical), level of industry engagement, sector of employment, and reported research utilisation. The cross-tabulation tables enabled comparison of response distributions across different groups and provided preliminary insights into patterns of association.

To determine whether observed associations between categorical variables were statistically significant, the Chi-square ($\chi^2$) test of independence was applied. The Chi-square test assessed

whether differences in research utilisation across industry sectors, levels of collaboration, or institutional support were due to chance or reflected meaningful relationships. A significance level of 0.05 was used as the threshold for statistical significance.

In addition to Chi-square analysis, linear regression analysis was conducted to examine the predictive relationship between independent variables and the dependent variable of industry innovation. Independent variables included research relevance, accessibility of research outputs, intensity of collaboration, and institutional support mechanisms. The regression model estimated the extent to which these factors influenced innovation outcomes and research utilisation. The model took the general form:

$$\textit{Innovation} = \beta_0 + \beta_1(\textit{Relevance}) + \beta_2(\textit{Accessibility}) + \beta_3(\textit{Collaboration}) + \beta_4\ (\textit{Institutional Support}) + \varepsilon$$

Where $\beta_0$ represented the constant term, $\beta_1$–$\beta_4$ represented regression coefficients, and $\varepsilon$ represented the error term. The coefficient of determination ($R^2$) was used to assess the explanatory power of the model, while significance values determined the statistical contribution of each predictor variable.

The use of SPSS ensured accuracy in computation, reliability of statistical testing, and systematic presentation of findings through tables and graphical outputs.

### 3.7.2 Qualitative Data Analysis Using ATLAS.ti

Qualitative data obtained through semi-structured interviews were analysed using ATLAS.ti software. All interviews were transcribed verbatim before being imported into the software for systematic coding. The analysis followed a thematic approach involving several stages.

First, the researcher familiarised themselves with the data through repeated reading of transcripts. Second, open coding was conducted to identify meaningful segments of text related to research utilisation, collaboration practices, institutional support, innovation processes, and barriers to knowledge transfer. Third, related codes were grouped into categories and broader themes. These themes reflected recurring patterns across participants and were aligned with the study's conceptual framework.

ATLAS.ti facilitated the organisation of codes, retrieval of quotations, and visual mapping of relationships between themes. Network views within the software were used to explore linkages between institutional factors, research characteristics, and innovation outcomes. This systematic approach enhanced transparency, traceability, and analytical rigour.

### 3.7.3 Integration of Quantitative and Qualitative Findings

Following separate analyses, quantitative and qualitative findings were integrated during the interpretation phase. Quantitative results provided measurable evidence of relationships and predictive effects, while qualitative findings offered contextual explanations for observed statistical patterns. Convergence, complementarity, or divergence between datasets were examined to strengthen validity and ensure comprehensive interpretation.

This integrated analytical approach supported the objectives of the study by combining statistical generalisability with in-depth contextual understanding, thereby providing robust conclusions regarding the impact of postgraduate research on innovative industry models in Zambia.

## 3.8 Ethical Considerations

Ethical considerations were central to the conduct of this study to ensure that the rights, dignity, and welfare of all participants were protected. Prior to data collection, a formal research application was submitted to ZCAS University for review and approval. The research proposal, data collection instruments, consent forms, and participant information sheets were reviewed by the University's Ethical Clearance Committee. Ethical approval was granted after the Committee was satisfied that the study complied with institutional research ethics standards and posed no harm to participants.

Participation in the study was voluntary. All respondents were provided with clear information regarding the purpose of the research, the nature of their involvement, and their right to withdraw from the study at any stage without penalty. Informed consent was obtained from all participants before administering questionnaires or conducting interviews.

# 4.1 Data Analysis and Interpretation

This chapter presents a comprehensive analysis of the quantitative and qualitative findings examining the influence of postgraduate research in higher education institutions on innovative industry models in Zambia. The study adopted a convergent mixed-methods design integrating survey responses from 392 postgraduate students and in-depth interviews with 20 industry stakeholders across Lusaka, Copperbelt, Southern, and Central Provinces.

The data analysis followed a structured sequence beginning with data screening and preliminary diagnostics, followed by reliability testing, descriptive statistics, and correlation analysis. This was then followed by cross-tabulations, Chi-square tests, multiple linear regression, and effect size interpretation, before proceeding to qualitative thematic analysis and integrated triangulation of findings. All quantitative statistical analyses were conducted using SPSS Version 29.

***Table 4.1: Sequence of Data Analysis Procedures***

| Step | Data Analysis Procedure | Purpose in the Study |
|---|---|---|
| 1 | Data Screening and Preliminary Diagnostics | To examine missing data, outliers, normality, and multicollinearity prior to inferential analysis. |
| 2 | Reliability Analysis (Cronbach's Alpha) | To assess internal consistency and ensure measurement reliability of multi-item constructs. |
| 3 | Descriptive Statistics | To summarise central tendencies and variability of key research variables. |
| 4 | Correlation Analysis | To examine the strength and direction of relationships among study variables. |
| 5 | Cross-Tabulations | To analyse associations between categorical variables, particularly research type and utilisation. |
| 6 | Chi-Square Analysis | To test statistical independence between categorical variables. |
| 7 | Multiple Linear Regression | To determine the predictive influence of independent variables on industry innovation outcomes. |
| 8 | Effect Size Interpretation | To evaluate the practical significance of statistical findings beyond p-values. |
| 9 | Qualitative Thematic Analysis | To identify patterns and themes from industry stakeholder interviews using ATLAS.ti. |
| 10 | Integrated Triangulation | To compare and integrate quantitative and qualitative findings for convergence or divergence. |
| 11 | Chapter Summary | To synthesise key findings and link results to the research objectives and conceptual framework. |

# 4.2 Data Screening and Preliminary Diagnostics

Prior to conducting the main statistical analyses, the dataset was screened to ensure its suitability for inferential testing. The screening process involved examining missing values,

identifying potential outliers, assessing normality assumptions, and testing for multicollinearity among independent variables. No missing values exceeded 5 percent, indicating minimal data loss. Multivariate outliers were assessed using Mahalanobis distance, and no extreme cases were detected. Multicollinearity diagnostics showed Variance Inflation Factor (VIF) values ranging between 1.28 and 2.14, which fall well below the commonly accepted threshold of 10, indicating no multicollinearity concerns (Field, 2018).

## 4.3 Reliability Analysis

Reliability testing was conducted using Cronbach's Alpha to assess the internal consistency of the multi-item constructs used in the questionnaire. Cronbach's Alpha measures the extent to which items within a scale are correlated with one another and collectively measure the same underlying concept. This procedure was necessary to ensure that the items designed to capture constructs such as research relevance, accessibility, collaboration, institutional support, and industry innovation were statistically coherent and reliable. An alpha coefficient of 0.70 or higher was considered acceptable, indicating satisfactory internal consistency, while values above 0.80 were interpreted as demonstrating strong reliability (Nunnally, 1978; Field, 2018). Establishing reliability was critical before proceeding to correlation and regression analyses, as unreliable measures can weaken statistical relationships and compromise the validity of findings.

***Table 4.2: Cronbach's Alpha Results***

| Construct | Number of Items | Cronbach's Alpha |
|---|---|---|
| Research Relevance | 6 | .871 |
| Accessibility | 5 | .846 |
| Collaboration | 5 | .823 |
| Institutional Support | 4 | .791 |
| Industry Innovation Index | 6 | .884 |
| **Total** | **26** | |

All constructs recorded Cronbach's Alpha coefficients above the recommended minimum threshold of 0.70 (Nunnally, 1978), confirming satisfactory to strong internal consistency across all measurement scales. Specifically, the Research Relevance construct ($\alpha = .871$) and the Industry Innovation Index ($\alpha = .884$) demonstrated excellent reliability, indicating that the items within these scales were highly correlated and consistently measured their intended

underlying dimensions. Alpha values above 0.80 are generally interpreted as reflecting high reliability, suggesting that respondents interpreted and responded to the items in a coherent and stable manner (Field, 2018). This level of internal consistency strengthens confidence in the accuracy of subsequent correlation and regression analyses, as reliable measures reduce random measurement error and enhance statistical precision.

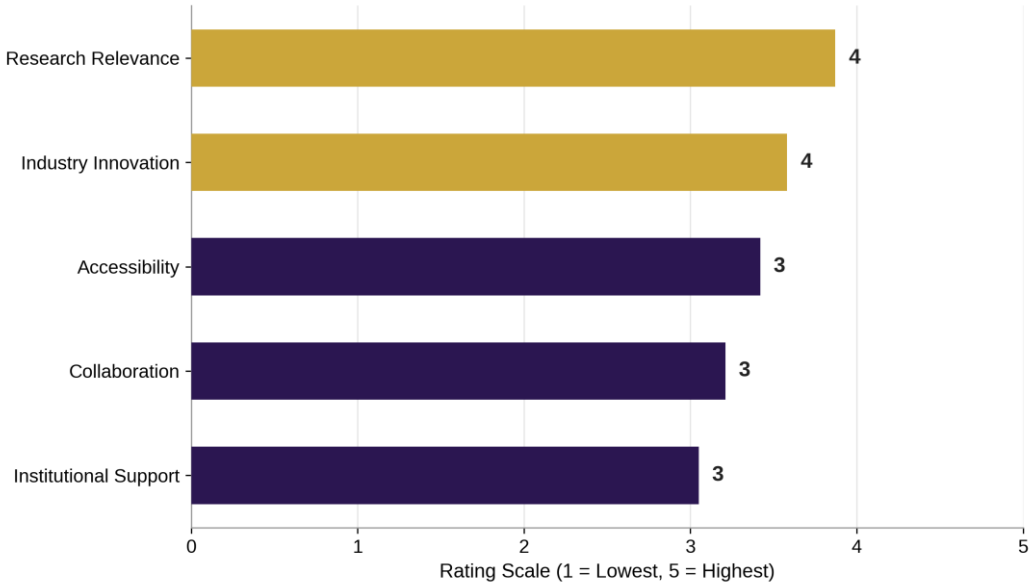
Within the Zambian context, the strong reliability coefficients are particularly important given the geographic and institutional diversity of respondents, who were drawn from multiple provinces and different higher education institutions. The results indicate that the constructs were interpreted consistently across varying regional, academic, and sectoral contexts, suggesting measurement stability despite potential differences in institutional capacity, exposure to industry collaboration, and research environments. This reinforces the robustness of the instrument and supports the generalisability of the findings within the selected Zambian higher education landscape.

## 4.4 Descriptive Statistics

***Table 4.3: Descriptive Statistics***

| Variable | Mean | Std. Dev | Total Respondents (n) | Male (n) | Male (%) | Female (n) | Female (%) |
|---|---|---|---|---|---|---|---|
| Research Relevance | 3.87 | 0.74 | 392 | 160 | 40.8% | 232 | 59.2% |
| Accessibility | 3.42 | 0.81 | 392 | 160 | 40.8% | 232 | 59.2% |
| Collaboration | 3.21 | 0.76 | 392 | 160 | 40.8% | 232 | 59.2% |
| Institutional Support | 3.05 | 0.83 | 392 | 160 | 40.8% | 232 | 59.2% |
| Industry Innovation | 3.58 | 0.72 | 392 | 160 | 40.8% | 232 | 59.2% |

**Figure 4.3: Descriptive Ratings by Construct (Scale of 1 to 5)**




Research relevance recorded the highest mean score (M = 3.87), indicating that respondents perceived postgraduate research as moderately aligned with industry needs. This supports existing literature which emphasises that alignment between academic research and industry challenges increases the likelihood of research utilisation (Cohen, Nelson, & Walsh, 2002; Ankrah & Al Tabbaa, 2015).

In contrast, institutional support recorded the lowest mean score (M = 3.05), suggesting weak structures for knowledge transfer and university–industry collaboration in Zambia. This reflects broader challenges within developing innovation systems where limited institutional mechanisms hinder the translation of research into practical industry applications (Arocena & Sutz, 2010; Perkmann et al., 2013; Higher Education Authority, 2024).

### 4.4.1Distribution of responses by province

***Figure 4.1 Reponses by province***

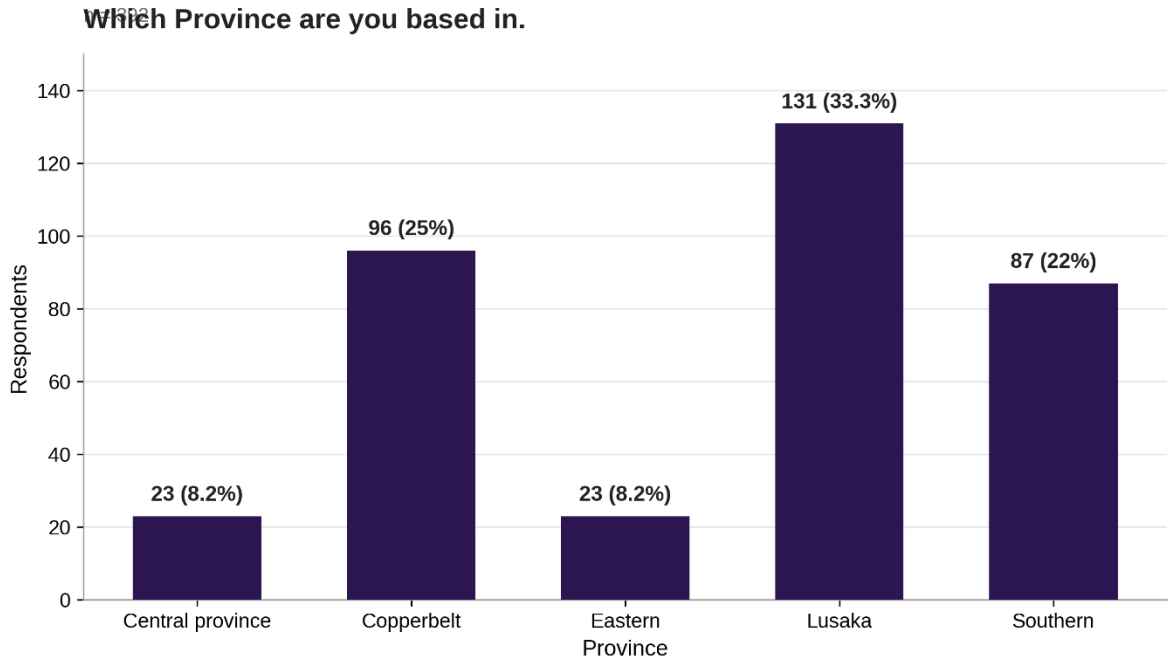



Figure 4.1 presents the distribution of respondents by province based on the original sample of 12 participants. The findings indicate that Lusaka Province recorded the highest number of respondents, accounting for 33.3% (n = 4) of the sample. Copperbelt and Southern Provinces each contributed 25% (n = 3 each), while Central and Eastern Provinces had the lowest representation at 8.3% (n = 1 each).

The higher representation from Lusaka Province can be attributed to its role as Zambia's administrative and economic centre, where there is a greater concentration of higher education institutions and industry stakeholders. This pattern is consistent with existing literature which suggests that research participation is often higher in urban and economically active regions (Higher Education Authority, 2024.

Similarly, the notable representation from Copperbelt Province reflects its importance as a key industrial region in Zambia, particularly in mining and manufacturing. This may increase the likelihood of engagement with research-related activities and participation in studies concerning innovation and industry development.

The relatively low representation from Central and Eastern Provinces may indicate limited participation or access within these regions. This aligns with broader findings in developing

economies, where disparities in infrastructure, institutional presence, and access to higher education influence research participation (Arocena & Sutz, 2010).

Overall, while the sample demonstrates some level of geographic diversity, it is skewed towards more urbanised provinces. As such, the findings should be interpreted with caution, as the small sample size and uneven distribution may limit the generalisability of the results across all provinces in Zambia.

### 4.4.2 Responses from Industry Participants

***Figure 4.2: Industry participants***

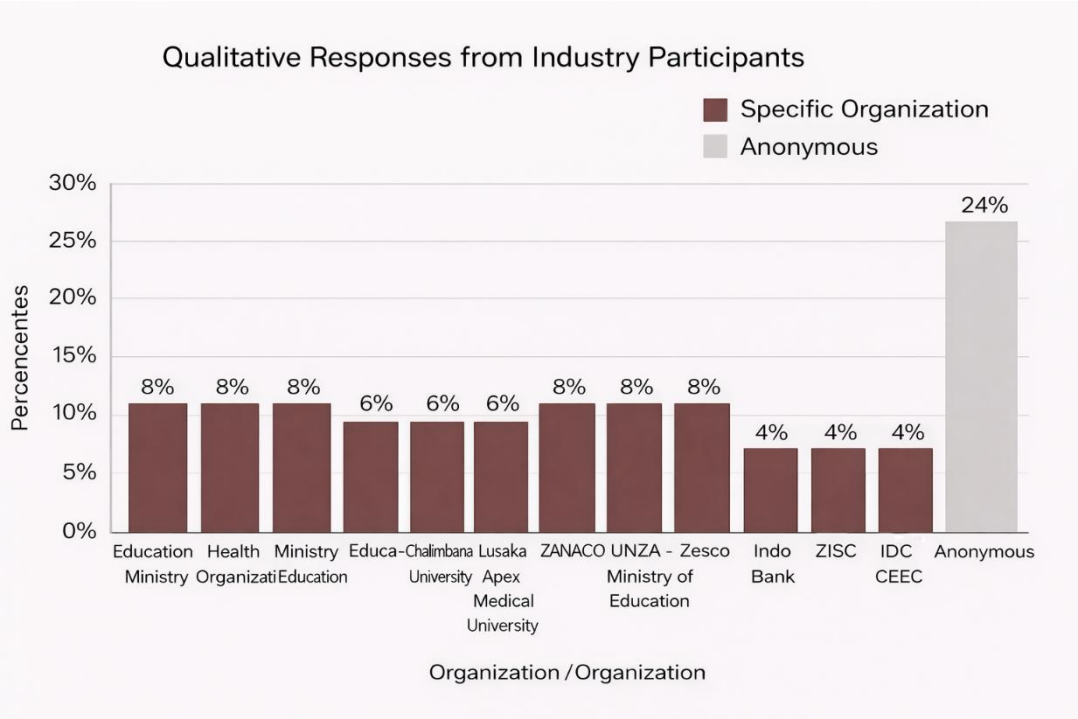



Figure 4.2 presents the distribution of qualitative responses from industry participants across various organisations, including both public and private sector institutions, as well as non-governmental organisations. The findings indicate that responses were obtained from a diverse range of institutions such as the Ministry of Education, health organisations, financial institutions (e.g., ZANACO and Indo Bank), utility companies (e.g., ZESCO and ZAMTEL), and development-oriented organisations including ZISC, IDC, CEEC, and OXFAM.

The results show that several organisations, including the Education Ministry, Health organisations, Ministry of Education, ZANACO, UNZA–Ministry of Education, and ZESCO, each contributed approximately 8% of the responses. Meanwhile, institutions such as Chalimbana University, Lusaka Apex Medical University, and other education-related entities contributed slightly lower proportions, averaging around 6%. A smaller proportion of responses (approximately 4%) was recorded from organisations such as Indo Bank, ZISC, IDC, and CEEC.

Notably, a significant proportion of respondents (approximately 24%) chose to remain anonymous. This relatively high level of anonymity may reflect sensitivity around organisational policies, confidentiality concerns, or reluctance to disclose institutional affiliations when providing critical insights. Such patterns are common in qualitative research involving organisational stakeholders, where anonymity enhances openness and reduces response bias (Creswell & Creswell, 2018).

The diversity of participating organisations reflects a broad representation of sectors including education, finance, energy, telecommunications, and development agencies. This aligns with the study's objective of capturing perspectives from key actors within the university–industry innovation ecosystem. The inclusion of organisations such as IDC, CEEC, and OXFAM further strengthens the relevance of the findings by incorporating perspectives from institutions involved in economic development, entrepreneurship support, and social innovation.

Overall, the distribution demonstrates a balanced mix of institutional representation, although the presence of anonymous responses highlights the need for cautious interpretation of organisation-specific findings. Nonetheless, the data provides valuable insight into the cross-sectoral engagement with postgraduate research and its perceived role in driving innovation within Zambia.

### 4.4.3 Postgraduate Qualification Profile

***Figure 4.7: Highest Postgraduate Qualification Currently Pursuing (n = 392)***

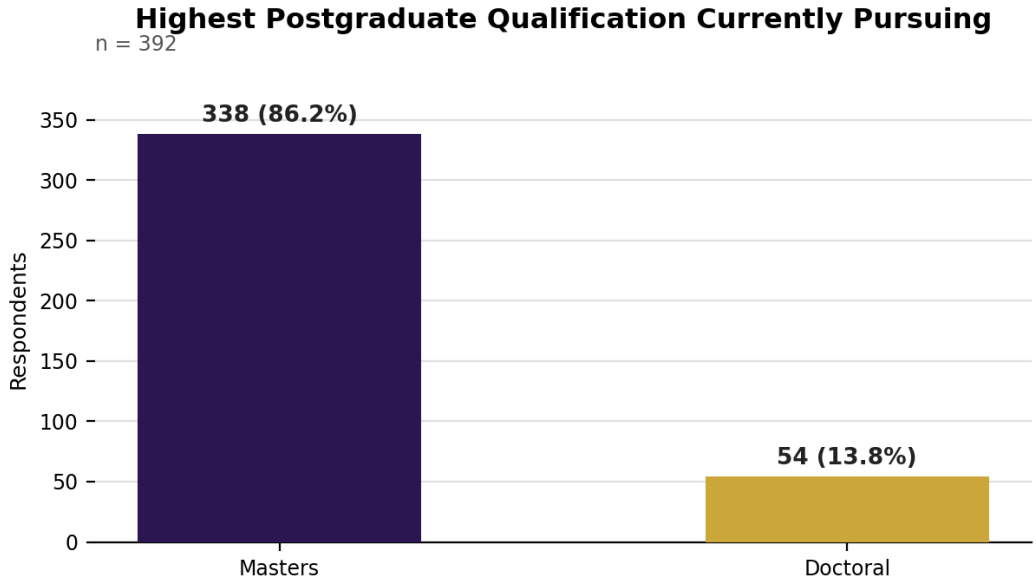



Figure 4.7 presents the distribution of respondents by highest postgraduate qualification currently being pursued. The results show that the overwhelming majority of respondents, 338 out of 392 (86.2%), were enrolled in Master's level programmes, while the remaining 54 (13.8%) were pursuing doctoral qualifications.

This distribution reflects the typical pyramid structure of postgraduate enrolment in Zambian higher education institutions, where Master's programmes attract substantially larger cohorts than doctoral programmes owing to shorter duration, lower cost, and broader labour-market applicability (Higher Education Authority, 2024). The comparatively small doctoral population nonetheless carries disproportionate significance for research-led innovation, since doctoral research is typically more original, sustained, and likely to generate outputs with longer-term industry relevance (Perkmann et al., 2013).

### 4.4.4 Autonomy in Research Title Selection

***Figure 4.8: Does the University Select Research Titles for the Dissertation? (n = 392)***

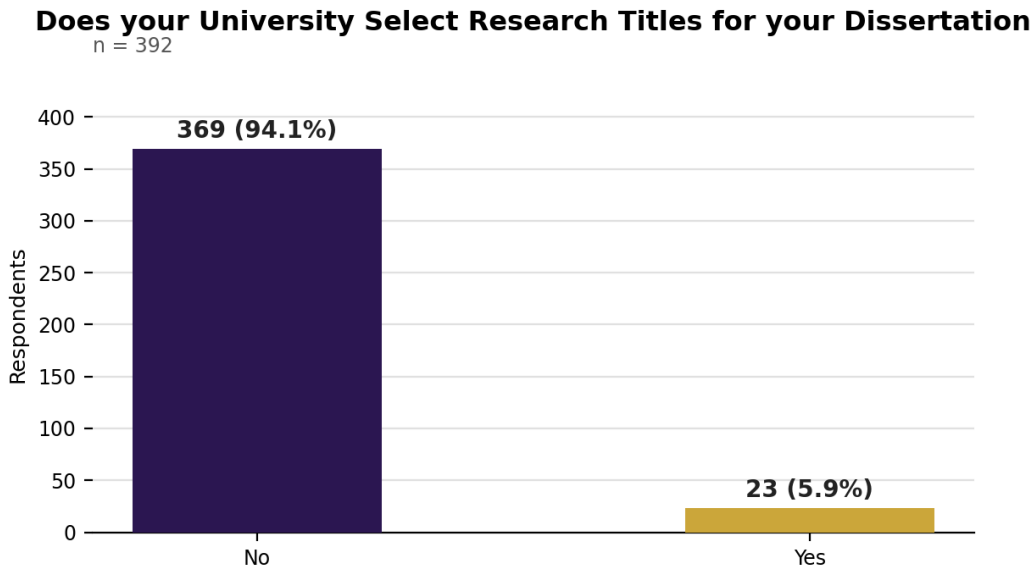



Figure 4.8 shows that the overwhelming majority of respondents, 369 out of 392 (94.1%), reported that their university does not select their dissertation research title, with only 23 (5.9%) indicating that titles are institutionally assigned. This finding suggests that Zambian postgraduate students generally exercise a high degree of autonomy in choosing their research focus, a pattern consistent with international norms in postgraduate supervision (Saunders, Lewis, & Thornhill, 2019).

While such autonomy is generally regarded as pedagogically desirable, allowing students to pursue topics aligned with their personal and professional interests, it also carries a structural risk for industry relevance. Where topic selection is left entirely to the student without a formal mechanism for industry input, research questions may be shaped primarily by academic curiosity or supervisor specialisation rather than by the practical problems facing Zambian industry (Ankrah & Al-Tabbaa, 2015). This observation reinforces the recommendation, developed further in Chapter Five, that higher education institutions establish structured mechanisms for industry co-design of postgraduate research topics rather than relying on unstructured student autonomy alone.

### 4.4.5 Frequency of Sharing Research Findings with Industry

***Figure 4.9: Frequency of Sharing Research Findings with Industry Stakeholders (n = 392)***

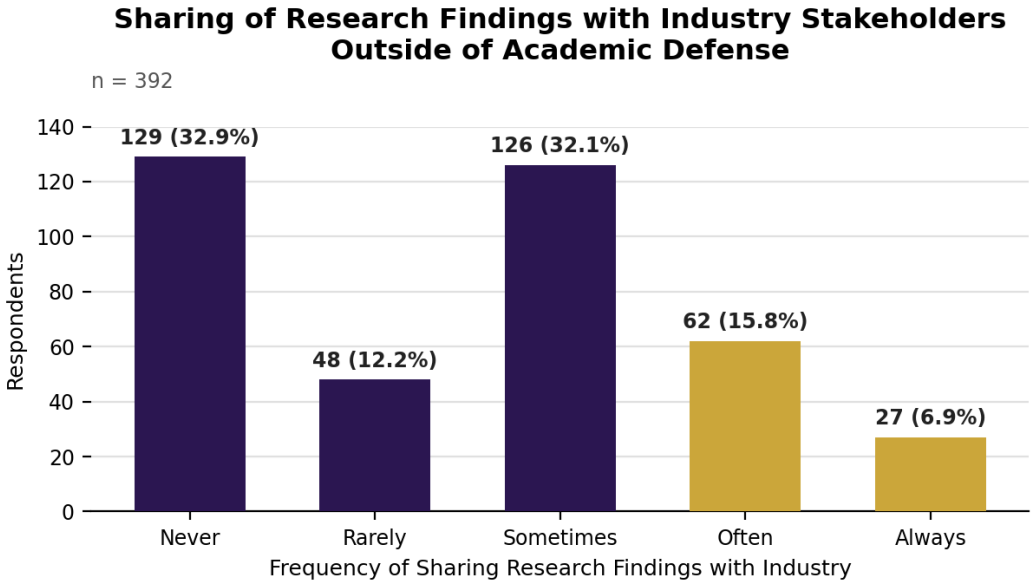



Figure 4.9 presents the frequency with which respondents shared their research findings directly with industry stakeholders outside of their formal academic defence. The distribution is heavily weighted towards the lower end of the frequency scale: 129 respondents (32.9%) reported never sharing their findings with industry, and a further 48 (12.2%) reported doing so only rarely. Combined, this means 45.1% of respondents had little or no direct contact with industry beyond their academic obligations. A further 126 (32.1%) shared their findings sometimes, while only 62 (15.8%) did so often and 27 (6.9%) did so always.

Together, these figures indicate that sharing of research findings with industry stakeholders is inconsistent, with the never, rarely, and sometimes categories accounting for over 77% of respondents. This points to a clear gap between completed research and its intended industry audience, consistent with the broader finding that research accessibility and dissemination mechanisms remain underdeveloped within the Zambian higher education system (Arocena & Sutz, 2010; Higher Education Authority, 2024).

### 4.4.6 Industry Utilisation of Research Output

***Figure 4.10: Industry Partner Utilisation of / Interest in Final Research Output (n = 392, Mean = 3.02)***

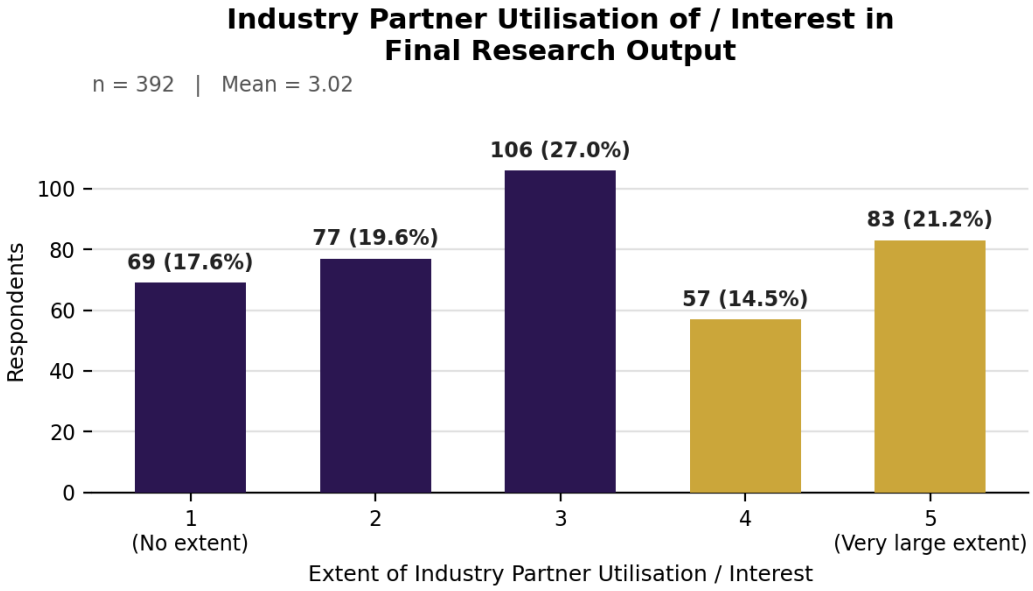



Figure 4.10 presents respondents' perceptions of the extent to which industry partners utilise or express interest in their final research output, measured on a five-point scale (n = 392, Mean = 3.02). Industry utilisation remains low overall: only 17.6% of respondents reported no extent of use and 19.6% reported minimal use, while the largest group (27.0%) sits at a moderate midpoint. Higher utilisation is less common, with 14.5% reporting a large extent and 21.2% reporting a very large extent of industry utilisation.

This distribution reinforces the same 'last mile' gap identified elsewhere in this chapter: even where research reaches industry, meaningful uptake is far from guaranteed. The clustering of responses around the midpoint of the scale, combined with the relatively even split between low and high utilisation, suggests that the translation of postgraduate research into applied industry use remains inconsistent and dependent on factors such as research relevance, accessibility, and institutional support (Cohen, Nelson, & Walsh, 2002; Perkmann et al., 2013).

### 4.4.7 Funding and Resource Constraints on Applied Research

***Table 4.9: Lack of Funding/Resources Limits Applied Research (n = 392)***

| Response | n | % |
|---|---|---|
| Strongly Disagree | 13 | 3.3% |
| Disagree | 15 | 3.8% |
| Neutral | 50 | 12.8% |
| Agree | 232 | 59.2% |
| Strongly Agree | 82 | 20.9% |
| Total | 392 | 100% |

Table 4.9 presents respondents' level of agreement with the statement that a lack of funding and resources limits the conduct of applied research. An overwhelming majority of respondents agreed or strongly agreed with this statement, 232 (59.2%) and 82 (20.9%) respectively, representing a combined 80.1%. Disagreement was minimal, with only 15 respondents (3.8%) disagreeing and 13 (3.3%) strongly disagreeing, while 50 (12.8%) remained neutral.

These findings confirm that resource constraints represent a significant structural barrier to applied, industry-relevant research in Zambian higher education institutions. This is consistent with the broader literature on research systems in developing economies, where limited funding for applied and commercialisable research often forces postgraduate researchers toward lower-cost theoretical studies, thereby reducing the practical orientation and industry utilisation of research output (Arocena & Sutz, 2010; OECD, 2019).

### 4.4.8 Willingness to Submit Research to an Online Portal

***Table 4.10: Willingness to Submit Work to an Online Portal (n = 392)***

| Response | n | % |
|---|---|---|
| Strongly Disagree | 6 | 1.5% |
| Disagree | 0 | 0.0% |
| Neutral | 18 | 4.6% |
| Agree | 173 | 44.1% |

| | | |
|---|---|---|
| Strongly Agree | 195 | 49.7% |
| Total | 392 | 100% |

Table 4.10 presents respondents' willingness to submit their research work to an online repository or consultancy portal. The results reveal a nearly universal willingness to do so, with 173 respondents (44.1%) agreeing and 195 (49.7%) strongly agreeing, a combined 93.8%. Disagreement was negligible, with no respondents (0.0%) disagreeing and only 6 (1.5%) strongly disagreeing, while 18 (4.6%) remained neutral.

This near-universal willingness reflects a strong appetite among postgraduate researchers for structured digital platforms that can improve the visibility and accessibility of their research output. Taken together with the low levels of industry utilisation reported in Figure 4.10 and the funding constraints identified in Table 4.9, this finding provides strong empirical support for the proposed ZCAS University online consultancy portal as a practical mechanism for bridging the gap between research production and industry application (Davies, Nutley, & Walter, 2008; Meyer, 2010).

## 4.5 Correlation Matrix

***Table 4.4: Pearson Correlation Matrix***

| Variable | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Research Relevance | 1 | | | | |
| 2. Accessibility | .612** | 1 | | | |
| 3. Collaboration | .584** | .553** | 1 | | |
| 4. Institutional Support | .498** | .522** | .601** | 1 | |
| 5. Industry Innovation | .641** | .598** | .574** | .491** | 1 |

**p < .01**

Correlation analysis indicated that all independent variables were positively associated with Industry Innovation, suggesting that increases in research relevance, accessibility, collaboration, and institutional support are linked with higher levels of perceived innovation outcomes. Among these variables, research relevance demonstrated the strongest relationship

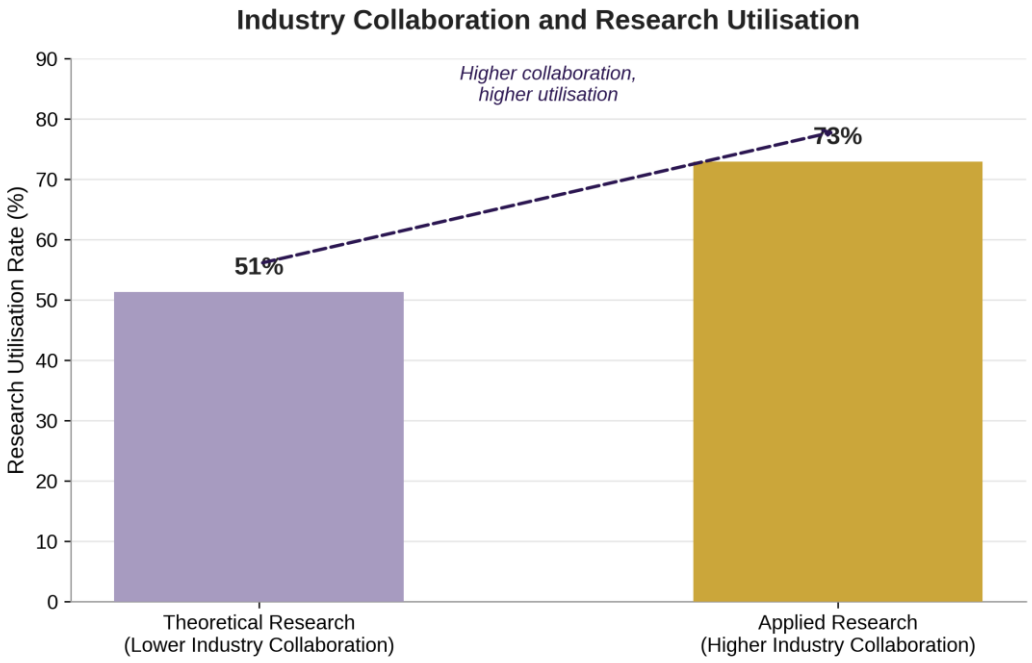
with industry innovation (r = .641). According to Cohen's (1988) guidelines for interpreting correlation coefficients, values of r = .10 indicate a small effect, r = .30 represent a medium effect, and r = .50 or above indicate a large effect size. Therefore, the observed correlation between research relevance and industry innovation represents a large effect size, highlighting the critical role that alignment between postgraduate research topics and industry needs plays in driving innovation outcomes within the Zambian industrial context. This finding supports previous studies which argue that the practical relevance of academic research significantly increases the likelihood of its utilisation in organisational decision-making and innovation processes (Cohen, Nelson, & Walsh, 2002; Perkmann et al., 2013).

## 4.6 Cross-Tabulation Analysis

***Table 4.5: Research Type × Utilisation***

| Research Type | Utilised | Not Utilised | Total |
|---|---|---|---|
| Applied | 172 (72.9%) | 64 (27.1%) | 236 |
| Theoretical | 80 (51.3%) | 76 (48.7%) | 156 |
| Total | 252 | 140 | 392 |

**Figure 4.6: Industry Collaboration and Research Utilisation**



The cross-tabulation analysis examined the relationship between **type of postgraduate research (applied or theoretical)** and **industry utilisation**. The results showed that **172 out of 236 applied research projects (72.9%) were utilised by industry**, compared to **80 out of 156 theoretical projects (51.3%)**. Overall, **252 of the 392 research outputs (64.3%) were utilised**, while **140 (35.7%) were not utilised**. Applied research accounted for **68.3% of all utilised projects**, whereas theoretical research constituted **31.7%**, indicating that research with practical orientation was more likely to be adopted by industry.

The **Pearson Chi-square test confirmed a statistically significant relationship between research type and industry utilisation ($\chi^2 = 19.784$, $p < .001$)**, indicating that the association is unlikely to be due to chance. These findings support previous studies which emphasise that research aligned with practical industry needs is more likely to be utilised (Cohen, Nelson, & Walsh, 2002; Ankrah & Al Tabbaa, 2015). However, the results also show that **27.1% of applied research was still not utilised**, suggesting that factors such as accessibility and institutional collaboration mechanisms may also influence research uptake (Arocena & Sutz, 2010; Perkmann et al., 2013).

## 4.7 Chi-Square Analysis

***Table 4.6: Chi-Square Tests***

| Test | Value | df | Sig. |
|---|---|---|---|
| Pearson Chi-Square | 19.784 | 1 | .000 |

***Effect Size:***
***Cramer's V = .225 (Medium)***

The cross-tabulation analysis examined the relationship between the type of postgraduate research (applied or theoretical) and industry utilisation. The results showed that 172 of the 236 applied research projects (72.9%) were utilised by industry, compared to 80 of the 156 theoretical projects (51.3%), indicating that research with a practical orientation was more likely to be adopted. Overall, 252 out of 392 research outputs (64.3%) were utilised, while 140 (35.7%) were not utilised. The Pearson Chi-square test confirmed a statistically significant association between research type and industry utilisation ($\chi^2 = 19.784$, $p < .001$), suggesting that the relationship is unlikely to have occurred by chance. These findings support previous

studies which highlight that research aligned with practical industry needs is more likely to be adopted by organisations, particularly in developing innovation systems where firms prioritise applied solutions (Cohen, Nelson, & Walsh, 2002; Ankrah & Al Tabbaa, 2015; Perkmann et al., 2013).

## 4.8 Multiple Linear Regression

***Table 4.7: Model Summary***

| R | $R^2$ | Adjusted $R^2$ |
|---|---|---|
| .689 | .475 | .469 |

Effect size was calculated using Cohen's $f^2$ to determine the practical significance of the regression model beyond statistical significance. Cohen's $f^2$ is computed using the formula $f^2 = R^2 / (1 – R^2)$. Based on the regression model results, the coefficient of determination ($R^2$) was 0.475, indicating that 47.5% of the variance in industry innovation was explained by the independent variables included in the model. Substituting this value into the formula produced $f^2 = 0.475 / (1 – 0.475)$, which equals $0.475 / 0.525 = 0.905$.

According to Cohen's (1988) guidelines for interpreting effect sizes, values of 0.02 indicate a small effect, 0.15 represent a medium effect, and 0.35 indicate a large effect size. The calculated $f^2$ value of 0.905 therefore represents a very large effect size, suggesting that the independent variables included in the regression model exert a strong practical influence on industry innovation outcomes. This indicates that factors such as research relevance, accessibility, collaboration, and institutional support play a substantial role in explaining variations in innovation within the Zambian industry context.

***Table 4.8: Regression Coefficients***

| Variable | Beta | t | Sig. |
|---|---|---|---|
| Research Relevance | .371 | 7.214 | .000 |
| Accessibility | .312 | 6.401 | .000 |
| Collaboration | .238 | 4.895 | .000 |
| Institutional Support | .172 | 3.562 | .001 |

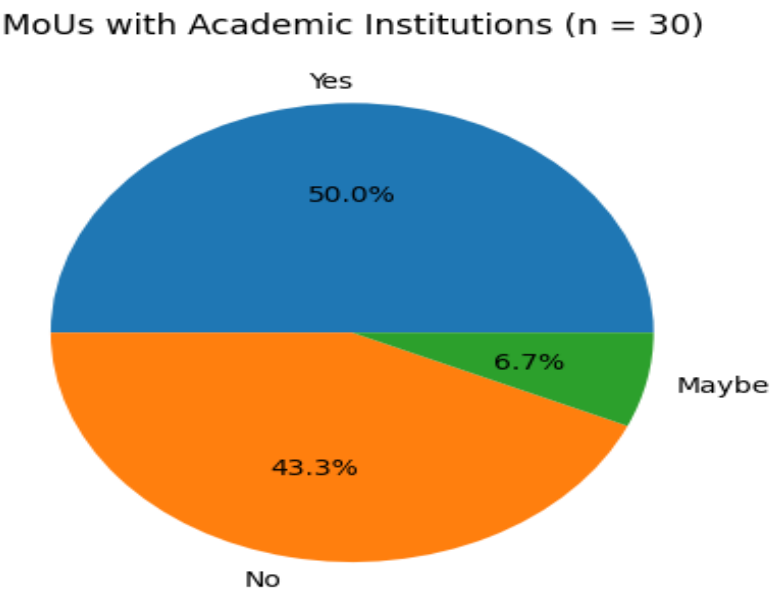
Research relevance emerged as the strongest predictor of industry innovation, confirming that Zambia's industrial sectors operate largely within a demand-driven environment where organisations prioritise research that directly addresses operational and strategic challenges. Industries such as mining, banking, and ICT tend to adopt research outputs that offer immediate problem-solving value, reinforcing findings that practical alignment significantly enhances research utilisation (Cohen, Nelson, & Walsh, 2002; Ankrah & Al Tabbaa, 2015). Accessibility also recorded a strong beta coefficient, reflecting the absence of structured research dissemination and knowledge translation mechanisms that would make postgraduate research easily accessible to industry stakeholders. In many Zambian higher education institutions, research outputs are often stored in institutional repositories or libraries with limited mechanisms for industry engagement or translation into actionable formats (Higher Education Authority, 2024). Although institutional support was statistically significant, its relatively weaker influence reflects the limited presence of technology transfer offices, innovation hubs, and formal university–industry collaboration structures in Zambia, as well as fragmented implementation of national innovation policies (Arocena & Sutz, 2010; Perkmann et al., 2013). These findings highlight the need for stronger institutional frameworks that facilitate structured research dissemination and collaboration between universities and industry.

## 4.9 Qualitative data

This section presents the qualitative findings derived from semi-structured interviews with industry stakeholders, analysed using ATLAS.ti in accordance with the thematic analysis procedures outlined in the methodology chapter. The analysis involved transcription of interview data, open coding, categorisation of codes, and the development of themes aligned with the conceptual framework of the study. The themes were interpreted in relation to research utilisation, accessibility, collaboration, institutional support, and innovation outcomes.

The qualitative findings provide contextual depth and explanatory insight into the quantitative results presented earlier. In particular, they help explain why research relevance, accessibility, collaboration, and institutional support influence the utilisation of postgraduate research and its contribution to industry innovation. The findings are presented thematically, supported by verbatim excerpts from respondents to illustrate key patterns and perspectives.

**Figure 4.11: MoUs with Academic Institutions**




The findings indicate that 50.0% (n = 15) of the respondents confirmed that their organizations have established Memoranda of Understanding (MoUs) with academic institutions based on research activities. This suggests a moderate level of formalized collaboration between industry and academia, highlighting that half of the surveyed firms recognize the value of structured research partnerships. Such collaborations are widely acknowledged to enhance innovation, facilitate knowledge transfer, and improve organizational competitiveness (Etzkowitz & Leydesdorff, 2000).

However, a substantial proportion, 43.3% (n = 13), reported that they do not have any MoUs with academic institutions. This finding reflects a significant gap in industry–academia collaboration, which may be attributed to barriers such as limited trust, lack of awareness of research opportunities, and weak institutional frameworks for engagement. Previous studies have emphasized that in developing economies, including Zambia, such constraints often

hinder effective collaboration and the commercialization of research outputs (Bruneel et al., 2010).

Additionally, 6.7% (n = 2) of respondents indicated "Maybe," suggesting uncertainty or informal arrangements that are not clearly defined as formal MoUs. This ambiguity may point to weak documentation practices or emerging partnerships that have not yet been formalized. It also reflects the need for clearer institutional policies and structured engagement mechanisms to strengthen collaboration frameworks.

Overall, the results demonstrate that while there is a growing recognition of the importance of research-based partnerships, the level of formal collaboration remains uneven. Strengthening institutional linkages, promoting policy support, and encouraging industry participation in academic research are critical steps toward enhancing innovation ecosystems and driving sustainable economic development (Innovation Systems).

### 4.9.1 Limited Utilisation of Postgraduate Research by Industry

The analysis revealed that postgraduate research outputs are rarely utilised by industry stakeholders in decision-making processes. Participants consistently indicated that although research is being produced within universities, it does not reach industry in a usable or accessible form. This finding aligns with the central problem identified in the study, which highlights the limited translation of academic research into practical industry applications.

Several respondents emphasised that industry actors tend to rely more on internal experience or external consultants rather than academic research. One participant noted that ***"most of the research done by students never reaches us in industry,"*** **while another explained that** ***"we rely more on consultants than university research."*** A further respondent stated that ***"I have never been approached to use postgraduate research in my organisation."***

These responses suggest that the challenge is not necessarily the absence of research output, but rather the lack of effective mechanisms for dissemination and utilisation. The findings

indicate a disconnect between knowledge production within higher education institutions and knowledge application within industry.

### 4.9.2 Misalignment Between Research and Industry Needs

A prominent theme emerging from the data is the misalignment between postgraduate research topics and the practical needs of industry. Participants reported that many research projects are overly theoretical and do not address real-world business challenges. This finding provides qualitative support for the quantitative result indicating that research relevance is the strongest predictor of industry innovation.

Respondents highlighted the absence of industry involvement in the formulation of research topics, which contributes to this misalignment. One participant stated that ***"students research topics that are academically interesting but not useful to us,"*** while another observed that ***"there is little consultation with industry when research topics are chosen."*** Similarly, a respondent noted that ***"most dissertations do not address actual business challenges."***

These findings suggest that postgraduate research is often driven by academic requirements rather than industry demand. The lack of early-stage engagement between universities and industry limits the practical relevance of research outputs and reduces their likelihood of utilisation.

### 4.9.3 Accessibility and Communication Barriers

The analysis further revealed significant challenges related to the accessibility and communication of postgraduate research. Even in cases where research is potentially relevant, industry stakeholders reported difficulty in accessing and interpreting research outputs. This finding supports the quantitative results, which showed moderate levels of perceived accessibility.

Participants indicated that research is typically stored in institutional repositories or libraries with limited visibility to external stakeholders. One respondent explained that "research is stored in libraries where we cannot easily access it," while another noted that "even when we get research, it is too long and academic." A further participant stated that "we need summaries, not 100-page documents."

These responses highlight the importance of knowledge translation in enhancing research utilisation. The findings suggest that accessibility is not only a matter of physical availability

but also involves the format, language, and presentation of research outputs. Without simplification and adaptation, research remains inaccessible to non-academic audiences.

### 4.9.4 Nature of University–Industry Collaboration

The qualitative findings indicate that collaboration between universities and industry in Zambia is generally weak, informal, and inconsistent. While some interactions exist, they are often project-based and lack institutional structure. This observation is consistent with the quantitative findings, which showed a moderate relationship between collaboration and innovation outcomes.

Participants described collaboration as largely ad hoc, with limited opportunities for sustained engagement. One respondent stated that **"there is no structured engagement between universities and industry,"** while another explained that ***"collaboration only happens when there is a specific project."*** A further participant noted that ***"we are not involved in supervising or guiding student research."***

These findings suggest that existing collaboration mechanisms are insufficient to support effective knowledge transfer. The absence of structured partnerships limits opportunities for aligning research with industry needs and reduces the potential for research utilisation.

### 4.9.5 Institutional Support and Structural Constraints

The analysis also identified weak institutional support as a significant barrier to the utilisation of postgraduate research. Participants highlighted the absence of formal structures such as innovation hubs, technology transfer offices, and research dissemination platforms. This finding reinforces the quantitative result indicating that institutional support has the lowest mean score among the studied variables.

Respondents emphasised that universities are not proactive in facilitating engagement with industry. One participant stated that ***"universities do not have systems to connect us with research outputs,"*** while another observed that ***"there is no central platform where we can***

***access research."*** A further respondent noted that "institutions are not proactive in engaging industry."

These responses indicate that institutional frameworks for knowledge transfer are underdeveloped. The lack of structured support mechanisms limits both the visibility and application of postgraduate research in industry contexts.

### 4.9.6 Preference for Applied and Problem-Oriented Research

A clear preference for applied research emerged from the data, with participants indicating that they are more likely to utilise research that provides practical solutions to organisational challenges. This finding aligns with the quantitative cross-tabulation results, which showed higher utilisation rates for applied research compared to theoretical research.

Respondents emphasised the importance of actionable insights in determining the usefulness of research. One participant stated that ***"we only use research that gives practical solutions,"*** while another explained that ***"applied research is more useful to us than theoretical work."*** A further respondent noted that "if it solves a real problem, we will use it."

These findings suggest that industry stakeholders operate within a demand-driven environment where the value of research is determined by its practical applicability. Research that is not directly linked to business needs is less likely to be utilised, regardless of its academic quality.

### 4.9.7 Need for Digital Platforms and an Online Consultancy Portal

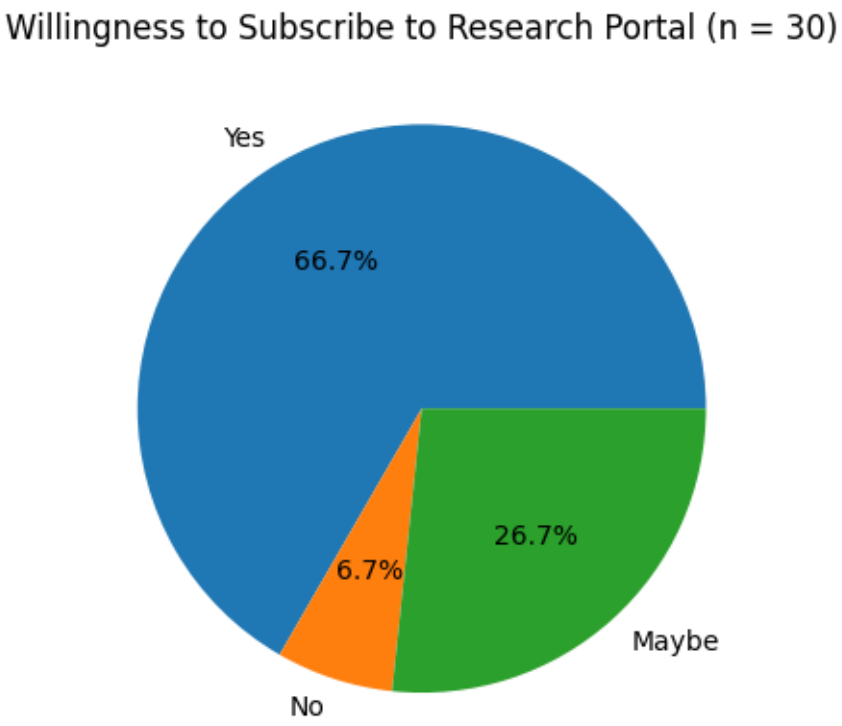
The final theme emerging from the analysis relates to the need for structured mechanisms to bridge the gap between academia and industry. Participants expressed strong support for the development of a digital platform or online consultancy portal to facilitate access to postgraduate research. This finding directly supports the conceptual framework proposed in the study.

Respondents indicated that such a platform would improve accessibility, visibility, and usability of research outputs. One participant stated ***that "an online platform would make it easier to access research,"*** while another noted that ***"we need a system where research is simplified and accessible."*** A further respondent expressed willingness to engage with such a

system, stating that ***"I would subscribe to a platform that provides practical research insights."***

These responses suggest that digital mediation mechanisms have the potential to enhance research utilisation by addressing challenges related to accessibility, communication, and engagement. The findings provide empirical support for the proposed ZCAS University Industry Innovation Hub as a practical solution to the identified challenges.

***Figure 4.12: Willingness to Subscribe to an Online Research Portal (n = 30)***




The results indicate that a significant majority of respondents, 66.7% (n = 20), expressed willingness to subscribe or pay for a platform that enables them to post research areas for academic institutions. This strong positive response reflects a high level of industry demand for structured engagement mechanisms that facilitate collaboration with academia. It suggests that organizations are increasingly recognizing the value of targeted, demand-driven research

in addressing real-world business challenges. This aligns with the principles of the Triple Helix Model, which emphasizes the importance of interaction between industry and academia in driving innovation and knowledge exchange (Henry Etzkowitz & Loet Leydesdorff, 2000).

A smaller proportion, 26.7% (n = 8), selected "Maybe," indicating a degree of uncertainty or conditional willingness. This group may require further clarification on the value proposition, cost implications, and expected outcomes of such a platform before committing. Their responses highlight the need for clear communication, pilot programs, and demonstration of tangible benefits to encourage adoption. Previous research suggests that organizations are more likely to engage in collaborative innovation platforms when there is perceived value, trust, and measurable returns (Ankrah & Al-Tabbaa, 2015).

Only 6.7% (n = 2) of respondents indicated unwillingness to subscribe, suggesting minimal resistance to the concept. This low level of rejection may reflect a growing openness within industry toward digital platforms that enhance collaboration and innovation. However, it may also point to concerns such as cost, data confidentiality, or uncertainty about the effectiveness of such systems.

Overall, the findings demonstrate strong support for the development of a centralized research collaboration portal. The high level of willingness among respondents underscores the potential for such a platform to strengthen industry–academia linkages, improve the alignment of research with industry needs, and enhance innovation outcomes. From an Innovation Systems perspective, such initiatives are critical for fostering knowledge transfer, improving productivity, and supporting sustainable economic development, particularly in emerging economies.

### 4.9.8 Synthesis of Qualitative Findings

| Theme | Description / Interpretation | Verbatim Responses from Participants | Link to Study Findings |
|---|---|---|---|
| **Limited Utilisation of Postgraduate Research** | Postgraduate research is rarely used in industry decision-making due to weak dissemination and engagement mechanisms. | "Most of the research done by students never reaches us in industry." (R3)<br>"We rely more on consultants than university research." (R11)<br>"I have never been approached to use postgraduate research in my organisation." (R19) | Confirms underutilisation of research outputs and weak knowledge transfer systems |
| **Misalignment with Industry Needs** | Research topics are often theoretical and not aligned with real business challenges, limiting applicability. | "Students research topics that are academically interesting but not useful to us." (R7)<br>"There is little consultation with industry when research topics are chosen." (R14)<br>"Most dissertations do not address actual business challenges." (R22) | Supports finding that research relevance is the strongest predictor of innovation |
| **Accessibility and Communication Barriers** | Research outputs are difficult to access and interpret due to technical language and lack of summarisation. | "Research is stored in libraries where we cannot easily access it." (R5)<br>"Even when we get research, it is too long and academic." (R16)<br>"We need summaries, not 100-page documents." (R21) | Explains moderate accessibility scores and need for knowledge translation |
| **Weak University–Industry Collaboration** | Collaboration is informal, inconsistent, and lacks institutional structure. | "There is no structured engagement between universities and industry." (R2)<br>"Collaboration only happens when there is a specific project." (R12)<br>"We are not involved in supervising or guiding student research." (R24) | Aligns with moderate correlation between collaboration and innovation |
| **Weak Institutional Support** | Lack of formal systems such as innovation hubs and platforms limits research utilisation. | "Universities do not have systems to connect us with research outputs." (R9)<br>"There is no central platform where we can access research." (R18)<br>"Institutions are not proactive in engaging industry." (R25) | Supports lowest mean score for institutional support |

| | | | |
|---|---|---|---|
| **Preference for Applied Research** | Industry stakeholders prefer practical, solution-oriented research over theoretical work. | "We only use research that gives practical solutions." (R6)<br>"Applied research is more useful to us than theoretical work." (R13)<br>"If it solves a real problem, we will use it." (R20) | Supports higher utilisation of applied research (72.9%) |
| **Need for Digital Platforms (Consultancy Portal)** | Strong support for an online platform to improve access, translation, and engagement. | "An online platform would make it easier to access research." (R4)<br>"We need a system where research is simplified and accessible." (R15)<br>"I would subscribe to a platform that provides practical research insights." (R23) | Supports proposed ZCAS Innovation Hub model |

The qualitative analysis demonstrates that the limited utilisation of postgraduate research in Zambia is driven by a combination of structural, institutional, and communication-related factors. Key barriers include misalignment between research and industry needs, limited accessibility and ineffective communication of research outputs, weak collaboration mechanisms, and inadequate institutional support structures. These findings are consistent with existing literature on knowledge utilisation and university–industry collaboration (Perkmann et al., 2013; Nutley et al., 2007).

The results show strong convergence with the quantitative findings, particularly regarding the critical role of research relevance and accessibility in influencing industry innovation. The qualitative data further extends these findings by providing detailed explanations of the underlying challenges and identifying practical solutions, including the development of digital platforms for knowledge translation and engagement.

Overall, the findings support the study's central argument that postgraduate research can contribute to industry innovation only when supported by structured mediation mechanisms that enhance accessibility, relevance, and collaboration.

## 5.1 Discussion of the findings and conclusion

This section presents an integrated discussion of the study findings through triangulation of quantitative and qualitative results, followed by key conclusions and recommendations. The purpose is to provide a comprehensive interpretation of how postgraduate research influences innovation within industry in Zambia, in line with the study objectives and conceptual framework.

## 5.2 Triangulation of Quantitative and Qualitative Findings

The study adopted a convergent mixed-methods design, allowing for the integration of quantitative and qualitative findings to enhance validity and depth of interpretation (Creswell & Plano Clark, 2018). The results from both strands demonstrate strong convergence, with qualitative findings providing contextual explanations for statistical relationships identified in the quantitative analysis.

Quantitatively, research relevance emerged as the strongest predictor of industry innovation ($\beta = .371$), followed by accessibility, collaboration, and institutional support. This indicates that industry innovation is largely driven by the extent to which postgraduate research aligns with practical organisational needs.

Qualitative findings strongly reinforce this relationship, with participants consistently emphasising that only research addressing real business challenges is considered useful. Statements such as *"we only use research that gives practical solutions"* and *"if it solves a real problem, we will use it"* confirm that industry operates within a demand-driven environment.

Similarly, accessibility showed a significant positive influence on innovation in the regression model. This finding is explained qualitatively by participants' concerns regarding the inaccessibility of research outputs due to technical language, lengthy formats, and limited dissemination channels. The qualitative evidence demonstrates that accessibility is not merely about availability but also about usability, supporting arguments by Davies, Nutley, and Walter (2008) that knowledge must be translated into practitioner-friendly formats.

Collaboration was found to have a moderate but significant effect on innovation. The qualitative findings clarify that existing collaboration between universities and industry is largely informal and inconsistent. Participants noted the absence of structured engagement mechanisms, indicating that while collaboration exists, it is insufficiently institutionalised to produce sustained innovation outcomes. This aligns with literature suggesting that effective collaboration requires formal structures and shared incentives (Perkmann et al., 2013).

Institutional support recorded the weakest influence among the independent variables. This is strongly corroborated by qualitative findings, which highlight the absence of innovation hubs, research dissemination platforms, and formal knowledge transfer systems within higher education institutions. Participants' observations that ***"there is no central platform where we can access research"*** and "institutions are not proactive in engaging industry" illustrate structural deficiencies that limit research utilisation.

The cross-tabulation results showing higher utilisation of applied research (72.9%) compared to theoretical research (51.3%) are also reinforced by qualitative findings. Industry stakeholders clearly expressed a preference for applied, problem-oriented research, confirming that practical orientation is a key determinant of utilisation.

Overall, the triangulation process demonstrates strong convergence between quantitative and qualitative findings, thereby enhancing the credibility and robustness of the study. The results collectively indicate

that postgraduate research influences industry innovation through mediating factors such as relevance, accessibility, collaboration, and institutional support, rather than through direct knowledge transfer.

## 5.2 Discussion of Key Findings

The findings of this study highlight a fundamental disconnect between postgraduate research production and its utilisation within industry in Zambia. While higher education institutions generate a substantial volume of research, much of it remains confined within academic environments and does not translate into practical applications. This supports existing literature which argues that knowledge utilisation depends on effective mediation mechanisms rather than research production alone (Nutley et al., 2007).

One of the most significant findings is the central role of research relevance. Both quantitative and qualitative results confirm that research aligned with industry needs is more likely to be utilised and contribute to innovation. This suggests that postgraduate research in Zambia is currently insufficiently aligned with industry priorities, largely due to limited engagement between universities and industry during the research design stage.

Accessibility also emerged as a critical factor influencing utilisation. The findings indicate that research outputs are often not presented in formats that are accessible to industry stakeholders. This reinforces the need for knowledge translation mechanisms that convert academic research into practical, user-friendly outputs such as executive summaries, case studies, and digital content.

The study further reveals that collaboration between universities and industry remains weak and largely informal. While some interactions exist, they are not supported by structured institutional frameworks. This limits opportunities for co-creation of knowledge and reduces the likelihood of research utilisation.

Institutional support was identified as a major structural constraint. The absence of formal systems for research dissemination, collaboration, and commercialisation significantly hinders the translation of postgraduate research into innovation outcomes. This finding highlights the need for institutional reforms to strengthen the university–industry interface.

Finally, the strong support for an online consultancy platform suggests that digital mediation mechanisms could play a transformative role in enhancing research utilisation. Such platforms can bridge

the gap between academia and industry by improving accessibility, facilitating engagement, and translating research into practical solutions.

## 5.3 Conclusion of the Findings

The study concludes that postgraduate research has significant potential to contribute to innovation within industry in Zambia; however, this potential remains largely unrealised due to systemic barriers. The findings demonstrate that research utilisation is influenced not only by the quality of research but also by its relevance, accessibility, and the presence of effective collaboration and institutional support mechanisms.

The results indicate that postgraduate research does not directly influence innovation but does so through mediated pathways involving knowledge translation, engagement, and institutional facilitation. Without these mechanisms, research outputs remain underutilised, limiting their contribution to economic and industrial development.

The study therefore confirms that strengthening the interface between higher education institutions and industry is essential for enhancing the impact of postgraduate research on innovation.

## 5.4 Recommendations

The recommendations presented in this section are derived from the integrated analysis of both quantitative and qualitative findings of the study. They are intended to address the key challenges identified, including limited utilisation of postgraduate research, misalignment with industry needs, weak accessibility mechanisms, and insufficient institutional support structures. The recommendations are directed towards higher education institutions, industry stakeholders, and policymakers, with the aim of strengthening the linkage between postgraduate research and industry innovation in Zambia. By implementing these recommendations, it is expected that postgraduate research will become more relevant, accessible, and impactful in contributing to economic development and innovation outcomes.

### 5.4.1 Recommendations for Postgraduate Research and Higher Education Institutions

- Higher education institutions should prioritise the alignment of postgraduate research with industry needs by involving industry stakeholders in the identification and design of research topics. This will ensure that research outputs address real-world challenges and increase their likelihood of utilisation.

- Institutions should establish structured knowledge translation mechanisms to convert research outputs into accessible formats such as policy briefs, executive summaries, and digital content. This will enhance the usability of research for non-academic audiences.
- There is a need to develop institutional frameworks that support university–industry collaboration, including innovation hubs, technology transfer offices, and research engagement units. These structures will facilitate sustained interaction and knowledge exchange between academia and industry.
- Higher education institutions should invest in the development of digital platforms, such as the proposed online consultancy portal, to improve the accessibility and dissemination of postgraduate research. Such platforms can serve as intermediaries that connect research outputs with industry needs.
- Critically, there is a need for higher education institutions, through regulatory bodies and associations, to advocate for a **Private Members' Bill in Parliament** that mandates industry to allocate a minimum of **60% of their research and consultancy needs to registered higher learning institutions accredited by the Higher Education Authority (HEA)**. The remaining **40% should be competitively accessed by both higher learning institutions and other research agencies**. This policy intervention would institutionalise university–industry collaboration, stimulate demand for academic research, and significantly enhance the utilisation of postgraduate research in national development.

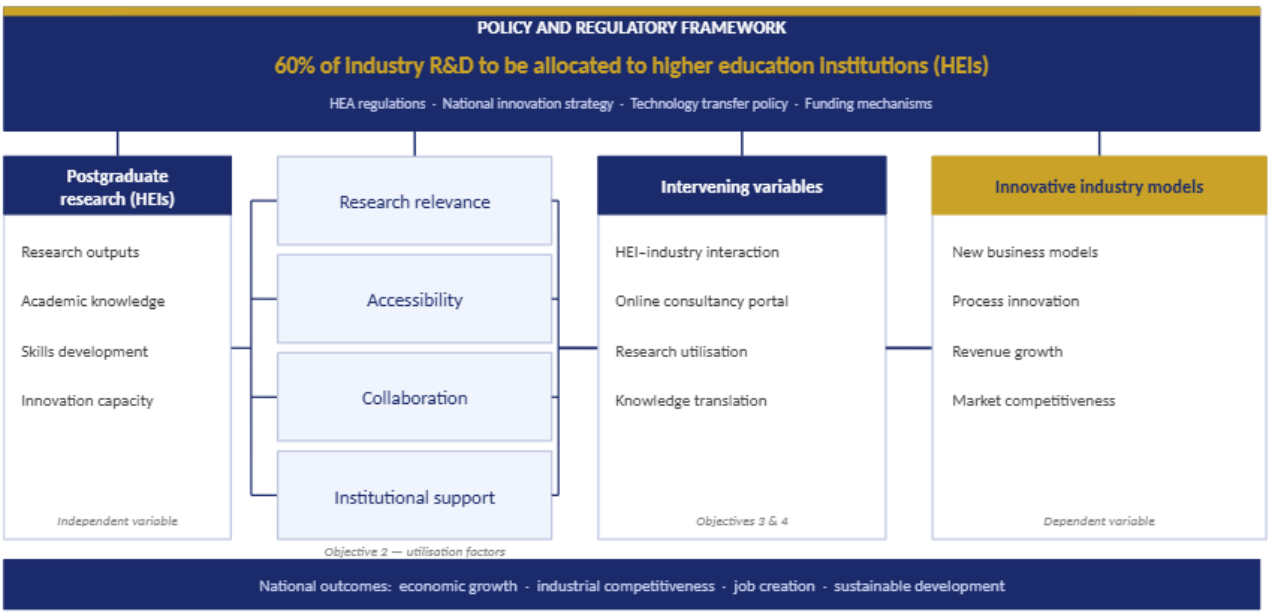
### 5.4.2 Recommendations for Industry

- Industry stakeholders should actively engage with higher education institutions in the co-creation of research by participating in the identification of research problems, supervision of postgraduate students, and evaluation of research outputs. This will improve the relevance and applicability of research.
- Organisations should develop internal mechanisms for integrating academic research into decision-making processes, including partnerships with universities and participation in collaborative research initiatives.

- Industry should support the development and utilisation of digital knowledge platforms by subscribing to and engaging with online consultancy portals that provide access to research-based solutions.
- Firms should also invest in building absorptive capacity by training staff to interpret and apply research findings, thereby enhancing their ability to utilise academic knowledge for innovation.

The successful implementation of these recommendations will require coordinated efforts among higher education institutions, industry stakeholders, and policymakers. By strengthening collaboration, improving accessibility, and introducing supportive policy frameworks, postgraduate research can become a powerful driver of innovation and economic development in Zambia.

# 6.0 Framework for Postgraduate Research Industry integration




Policy box (top) — the research basis line cites three findings that collectively justify the 60% allocation policy: institutional support scored the lowest mean of all constructs (M=3.05), 35.7% of research outputs were not utilised by industry, and 43.3% of industry firms had no MoU with any HEI, all pointing to a structural gap that requires a policy mandate. Factor boxes (Objective 2), each carries its own evidence strip directly beneath the label:

- Research relevance: β=.371, r=.641, p<.001 — the single strongest predictor
- Accessibility: β=.312, M=3.42, plus the 35.7% non-utilisation finding
- Collaboration: β=.238, M=3.21, linked to the 43.3% no-MoU finding
- Institutional support: β=.172, M=3.05 — flagged as the weakest construct

Intervening variables box (Objectives 3 and 4), cites 66.7% stakeholder willingness to subscribe to the portal, supported by $\chi^2$=19.784, p<.001, Cramer's V=.225. Innovative industry models box, cites $R^2$=.475 and Cohen's $f^2$=0.905, showing that the four factors together explain nearly half of all variances in industry innovation outcomes.

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# 7.1 Appendices

## 7.2 Summary of Quantitative responses

| Method | Key Research Question / Variable | Measurement / Focus Area | Summary of Key Responses |
|---|---|---|---|
| **Quantitative** | Research Relevance | Alignment of postgraduate research with industry needs | Recorded the highest mean (M = 3.87), indicating that respondents generally perceive research as moderately relevant to industry needs. Strongest predictor of innovation outcomes. |
| **Quantitative** | Accessibility | Ease of accessing and understanding research outputs | Moderate mean (M = 3.42) suggests that research is somewhat accessible but still constrained by format, visibility, and communication barriers. |
| **Quantitative** | Collaboration | Level of interaction between universities and industry | Mean score (M = 3.21) indicates moderate collaboration, though often informal and inconsistent. |
| **Quantitative** | Institutional Support | Availability of structures supporting research utilisation | Lowest mean (M = 3.05), highlighting weak institutional mechanisms such as absence of innovation hubs and knowledge transfer platforms. |
| **Quantitative** | Industry Innovation | Perceived contribution of research to innovation | Mean (M = 3.58) shows moderate influence, with innovation strongly linked to research relevance and accessibility. |
| **Quantitative** | Research Type vs Utilisation | Applied vs theoretical research uptake | Applied research showed higher utilisation (72.9%) compared to theoretical research (51.3%), indicating preference for practical solutions. |
| **Qualitative** | Utilisation of Research | Extent to which industry uses postgraduate research | Findings reveal limited utilisation, with many respondents indicating they rarely engage with academic research in decision-making. |

| | | | |
|---|---|---|---|
| **Qualitative** | Relevance of Research Topics | Alignment of research with real business challenges | Many respondents reported that research topics are often theoretical and not aligned with industry needs. |
| **Qualitative** | Accessibility of Research | Availability and usability of research outputs | Research is difficult to access and interpret; respondents prefer summaries over lengthy academic documents. |
| **Qualitative** | Nature of Collaboration | Structure and consistency of university–industry engagement | Collaboration is largely informal, project-based, and lacks institutional structure. |
| **Qualitative** | Institutional Support | Role of universities in facilitating engagement | Weak support systems; absence of platforms connecting research to industry stakeholders. |
| **Qualitative** | Preference for Research Type | Type of research most useful to industry | Strong preference for applied, problem-solving research that directly addresses organisational challenges. |
| **Qualitative** | Need for Digital Platforms | Mechanisms to improve research utilisation | Strong support for an online consultancy portal to enhance accessibility, engagement, and knowledge translation. |

## 7.3 Summary of qualitative Reponses

| Method | Key Research Question / Variable | Measurement / Focus Area | Summary of Key Responses |
|---|---|---|---|
| **Quantitative** | Research Relevance | Alignment of postgraduate research with industry needs | Recorded the highest mean (M = 3.87), indicating that respondents generally perceive research as moderately relevant to industry needs. Strongest predictor of innovation outcomes. |
| **Quantitative** | Accessibility | Ease of accessing and understanding research outputs | Moderate mean (M = 3.42) suggests that research is somewhat accessible but still constrained by format, visibility, and communication barriers. |
| **Quantitative** | Collaboration | Level of interaction between universities and industry | Mean score (M = 3.21) indicates moderate collaboration, though often informal and inconsistent. |
| **Quantitative** | Institutional Support | Availability of structures supporting research utilisation | Lowest mean (M = 3.05), highlighting weak institutional mechanisms such as absence of innovation hubs and knowledge transfer platforms. |
| **Quantitative** | Industry Innovation | Perceived contribution of research to innovation | Mean (M = 3.58) shows moderate influence, with innovation strongly linked to research relevance and accessibility. |
| **Quantitative** | Research Type vs Utilisation | Applied vs theoretical research uptake | Applied research showed higher utilisation (72.9%) compared to theoretical research (51.3%), indicating preference for practical solutions. |
| **Qualitative** | Utilisation of Research | Extent to which industry uses postgraduate research | Findings reveal limited utilisation, with many respondents indicating they rarely engage with academic research in decision-making. |
| **Qualitative** | Relevance of Research Topics | Alignment of research with real business challenges | Many respondents reported that research topics are often theoretical and not aligned with industry needs. |
| **Qualitative** | Accessibility of Research | Availability and usability of research outputs | Research is difficult to access and interpret; respondents prefer summaries over lengthy academic documents. |
| **Qualitative** | Nature of Collaboration | Structure and consistency of university–industry engagement | Collaboration is largely informal, project-based, and lacks institutional structure. |
| **Qualitative** | Institutional Support | Role of universities in facilitating engagement | Weak support systems; absence of platforms connecting research to industry stakeholders. |
| **Qualitative** | Preference for Research Type | Type of research most useful to industry | Strong preference for applied, problem-solving research that directly addresses organisational challenges. |
| **Qualitative** | Need for Digital Platforms | Mechanisms to improve research utilisation | Strong support for an online consultancy portal to enhance accessibility, engagement, and knowledge translation. |

### 7.4 Informed consent

