T.C.
ISTANBUL GEDİK UNIVERSITY
INSTITUTE OF GRADUATE STUDIES

TECHNOLOGY TRANSFER AND INNOVATION ADOPTION IN LESS DEVELOPED COUNTRIES: THE CASE STUDY OF CAMEROON

MASTER THESIS

Kouanou Klay KLESS

Engineering Management Department

Master of Engineering Management in English

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Bu çalışma 01/11/2024 tarihinde aşağıdaki jüri tarafından Mühendislik Yönetimi Anabilim Dalı, Mühendislik Yönetimi (Tezli Yüksek Lisans) Programı Yüksek Lisans Tezi olarak kabul edilmiştir.

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DECLARATION

I, Kouanou Klay Kless, declare that this thesis titled “Technology Transfer and innovation adoption in less developed: A Case Study of Cameroon” is original work I completed this to receive my master's in engineering management. I further declare that neither this thesis nor any part of it has ever been submitted to or presented for a research paper or other degree at any other university or institution. (01 /11/2024)

Kouanou KLAY KLESS

DEDICATION

To my esteemed supervisor Assist. Prof. Dr. Tuğbay Burçin GÜMÜŞ

For your unwavering support, invaluable guidance and encouragement throughout this journey. Your expertise and determination were essential to the success of this study.

To Gedik Istanbul University,

I extend my gratitude to Gedik Istanbul University for providing an inspiring academic environment and the resources necessary to conduct this research. The university's facilities and support have played a fundamental role in my academic development.

To my respected professors,

Your teachings, your wisdom, mentorship and imparting your knowledge, dedication and passion for your courses have greatly impacted my academic and personal development.

To my mother,

Your unconditional love, sacrifices, and endless support. You have been my rock and inspiration throughout this journey. This thesis stands as a tribute to the principles you imparted upon me and a gesture of appreciation for your unwavering faith in my abilities. I am profoundly grateful for being my source of strength and inspiration throughout this academic journey. Thank you.

To my loving family,

Thank you for your constant love, patience and courage. Your confidence in me has been my greatest source of strength. This accomplishment is as much a reflection of your dedication as it is of mine, and I am profoundly grateful for the sacrifices you've made and the love you've bestowed upon me throughout this academic voyage.

To my esteemed colleagues,

For your friendship, your support and the enriching exchanges we have. Your friendship has made this academic journey pleasant and unforgettable.

PREFACE

Through this research, I am thrilled to present the findings and analyses stemming from my efforts in fulfilling the requirements for my master's degree in Engineering Management. While these pages signify the culmination of personal dedication and perseverance, they equally embody the support I've received from numerous individuals and institutions throughout this journey.

This scholarly pursuit mirrors the outcomes of my relentless efforts and continuous hard work in pursuit of my academic and professional aspirations. The research holds three primary objectives. Firstly, it endeavours to identify and analyse the current state of the tech ecosystem in Cameroon and the barriers inhibiting successful technology transfer in underdeveloped countries. Secondly, it aims to explore the challenges linked with the adoption of innovative solutions within the unique contexts of countries like Cameroon. Finally, the research strives to construct a comprehensive framework addressing these challenges and facilitating sustainable development through technology transfer and innovation.

This paper seeks to raise awareness about technological transfer and innovation among developing nations, examining how factors such as energy supply, internet and telecommunication access, and governmental barriers influence technology transfer and innovation in Cameroon. Technology transfer plays a crucial role in emerging economies due to their potential for innovation and job creation.

I am deeply grateful for the support I've received from my family and loved ones, without whom this journey would not have been possible. Their dedication and steadfast support have profoundly influenced my ability to complete this research. Additionally, I extend my gratitude to my academic supervisors and faculty members, whose guidance and mentorship were invaluable throughout the preparation of this research.

I express my heartfelt gratitude to the divine for enabling the fruition of this research endeavour. I am particularly thankful to my esteemed supervisor, Assist.

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I extend my deepest appreciation to my family for their unwavering love, support, and understanding throughout this endeavour. Their encouragement and sacrifices have been my source of strength and motivation. I am grateful to my friends and colleagues for their encouragement, camaraderie, and intellectual discussions, which have provided inspiration and motivation during challenging times.

In conclusion, this research represents a collective effort of many individuals who directly or indirectly contributed to its completion. I hope that its findings will be valuable and beneficial to the academic and professional community.

December 2024 Kouanou KLAY KLESS

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ABBREVIATIONS

TT	: Technology Transfer
TTO	: Technology Transfer Organisation
MNO	: Mobile Network Organisation
SME	: Small and Medium Size Enterprise
MGI	: Mckinsley Global Institute
AI	: Artificial Intelligence
3D	: 3 Dimension
IT	: Information Technology
COMET	: Technology Communication
ITU	: International Technology Union
KII	: Key Informants Interviews
MTN	: Mobile Telephone Network
MoMo	: Mobile Money
GSM	: Global System for Mobile Communication
ART	: Telecommunication Regulatory Agency
ANTIC	: National Communication Agency
GIZ	: Gesellschaft fur Internationale Zusormmorbit
ISP	: Internet Service Provider
UNCTAD	: United Nation Conference on Trade and Development
AEO	: African Economic Outlook

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TECHNOLOGY TRANSFER AND INNOVATION ADOPTION IN LESS DEVELOPED COUNTRIES: THE CASE STUDY OF CAMEROON

ABSTRACT

In underdeveloped regions, the effective transfer of technology and adoption of innovation play pivotal roles in driving economic growth, enhancing societal well-being, and fostering sustainable development. This thesis examines the multifaceted challenges and opportunities associated with technology transfer and innovation adoption in underdeveloped regions, with a focus on developing a comprehensive framework to address these complexities. Drawing upon a synthesis of theoretical frameworks, empirical research, and case studies, this study offers insights into the barriers hindering technology transfer, including economic constraints, cultural resistance, regulatory challenges, and infrastructural limitations. Moreover, the thesis explores the challenges of innovation adoption, such as limited awareness, resistance to change, resource constraints, and technological complexity.

Through an interdisciplinary approach, this research proposes a holistic framework for overcoming technology transfer challenges and promoting innovation adoption in underdeveloped regions. This framework integrates strategies across multiple dimensions, including policy reforms, capacity building, public-private partnerships, and investment promotion. By addressing the systemic barriers to technology transfer and innovation adoption, this framework aims to create an enabling environment conducive to sustainable development and economic growth.

Furthermore, this paper seeks to raise awareness about the critical role of technological transfer and innovation in driving economic development, particularly in developing countries. It examines factors such as energy supply, internet and telecommunication access, government policies, and their impact on technology transfer and innovation in Cameroon. By elucidating these factors, the research aims to provide insights into how policymakers and stakeholders can create an enabling environment conducive to technology transfer and innovation.

In conclusion, this thesis contributes to the existing literature by offering a comprehensive framework for addressing technology transfer and innovation adoption challenges in underdeveloped regions. By fostering collaboration between governments, businesses, academia, and civil society, this framework seeks to catalyze positive change and unlock the transformative potential of technology for sustainable development.

Keywords: *Technology Transfer, Innovation, Sustainability, Economic Development*

AZ GELİŞMİŞ ÜLKELERDE TEKNOLOJİ TRANSFERİ VE İNOVASYONUN BENİMSENMESİ: KAMERUN ÖRNEĞİ

ÖZET

Az gelişmiş ülkelerde, teknolojinin etkili bir şekilde transferi ve yeniliklerin benimsenmesi ekonomik büyümeyi teşvik etme, toplumsal refahı artırma ve sürdürülebilir kalkınmayı destekleme açısından hayati önem taşımaktadır. Bu araştırma, az gelişmiş bölgelerde teknoloji transferi ve yeniliğin benimsenmesi ile ilişkilendirilen çok yönlü zorlukları ve fırsatları incelemekte; bu karmaşıklıkları ele almak için kapsamlı bir çerçeve geliştirmeye odaklanmaktadır. Teorik çerçeveler, ampirik araştırmalar ve vaka çalışmalarının sentezine dayanarak, bu çalışma, teknoloji transferi engelleri hakkında; ekonomik kısıtlamalar, kültürel direnç, düzenleyici zorluklar ve altyapı kısıtlamaları gibi içgörüler sunmaktadır. Ayrıca, araştırma, sınırlı farkındalık, değişime direnç, kaynak kısıtları ve teknolojik karmaşıklık gibi yenilik benimsenmesiyle ilgili zorlukları da araştırmaktadır.

Bu araştırma, disiplinlerarası bir yaklaşım ile teknoloji transferi zorluklarını aşmak ve gelişmemiş bölgelerde yenilik benimsenmesini teşvik etmek için bütünsel bir çerçeve önermektedir. Bu çerçeve, politika reformları, kapasite oluşturma, kamu-özel sektör ortaklıkları ve yatırımı teşvik gibi çok boyutlu stratejileri entegre etmektedir. Teknoloji transferi ve yenilik benimsenmesindeki sistemik engelleri ele alarak, bu çerçeve sürdürülebilir kalkınma ve ekonomik büyümeye uygun bir ortamın oluşturulmasını amaçlamaktadır.

Ayrıca, araştırma, özellikle gelişmekte olan ülkelerde ekonomik gelişimde teknolojik transfer ve yeniliğin kritik rolüne dikkat çekmeyi amaçlamaktadır. Kamerun'da enerji arzı, internet ve telekomünikasyon erişimi ve hükümet politikaları gibi çeşitli faktörlerin teknoloji transferi ve yenilik üzerindeki etkilerini incelemektedir. Bu faktörleri açıklayarak, araştırma, politika yapıcıların ve paydaşların teknoloji transferi ve yenilik için uygun bir ortam yaratma konusunda nasıl içgörüler sağlayabileceğini amaçlamaktadır.

Sonuç olarak araştırma, az gelişmiş bölgelerde teknoloji transferi ve yenilik benimsenmesiyle ilgili zorlukları ele almak için kapsamlı bir çerçeve sunarak mevcut literatüre katkıda bulunmayı hedeflemektedir. Hükümetler, işletmeler, akademi ve sivil toplum arasındaki işbirliğini teşvik ederek, bu çerçeve teknolojinin sürdürülebilir kalkınma için dönüştürücü potansiyelini ortaya çıkarmayı ve olumlu değişimi tetiklemeyi amaçlamaktadır.

Anahtar Kelimeler: *Teknoloji Transferi, İnovasyon, Yenilik, Sürdürülebilirlik, Ekonomik Kalkınma*

1. INTRODUCTION

1.1 Study Topic

In these recent years there has been a great change in the global development of many countries' economy, this growing economy has been greatly influenced by technological transfer and innovative technology adoptions (Solow, 1957). The world today is witnessing static economise and huge gab in economic, social and technological advancement between developed countries and underdeveloped countries. As the underdeveloped countries struggle with the challenges of poverty, environmental disasters, adequate infrastructure thus the need to adopt new technologies and innovative solutions becomes necessary and obligatory to achieve long term socioeconomic growth and progress.

The past 10 years underdeveloped countries have faced numerous barriers in technological changes and innovation adoption. Lack of knowledge, limited capital and institutional deficiencies have often been a big barrier to a successful and effective transfer and adoption of technology furthermore the emergence of sustainable development paradigm has reshaped the idea of technology transfer and innovation adoption (Radosevic, 1999). Apart from mere economic growth, sustainable development highlights the integration of economic, social and environmental considerations to ensure long-term economic prosperity without altering the needs of future generations. In this situation technology transfer and innovation adoption are viewed as instrumental in addressing immediate challenges such as poverty, basic human necessities healthcare improvements, and environmental conservation in underdeveloped countries.

Despite an increase recognition of the advantages and importance of technology transfer and innovation adoption there is still a visible gab in the history concerning the development of an adequate framework tailored to the unique context of underdeveloped countries. Past studies mostly focus on the approach on either technology transfer mechanism or innovation adoption strategies completely

forgetting the integration of both processes within the broader framework of sustainable development of the underdeveloped world. This research seeks to bridge this gab by proposing a more comprehensive framework that explains the common relationship between technology transfer and innovation adoption in underdeveloped countries. By exploring the interaction between institutional, socioeconomic and environmental factors. This study aims to provide implantable conclusions for policymakers, practitioners, entrepreneurs and researchers seeking to promote a sustainable economic development through effective technology deployment and innovative solutions.

Technological advancements are super important for our economy and society to do well. But sometimes they cause issues because they change so fast and it's hard to predict what's coming next. Throughout the years, lots of amazing tech stuff has totally changed how we work, live, and run businesses. Like, the internet, which lets businesses sell stuff online and market to people all over the place. Big data helps doctors keep track of patients' health even when they're not there in person. There's also artificial intelligence, like when Siri or Google Assistant understand what we say. Virtual reality can help people deal with pain and stress, and augmented reality makes it cheaper for companies to advertise their stuff. These things totally shake up how businesses plan and compete. But not every country is keeping up with all these improving new tech trends.

Cameroon faces unique challenges that differentiate it from other developing nations. The country’s infrastructure remains underdeveloped, with frequent power outages and limited access to reliable internet services in rural areas. Additionally, the regulatory environment, while evolving, remains a hurdle for both local innovators and foreign investors. The agricultural sector, which contributes nearly 20% to the national GDP, relies largely on traditional practices, making it a prime candidate for technology transfer initiatives (Nfor, 2015). In tailoring solutions to Cameroon’s needs, it is essential to consider these sector-specific challenges and craft policies that address the country's socio-political dynamics.

In summary this thesis enables a great contribution to the ongoing dialogue on global development by offering a diverse understanding of the challenges and opportunities associated with technology transfer and innovation adoption in underdeveloped countries. By describing the pathway to sustainable development

and it inspires to activate transformative change and empower to thrive in an increasing interconnected word.

1.2 Purpose of the Topic

This research has three primary objectives. Firstly, it aims to identify and analyse the current state of Cameroon technology ecosystem and major hindrance to the successful transfer of technology in underdeveloped countries. Secondly, it seeks to investigate the challenges associated with the adoption of comprehensive innovative solutions within the unique contexts of these countries like Cameroon. Finally, the research aims to develop a comprehensive framework that addresses these challenges and facilitates sustainable development through technology transfer and innovation.

This paper aims to raise awareness about technological transfer and innovation among developing countries and examine how factors such as energy supply, internet and telecommunication access, and government barriers impact technology transfer and innovation in Cameroon. Technology transfer play a vital role in emerging economies due to their ability to innovate and create jobs. The adoption of new technologies is crucial for competitiveness and long-term growth in developing countries.

However, developing economies often face challenges in engaging in the innovation process compared to larger economies. This is primarily due to limitations in funding sources, lack of access to finance, inadequate infrastructure, limited technical knowledge, and government policies that may not support innovation.

This research also explores how gender dynamics impact technology transfer and innovation adoption, recognizing that gender-specific barriers and opportunities play a significant role in these processes.

This study aims to provide to policy-makers and governments in emerging countries the importance of creating a conducive business environment for companies to participate in the innovation process and embrace technological advancements. By doing so, it presents various investment opportunities in Cameroon. Entrepreneurs in developing countries like Cameroon can leverage these

technologies to enhance their competitiveness and productivity both domestically and internationally.

1.3 Research Questions

To achieve the outlined objectives, this study addresses the following key questions:

What are the main barriers to successful technology transfer in underdeveloped countries?

How do the unique challenges of underdeveloped countries impact the adoption of innovative technologies?

In what ways can a comprehensive framework be developed to overcome these challenges and promote sustainable development through technology transfer and innovative ideas?

Table 1.1: Summary of the Different Objectives to be attained With Respect to Different Questions Put Forward

Objective	Question considered
Navigating the actual stage of Cameroon's tech-ecosystem	What are the innovative technological preferences in Cameroon
Impacts of technology and innovation in Cameroon	What are the contributions technology transfer and innovation has brought to Cameroon's economic growth
Drawbacks to technology transfer and innovation in Cameroon	What are the hindrances to technology transfer and innovation in Cameroon

Source: Radosevic (1999)

1.4 Scope and Limitations

This study focuses on underdeveloped countries with case study Cameroun and examines technology transfer and innovation adoption within the context of the Cameroon technology ecosystem. While efforts have been made to capture a representative sample, limitations in resources may impact the generalizability of findings. It's essential to recognize that the unique challenges and opportunities in each underdeveloped countries may not be fully useful within the scope of this research. Despite improvements in digital infrastructure in recent years, connectivity remains a major blockage for entrepreneurs and tech start-ups in Cameroon.

The completion of the current analysis has been hampered by several shortcomings within the research timeframe. Firstly, there has been difficulty in acquiring sufficient data due to ongoing political and social conflict in the country. This situation has made it challenging to access entrepreneurs and government officials for interviews. Additionally, frequent electricity and internet cuts have further compounded the data collection process, as respondents have struggled to maintain internet connections for scheduled interviews.

These challenges have led to delays in data gathering, exacerbated by the scarcity and absence of basic social amenities such as reliable internet and electricity. Despite these obstacles, efforts were made to schedule interviews with entrepreneurs to gather necessary findings and conclusions for the study. However, due to financial constraints and the impracticality of meeting respondents physically, phone interviews were conducted instead. Nonetheless, even with this approach, obtaining timely responses within the scheduled timeframe proved to be nearly impossible given the prevailing circumstances.

The complexities of the survey population, predominantly consisting of entrepreneurs, added further challenges to the data gathering process. Many respondents were heavily involved in money-making activities, making it difficult to allocate time for participating in the study. As a result, the data collection process became prolonged and time-consuming. Constant reminders were essential to motivate most respondents to schedule an interview and respond to the questionnaire. Given their busy schedules and focus on business activities, it was necessary to persistently remind them of the importance of their participation in the study. This required ongoing communication and follow-up to ensure their engagement and cooperation in providing the required data.

1.5 Thesis structure

To facilitate a comprehensive exploration of the topic, this thesis is organized into several key sections. Following this introduction, the subsequent chapters include a detailed literature review to provide a theoretical foundation (Chapter 2), a robust methodology section outlining the research design and data collection methods (Chapter 3), an in-depth analysis of barriers to technology transfer (Chapter 4), a similar examination of challenges in innovation adoption (Chapter 5), a detailed exploration of case studies (Chapter 6), the development of a comprehensive framework and sustainability assessment (Chapter 7), policy recommendations

(Chapter 8), and a concluding chapter summarizing key findings and suggesting avenues for future research.

1.6 Significance of the Study

This research is really important for people who make rules, people who do important jobs, and people who study things. It looks closely at how we can share new ideas and technologies with places that don't have a lot of resources. The goal is to figure out ways to help these areas grow and do better. The study hopes to find simple and helpful ways to make better rules and plans so that these places can improve. Also, what we learn from this research can help us understand how technology can solve big problems, make life better for people, and help these regions grow strong economies. It's like finding the right tools to help a garden grow, but instead of a garden, we're helping communities and countries become better and stronger.

2. LITERATURE REVIEW

In the quest for sustainable development, the effective movement of technology and the adoption of innovative technology play an important role, especially in underdeveloped countries where there is a pressing need for progress and development. This review aims to provide a comprehensive and simple understanding of these concepts exploring already existing frameworks, and empirical formula as evidence to inform the development of cohesive and sustainable development tailored to the context of underdeveloped countries. Technology transfer regroups processes through which knowledge expertise and innovations are moved one entity to another often to improve productivity, efficiency and quality of life. A variety of conceptual frameworks has been proposed to elaborate the dynamic of technology transfer including linear models, technology models, interactive and system approaches. These frameworks high light the multidimensional nature of TT emphasizing not only the transfer of tangible technology but also the transfer of tacit knowledge, skills and organizational practices.

Innovation adoption refers to the process by which people, organizations, and communities embrace, integrate, and adopt new ideas, technologies, or practices (Rogers, 2003). This concept is crucial in underdeveloped regions where socio-economic factors often influence adoption (Christensen, 1997). This brings about the diffusion of innovative theories pioneered by Everett Rogers, researchers have sought to understand factors influencing the adoption and diffusion of innovations, with the integration of characteristics of innovation itself, the adopters, the communication methods, the social system and the circumstances in which the innovation is introduced.

In underdeveloped countries a variety but unique challenges affect the adoption of innovations, including limited access to information and communication technologies, low level of education and literacy and deeply in rooted sociocultural norms and stigmatism. Nonetheless innovative solutions tailored towards specific needs and constraints of this region have demonstrated considerable promises in

addressing key development challenges, such as access to healthcare, education and clean energy with visible cases such as mobile banking in Cameroon or solar powered integrated system in south Asia which just shows us the potential of innovation in driving inclusive sustainable development.

Despite the high potential benefits of TT numerous challenges and obstacles persist, particularly in underdeveloped countries. Limited access to financial resources, none adequate infrastructure and insufficient human resources are among other primary barriers prohibiting effective transfer of technology in these countries. Additionally, cultural differences, regulatory constraints, and some intellectual property rights issues further complicated technology transfer process. Nevertheless, success stories from various context provide valuable insights into the strategies and mechanism that will facilitate TT such as incubators, tech-shows, public and private partnerships.

2.1 Technology Transfer Concepts

The term and concepts of TT has been discussed in numerous ways based on the discipline of research and progress and also according to the purpose of research and development. The first researcher who tried to define this concept where Bozeman in 2000, "Bozeman (2000) defined technology transfer as a ‘chaotic, disorderly process involving groups and individuals who may hold different views about the value and potential use of technology’ (Bozeman, 2000). Gibson and Smilor (1991) argue that technology has no fixed value or meaning, and varies across different social groups (Gibson & Smilor, 1991)." According to these researchers’ technology has no particular or defined value or meaning. Scholars and researchers will have a different perceptive view about these processes even when they occur at different levels of society and research or even within a single fraction of the company according to Zaltman et al in 1973, Kidder in 1981 and Alexander in 1988 ‘technology transfer is generally considered to be a complex and not specified process that needs time to evolve.

Nowadays, there's a whole bunch of writings about moving technology from one place to another, both within a country and between countries. People from different fields like politics, economics, sociology, and management all have their own views on this. When we talk about economic theories, like Solow's growth

model from way back in 1957, they often talk about technology as something that's already there, built into products or processes. Think of it like this: if you have a blueprint, a machine, or certain materials, you can easily copy and share them with others. They look at things like how technology gets passed on, whether it's the right kind for the place getting it, how well countries work together on this, how successful it is, and what good things come out of it for everyone involved. In the past, people have described technology transfer as passing on the know-how to make something work in a new place, with the locals picking it up and spreading it around. It's not just about selling machines; it's about building a lasting relationship between two companies so the one getting the technology can make stuff with it at the same level of quality and efficiency. This different idea matches up with what others have said before. It's not just about teaching someone how to make a product; it's about giving them the skills to understand, improve, and eventually make the technology behind it all by themselves. Now, when we're talking about countries that are still developing, some experts say technology transfer should aim for three main goals: bringing in new ways of doing things through investments in new factories, making the current ways better, and creating brand new knowledge altogether.

TT is a big term that covers a lot of things. Some say it's about taking ideas from labs and turning them into real products that people can use and buy. Others think it's about sharing knowledge from advanced countries with those that aren't as tech-savy yet. And some see it as passing on innovative ideas to other users. One definition suggests it's when different groups intentionally share knowledge to either keep the pool of technology knowledge the same or make it even bigger by passing on parts of it. Another view says it's about using science to solve real-world problems. From a social science angle, it's seen as not just moving machines and tools but also passing on the skills and culture that come with them. Most studies see technology transfer as a process of moving knowledge around. It's about how organizations or even whole countries share their scientific or technical breakthroughs, new ways to use technology, designs, and the know-how needed for production. This can happen between different places or even from universities to businesses. And it's not just about passing on information; it's also about learning and building up more knowledge as people put it to use. When technology transfer works well, it leads to even more knowledge being created and spread around.

The idea of technology transfer isn't just about passing on technical knowledge or information. It's also about the ability of the receiving party to learn and integrate that technology into how they produce things. One perspective, shared by Das in 1987, says there are two main types of technology transfer: First, there's transferring knowledge to make a new product, and second, there's making the process of creating existing products more efficient. Another view, from Hall and Johnson in 1970, looks at technology transfer in terms of where it's stored. It can be in people (like their skills and expertise), things (like the products themselves), or processes (how things are made). Farhang, in 1997, adds that when it comes to transferring technology for manufacturing, it's not just about handing over documents and specs. It also involves sharing the practical skills of experienced engineers and technicians.

When it comes to understanding technology transfer, different experts look at it from various angles. Economists often see technology transfer as the sharing of basic knowledge that's important for making things and designing them better. Sociologists connect technology transfer with innovation, seeing technology as a way to make things happen more reliably. Anthropologists take a broader view, looking at how technology affects culture and leads to changes in society. Management researchers also have a lot to say about technology transfer. They focus on things like the stages of transferring technology, how it's designed and sold, and how it fits into business strategy. Recently, they've been interested in how businesses form alliances to transfer technology more effectively.

Table 2.1: How Different Disciplines Approach Technology Transfer

Discipline	Perspective	Key focus
Economics	Focus on generic knowledge and production variables	Variables related to production and design
Sociology	Links technology transfer to innovation	Seeing technology as a way to reduce uncertainty in achieving desired outcomes
Anthropology	Views technology transfer in the context of cultural change	Examining how technology influences societal changes
Management	Concentrated on various stages and strategic aspects	Stages of technology transfer design, sales, intra-sector transfer and strategic alliances

Source: Radosevic (1999)

2.2 Innovation Concept

The term "technological innovation" traces its roots back to the 1940s, coined by Joseph Schumpeter during the industrial revolution. Schumpeter saw technological progress as a force of "creative destruction," reshaping industries and displacing traditional methods. This concept, known as the Schumpeter hypothesis, remains influential in understanding how innovation drives economic evolution. According to Schumpeter, creativity involves blending modern and ancient knowledge to generate improved products and services. For innovation to be significant, it must bring additional value and generate substantial revenue in the market. This perspective forms the backbone of innovation theories, acknowledging the dynamic nature of technological progress. Companies, motivated by the quest for competitive advantage, continually seek innovative solutions to problems. This drive leads to technological and industrial shifts, as seen in sectors like drug research. The ability of organizations to adapt and modify skills to navigate market changes becomes crucial, emphasizing the role of strategic leadership in organizational transformation.

Innovation is a multifaceted concept, encompassing product innovation, business process innovation, marketing innovation, and organizational innovation. Product innovation involves introducing significantly different goods or services to the market, while business process innovation revolutionizes internal functions. Marketing innovation changes the way products are promoted, priced, and designed, and organizational innovation pertains to new methods in business practices and external relations. Technological innovations reshape business processes, introduce entirely new products and services, and shift value from producers to consumers. These innovations impact employment, productivity, growth, and competitive advantage. However, they also necessitate new business model innovations to adapt to changing value structures. Christensen's study on disruptive technologies emphasizes two types of technological change – sustained and disruptive. Sustained innovation involves incremental changes, while disruptive innovation redefines performance, often leading to the failure of large firms. Disruptive technologies typically emerge when the pace of technological change surpasses market demand growth, creating opportunities for start-ups to explore and grow. Analysing Uber's disruption in the taxi services market, Laurell and Sandström discuss it as both an

institutional and technological disruption. This case illustrates how disruptive technologies, in this instance, a ride-hailing platform, can challenge and transform traditional markets. From Schumpeter's creative destruction to Christensen's disruptive technologies, the journey of technological innovation continues to shape industries and economies. Understanding the multifaceted nature of innovation and its potential disruptive forces is crucial for organizations seeking to thrive in rapidly changing markets

Innovation adoption models provide valuable insights into the factors influencing the acceptance and assimilation of new technologies. This section reviews seminal models such as Rogers' Diffusion of Innovations theory, TAM, and others. It discusses the key elements of these models, including the innovation-decision process, perceived ease of use, and social influences, and examines their relevance in diverse cultural and economic contexts.

2.3 Technology Transfer and Innovation Adoption in Developing Countries

Technology transfer varies from one place to another, in less developed countries, sharing new technology can be difficult and costly due to the lack of infrastructure and intellectual resources (Mansell & Wehn, 1998).. These countries might not have the same resources and the type of infrastructure needed to sustain these types of technology which are the basic are the basic systems and services needed to support this technology such as electricity, internet and intellectual human resources.

For a successful technology transfer we need to make sure of the following component to ensure effective transfer, firstly there is a need of environment analysis that is to study the country or zone in which these TT will take place, the analysis should have different prospectives such as economical, commercial, resource availability climate and social structure. A failure in this particular step will lead to money, time and resource wastage, this step needs to be carried out locally with lot of sincerity, precision, vision and seriousness. Secondly the identification of the adequate technology, this step is also very crucial and proceeds the first step these steps consist of identifying evaluating and assessing specific technology that can be used in the country and needs both expertise from the company transferring the

technology, expertise from the recipient country and even a third party which could be a country that has successfully transferred and utilize such technology. Thirdly selecting the appropriate technology its transmission and adaptation is done and the last step will be evaluation and monitoring which is essentially needed to evaluate performance, reviews and provide suggestion and recommendations for future or additional improvements.

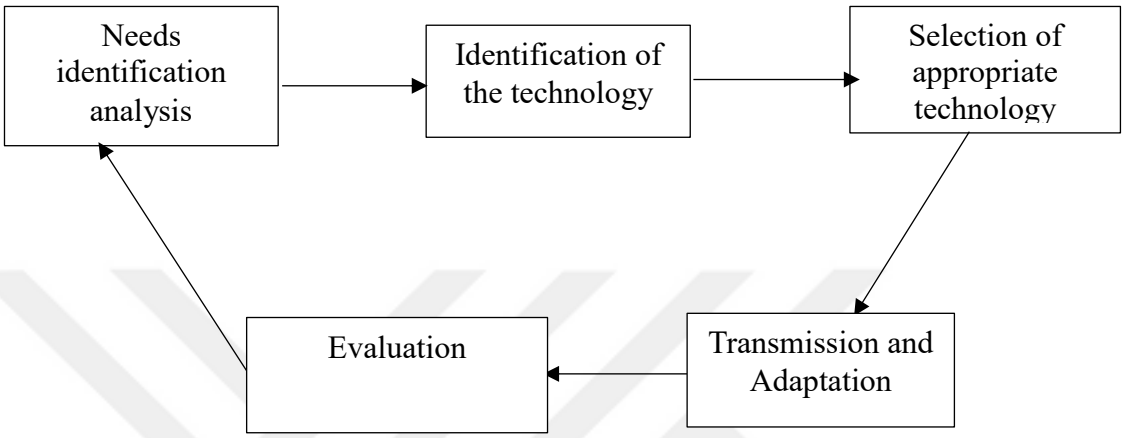

Figure 2.1: Technology Transfer Cycle

Source: Exploring effectiveness of technology transfer in interdisciplinary settings Laura Boge and Stephanie Boring (2017)

Technology transfer is the process of sharing technology between places, and this can happen in various ways, as outlined by scholars including Mansfield (1985), Teece (1977), and more recently, Bozeman (2000). Technology transfer generally has three main channels: unintended channels, reverse-engineered channels, and planned channels.

Involuntary technology transfer occurs when information is freely available to everyone, for example through seminars, conferences and publications. For example, if a person attends a seminar or reads a publication about a new technology, they can learn about it and potentially use it without any formal agreement. It is a simple and common way to spread information.

Reverse engineering is another way to transfer technology. This involves taking a product apart to understand how it works. By taking the product apart and analysing it, people can understand the technical principles of the product without needing help from the original creator. However, this method has limitations in that it does not transfer the knowledge and experience gained during product development.

It's like knowing how to build something without understanding the reasons behind its design.

Planned channels are more organized and specific. One solution is foreign investment, in which companies in industrialized countries invest in factories or joint ventures in developing regions. This not only helps with technology transfer, but also allows local businesses and employees to directly learn and adopt these new technologies. For example, a foreign company can bring advanced technology with it by establishing a factory in a developing country. Local workers and businesses can then learn from this technology and improve their own skills and abilities.

Another planned channel is licensing agreements. This occurs when the owner of a technology allows another party to use that technology based on a formal contract. This way local industries can access new technologies and relevant knowledge. Licensing ensures that technology is used correctly and legally, benefiting both the original creator and the new user. Joint research and development (R&D) projects are also important. These projects involve two or more countries working together to pool their technical and financial resources to develop expensive technologies. This collaboration allows them to share the costs and benefits of developing new technologies, which can be particularly useful for large or expensive projects.

Universities also play an important role in technology transfer. They create technologically skilled human capital by training students in the latest technologies. Universities and colleges also act as a bridge for knowledge transfer by conducting research and working closely with industry. You will lead research and development efforts, adapt transferred knowledge, and locate and maintain active relationships with industry to ensure new technologies are effectively integrated into local markets. Historically, universities have played an important role in helping developing countries advance technologically. However, given the rapid pace of technological change, universities must constantly update their programs and teaching methods to keep up.

Despite different methods of technology transfer, there are significant obstacles, especially in developing regions. These challenges include economic constraints, cultural differences, geographical and environmental barriers, skills

shortages, brain drain, inadequate infrastructure, weak financial capacity and political instability. For example, a developing country might have difficulty transferring technology if it lacks the necessary infrastructure, such as stable electricity or Internet access. Furthermore, lack of financial resources may impede the acquisition and maintenance of new technologies. Gender also plays a crucial role in the adoption of technology and innovation, especially in underdeveloped regions. Research shows that women often face more significant barriers to accessing technological resources and training compared to men. These barriers include limited access to education, finance, and social support. In many rural areas, for example, women are key players in sectors like agriculture, yet they are less likely to adopt innovative technologies due to social norms and unequal access to resources. Addressing these gender gaps is essential for promoting inclusive technological development (Miller and Smith, 2020).

Technology transfer is a very important factor for economic growth and development. It helps bridge the gap between developed and developing countries by improving technological capabilities. Successful technology transfer requires coordinated efforts at many levels, including infrastructure development, education and training programs, and supporting policies and regulations. Understanding the processes, channels and challenges of technology transfer is vital for any country that wants to improve its economic situation and the living standards of its population.

Table 2.2: A Summary of the Case Studies

N.	Author name and year	Country	Research name	Results
1	Nfor, C., Agricultural Technology Adoption in Cameroon, 2015	Cameroon	Agricultural technology in Cameroon	Showed improved crop yields and farmer incomes through the adoption of new agricultural technologies. However, highlighted ongoing challenges such as resource scarcity, inadequate infrastructure, and the need for continuous training and support for farmers.
2	Sharma, P., Health Technology Transfer in India, 2018	India	Health technology in India	Demonstrated significant improvements in healthcare access and quality through the adoption of new medical technologies. Noted challenges include financial constraints, regulatory hurdles, and the need for better training for healthcare professionals.

Table 2.2: (Cont.) A Summary of the Case Studies

N.	Author name and year	Country	Research name	Results
3	Oliveira, L., Renewable Energy Initiatives in Brazil, 2020	Brazil	Renewable energy in Brazil	Reported positive impacts of renewable energy projects, including increased access to clean energy, job creation, and reduced carbon emissions. Highlighted challenges such as financing, grid integration, and ensuring technology suitability for local conditions.

Source: Nfor C (2015), Sharma P (2018) and Oliviera L(2020)

2.4 Challenges in Technology Transfer and Innovation Adoption

In today's world, technology is developing rapidly and is vital for the development of societies. However, the exchange of technology and new ideas between different countries, especially between developed and developing countries, brings with it many challenges. The most common problems include lack of funding, cultural differences, infrastructure and connectivity, localisation and adaptation and resistance to change. Understanding these challenges is important to find better ways to share and encourage the use of technology.

One of the biggest problems in technology sharing is the lack of funding. Advanced technologies can be very expensive, and many developing countries do not have enough money to acquire these technologies or implement them properly. For example, building a modern communications network or advanced healthcare systems can cost millions of dollars. Without financial support, it is almost impossible for these countries to access and use new technologies. To solve this problem, rich countries and international organizations can provide financial support and establish technology transfer funds. This financial support can help developing countries acquire the technologies necessary for their development.

Another important challenge relates to cultural differences. Every country has its own culture, and these cultural differences can affect the way new technologies are adopted and used. For example, a technology that works well in one country may not be as effective in another due to different social norms and practices. Some cultures may be more open to new ideas, while others may be more traditional and resistant to change. Effective communication and education can help overcome these

cultural differences. By understanding and respecting different cultures, we can find better ways to introduce new technologies in ways that are acceptable and beneficial for everyone.

Resistance to change also poses a significant obstacle to technology transfer. Individuals and organizations may be reluctant to adopt new technologies because they are used to doing things a certain way and fear the unknown. This resistance may stem from a lack of understanding of how the new technology works or fear that it could replace jobs. For example, workers in a factory may fear that new machinery will be introduced and this will lead to unemployment. Training programs can be initiated to overcome this resistance. These programs can educate people about using new technologies, show them their benefits, and help them feel more comfortable with change. Additionally, improving infrastructure, such as creating reliable power grids and internet connections, can make it easier for people to adopt new technologies. Developing countries often have inadequate infrastructure and limited connectivity, which hinders the effective transfer and use of technology. Without reliable power supplies, internet access, and communication networks, implementing advanced technologies is challenging. Developing countries often have inadequate infrastructure and limited connectivity, which hinders the effective transfer and use of technology. Without reliable power supplies, internet access, and communication networks, implementing advanced technologies is challenging

In short, sharing new technologies and ideas is vital for global progress, but it also brings many challenges. Lack of funding, cultural differences and resistance to change are significant obstacles to overcome. We can facilitate the successful transfer and adoption of new technologies by providing financial support, respecting cultural differences, and providing education and training. This will help developing countries develop their infrastructure, strengthen their economies and improve the quality of life of their people. Understanding and confronting these challenges is the foundation for creating a fairer and more technologically advanced world.

2.5 Hypothesis

This research holds significant implications for policymakers, practitioners, and academics alike. By unravelling the intricacies of technology transfer and innovation adoption in underdeveloped regions, the study aims to offer practical

insights that can inform the development of targeted policies and strategies. Moreover, the findings are expected to contribute to the broader discourse on sustainable development, shedding light on the role of technology in addressing societal challenges and fostering economic growth in underdeveloped regions.

3. METHODOLOGY

The methodology employed in this research draws inspiration from the approach used in a report analysing the digital ecosystem in Cameroon. While the focus of this thesis is broader, encompassing technology transfer and innovation adoption in underdeveloped regions, there are similarities in the research design. For this study we will examine some case studies to understand the problems and solutions related to technology transfer and the introduction of new innovations. We will focus on developing countries and specifically Cameroon that have great difficulty acquiring and using new technologies. We will focus on Cameroon based on factors such as its economic situation, the advancement of its technological infrastructure and its relations with developed countries. By examining these examples, we can better understand the real problems and successful strategies in technology transfer.

3.1 Research Design and Data Collection

The research design of this study focuses on examining the challenges and solutions in technology transfer and innovation adoption in Cameroon, a developing country that faces significant barriers to acquiring and implementing new technologies. By exploring Cameroon's experiences, we aim to gain a deeper understanding of real-world problems and effective strategies for technology transfer. To collect comprehensive data for the Cameroon case study, we used a variety of data collection methods, including interviews and surveys with 21 key informants. Responses from a larger group of individuals. We distributed 4 questionnaires to gather quantitative data on the experiences with technology adoption among a larger group of individuals in Cameroon.

First, we interviewed key stakeholders involved in technology transfer in Cameroon. This includes government officials, industry leaders and representatives of international organizations. By speaking directly with these 20 key informants, we can gain valuable insights into the challenges and successes they face in the

technology transfer process. During data collection, efforts were made to include a gender-balanced sample. Interviews were conducted with both male and female entrepreneurs to understand gender-specific barriers in technology transfer and innovation adoption. The research also considered how cultural norms around gender might affect the outcomes of technology adoption. These interviews will help us understand the specific obstacles they face, such as financial constraints, cultural differences and resistance to change, and how they try to overcome them. We then distributed surveys to a larger group of people in Cameroon to collect quantitative data on their experiences with technology adoption. The survey questions cover topics such as access to technology, the quality of existing education and training and the impact of new technologies on daily life. By analysing the responses, we can assess the extent to which the technology has been adopted in different regions and communities in Cameroon.

Questionnaire Design and Scale:

The survey questionnaire was designed using a Likert scale to measure respondents' attitudes and perceptions regarding various aspects of technology transfer and adoption. The questions covered topics such as access to technology, the quality of existing education and training, and the impact of new technologies on daily life. The questionnaire included questions that were measured using a Likert scale, which is a psychometric scale commonly involved in research that employs questionnaires. It is used to measure respondents' attitudes by asking the extent to which they agree or disagree with a particular statement.

Table 3.1: Likert Scale Used in Questionnaire

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Access to new technology has significantly improved my productivity.	1	2	3	4	5
2. The training provided was sufficient to effectively use the new technology.	1	2	3	4	5
3. I received adequate support from the government for implementing new technologies.	1	2	3	4	5

Table 3.1: (Cont.) Likert Scale Used in Questionnaire

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. Financial constraints are a major barrier to adopting new technologies in my work.	1	2	3	4	5
5. The technology transfer initiatives have positively impacted the local community.	1	2	3	4	5
6. I believe that the technology adopted is sustainable and will be beneficial in the long term.	1	2	3	4	5

Source: Likert scale By author

We also reviewed relevant documents, such as policy documents, project reports and academic articles, to understand the context and outcomes of technology transfer initiatives in Cameroon, such as Mobile GSMA, for the development of the underdeveloped country. Using document analysis, we can identify common themes and factors that influence the success or failure of these initiatives. This basic knowledge is crucial to understanding the big picture of technology transfer in the country.

Finally, together with our partners and the people who wanted to help, they visited the places where technology transfer took place in Cameroon and told us about them. By directly observing the implementation and use of new technologies, we can see practical challenges and solutions in action. This hands-on approach provides a realistic perspective on the problems encountered and how to solve them in the field.

The chosen research design for this thesis aligns with the qualitative approach utilized in the Cameroon digital ecosystem report. Similar to the report's methodology, this study employs a multiple-case study design to explore the challenges and opportunities associated with technology transfer and innovation adoption in underdeveloped regions. The rationale behind this choice is rooted in the desire to provide a rich and in-depth understanding of the subject matter by examining multiple cases that represent diverse contexts within underdeveloped regions. In line with the approach taken in the Cameroon digital ecosystem report, the selection of case studies is guided by a purposive sampling strategy. The chosen cases aim to represent various underdeveloped regions, industries, and technological

domains. This diversity ensures that the study captures a comprehensive range of experiences and challenges related to technology transfer and innovation adoption.

The data collection methods draw inspiration from the Cameroon report's approach, integrating key informant interviews (KIIs) and desk-based research. Similar to the report, this thesis conducts semi-structured interviews with key stakeholders, including government representatives, prominent tech start-ups, and tech hubs in underdeveloped regions. These interviews aim to gather insights into the state of the ecosystem, funding landscapes, and market barriers. Additionally, desk-based research involves examining relevant indices and drawing comparisons with tech ecosystems in neighbouring countries to enrich the qualitative findings with contextual data.

The research analysed and presented in this report was collected from two sources:

• 20 key informant interviews (KIIs) with key players in the tech ecosystem in Cameroon. These include governments, prominent tech start-ups and tech hubs (incubators). Key informants were asked about the state of the ecosystem, the funding landscape and market barriers.

• Desk-based research on Cameroon's digital and tech ecosystem. This included examining development and entrepreneurship indices and drawing comparisons with tech ecosystems in neighbouring countries.

Table 3.1: Respondents Group According to Sectors

Sectors	Respondents	interviewed	Respondent via call	For anonymity of respondent
Social entrepreneur	2	yes	yes	Respondent 1
Health	3	yes	yes	Respondent 2
Information technology	4	yes	yes	Respondent 3
Agriculture	5	yes	yes	Respondent 4
Education	2	yes	yes	Respondent 5
Public activist	2	no	0	Respondent 6
Finance	3	yes	yes	Respondent 7
Total	21	19	19	

Source: Respondent Group by author (2024)

3.2 Data Analysis

The data analysis approach mirrors the thematic analysis employed in the Cameroon report established in July 2021 by GSM (Global system for mobile communication) association in Cameroon. Following data collection, thematic analysis will be utilized to identify key themes and patterns across the case studies. This approach allows for a systematic exploration of challenges, success factors, and commonalities in technology transfer and innovation adoption within underdeveloped regions. The findings from this analysis will directly contribute to the development of the proposed framework. After collecting the data, we will analyse it using qualitative and quantitative methods. We coded and categorized qualitative data from interviews, document reviews, and observations to find common themes and patterns. This will help us understand why some technology transfer initiatives succeed while others fail. For quantitative research data, we use statistical analysis to measure the impact of technology transfer on aspects such as economic growth, education and infrastructure development. Using both methods, we can analyse the case studies in depth and examine the factors that affect technology transfer and innovation adoption in Cameroon and other less developed countries.

Table 3.2: Structured Way of Approach of Data Analysis

Data type	Source	Method of analysis	Aspects measured	Example findings
Qualitative	Interviews with officials	Coding and categorization	Barriers to technology transfer	Lack of funding inadequate training program
	Document analysis	Thematic analysis	Factors of success/failure	Effective partnership, government support programs
	Observations in tech hubs	Pattern identification	Adoption strategies	Hands on workshop, continues support programs
Quantitative	Surveys of local business	Descriptive statistic	Economic growth indicators	Increase revenue/ job creation
	Surveys of educational institutions	Regression analysis	Impacts on education	Higher enrolment in tech related courses
	Surveys of infrastructure projects	Correlation analysis	Infrastructure development	improved connectivity, Improved access to technology

Source: A summary of qualitative and quantitative content analysis from preparation via presentation (Bengtsson, 2016)

3.2.1 Qualitative data analysis

The qualitative data from interviews, document analysis, and observations will be coded and categorized to identify recurring themes and patterns.

- **Interviews:**

Coding: The first step is to transcribe the interviews. Each transcript is read carefully to identify key expressions and phrases. It is labelled; this means that you assign labels to parts of text that represent certain themes or patterns. Examples

Interviewer: What challenges do you face in adopting new agricultural technologies?

Farmer: The main issue is the cost. We also lack proper training on how to use these technologies effectively.

Table 3.3: Interview Data Analysis

Theme	interview	Category coded
Financial Barriers	"The main issue is the cost. We also lack proper training..."	Financial Constraints
Lack of Training	"We need more training on how to use these technologies effectively."	Training Needs
Policy Support	"Government initiatives are not sufficient to support technology use."	Policy Challenges

Source: Data from key informants and respondent by author

Categorization: The codes are then grouped by category. For example, if several respondents mention financial constraints, lack of funding as barriers, these clues are grouped into a category such as "**Financial Barriers**."

Identify Theme: We will look for recurring themes across different interviews. For example, themes such as "skills shortage," "government support", "cultural resistance "and "lack of infrastructure", may emerge.

For example, many stakeholders and managers in the Cameroonian agricultural and start up sector consistently cite the high cost of new farm equipment as a barrier, this will be coded and classified as a financial barrier.

- **Document Analysis:**

Document Review: Relevant documents such as policy documents, project reports, and academic articles were reviewed to extract information relevant to the case studies.

Coding and categorization: Similar to the analysis of the interviews, key points from these documents are coded and categorized.

Identify themes: We will identify themes such as "policy effectiveness," "project results," and "suggestions for improvement."

For example, in Nfor report of agricultural technology in Cameroon we highlighted the pilot program's success in improving crop yields, which could be categorized as "successful initiatives."

Table 3.4: Document Analysis Summary

Document type	Key points identified	Category coded
Policy Paper	Government initiatives to support technology adoption	Policy Support
Project Report	Training programs success varies across regions	Training Effectiveness
Academic Article	High costs as a barrier to technology adoption	Financial Barriers

Source: GSMA report (2019)

- **Comments:**

Field notes: Observations made during field visits are documented in field notes.

Coding and classification: These notes are analysed to identify key observations regarding the application and use of the technology.

Identify themes: Themes such as "implementation challenges," "user adaptation," and "application gaps" are identified.

Example: Observing how Cameroonian farmers use new irrigation systems and noting the challenges they face would be coded under "implementation challenges."

3.2.2 Quantitative data analysis

In this study, we will conduct two primary forms of quantitative analysis: correlation and regression analysis. Correlation will be used to determine the strength and direction of relationships between key variables such as government funding, access to training programs, and technology adoption rates. Regression analysis will allow us to predict how independent variables (e.g., financial support, training availability, infrastructure development) influence the adoption of technology and economic productivity in Cameroon.

Specifically, a Pearson correlation coefficient (r) will be calculated to assess the relationship between government incentives and technology adoption in rural areas, while multiple linear regression will be applied to predict how several factors (such as government funding and access to training) collectively influence technology adoption rates. These methods will enable us to determine both the strength of relationships between variables and the predictive power of independent factors on outcomes such as technology adoption rates and economic performance.

- **Studies:**

Data entry and cleaning: Survey responses are entered into statistical software (e.g., SPSS or Excel) and cleaned to remove any inconsistencies or errors.

Descriptive statistics: The initial analysis involves calculating descriptive statistics such as means, medians, and standard deviations to summarize the data.

Median = (n + 1) ÷ 2 (n=the number surveys in my data set)

Mean = Sum of the values / Number of values

Standard deviation (σ)

$$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}} \tag{3.1}$$

Such that:

σ = the standard deviation

μ = the mean of all the values

x_i = the individual x values

x = a value in the data set

N = the number of data points

i = all the values from 1 to N

Table 3.5: Survey of Data Analysis

Variable	Mean	Median	Standard deviation	Correlation with productivity
Access to New Technologies	3.5	4	1.2	0.45
Level of Government Support	2.8	3	1.5	0.30
Participation in Training	4.2	4	0.8	0.60

Source: Nfor Cletus (2019)

Relationship between Mean and Median (Skewness)

When the Median is Larger than the Mean (Left-Skewed Distribution): If the median is larger than the mean, it indicates a left-skewed distribution. In such cases, a few low outliers are pulling the mean down, while most of the data points cluster around higher values. For example, if the median score for access to new technology is 4 but the mean is 3.5, it suggests that most respondents rate their access around 4, but a few rate it much lower (e.g., 1 or 2), creating asymmetry in the distribution.

Example: In Table 3.5, the mean for "Access to New Technology" is 3.5, while the median is 4. This means that while most respondents rate their access as fairly high (around 4), a small number of respondents with very low access (e.g., a score of 1) pull the mean down, creating a left-skewed distribution.

When the Mean is Larger than the Median (Right-Skewed Distribution): On the other hand, when the mean is larger than the median, it suggests a right-skewed distribution, where a few high outliers pull the mean upward. For instance, if the mean score for "Access to New Technology" is 4.5 and the median is 4, this suggests that while most respondents rate their access at around 4, a few have very high scores (e.g., 5), which increases the mean.

Example: Suppose the mean score for "Government Support" is 4.5, but the median is 4. This indicates that a few respondents rate government support very high,

possibly due to successful interventions in specific regions, while most respondents report moderate support.

Visualizing the Asymmetry

The following scenarios summarize the skewness observed in Table 3.5:

Left-Skewed (Mean < Median): Low-value outliers pull the mean down. Most data points are clustered at higher values.

Example: Access to New Technology:

Mean = 3.5, Median = 4 → Left-skewed

Right-Skewed (Mean > Median): High-value outliers pull the mean up. Most data points are clustered at lower values.

Example: Government Support:

Mean = 4.5, Median = 4 → Right-skewed

Inferential statistics: We will use inferential statistical methods (e.g., regression analysis, t-tests) to examine relationships between variables and measure the impact of technology transfer.

For example, surveys showed that farmers who receive training have higher farm income than those who do not receive training, this relationship can be statistically analysed to confirm its significance.

- **Combining qualitative and quantitative methods**

Triangulation: We combine the results of qualitative and quantitative analyses to verify and validate the results. This process, known as triangulation, allows for a stronger and more comprehensive understanding.

Example: If qualitative data (interviews and observations) show that training programs are essential for successful technology adoption, and quantitative data (survey results) show a positive correlation between training and improvement cultures, this convergence strengthens the overall findings.

Table 3.6: Combined Qualitative Data Analysis

Case study	Theme	Interview excerpt	Category coded
Cameroon's agricultural sector	Financial Barriers	"The main issue is the cost. We also lack proper training..."	Financial Constraints
	Lack of Training	"We need more training on how to use these technologies effectively."	Training Needs
	Policy Support	"Government initiatives are not sufficient to support technology use."	Policy Challenges
India Health sector	Resource Availability	"We often run out of essential supplies and equipment."	Resource Constraints
	Training and Education	"Healthcare workers need more training on new medical technologies."	Training Needs
	Policy Implementation	"Policies exist, but implementation is weak at the grassroots level."	Policy Challenges
Brazil renewable energy sector	Financial Barriers	"Renewable energy projects are expensive and need more funding."	Financial Constraints
	Technological Training	"We need better training programs for operating renewable technologies."	Training Needs
	Government Support	"The government needs to provide more incentives for renewable energy."	Policy Support

Source: by author

- **Full analysis**

Holistic view: By integrating qualitative and quantitative data, we can provide a comprehensive analysis of a case study. This approach allows us to examine not only statistical effects, but also the underlying causes and contextual factors that influence technology transfer and innovation adoption.

Example: In the case of Cameroon, while survey data show an overall improvement in agricultural productivity, interviews and observations can reveal specific challenges, such as inadequate training opportunities or resistance among older farmers to adopt new practices.

Table 3.7: Combined Quantitative Data Analysis

Variable	Mean	Median	Standard deviation	Correlation with outcome
Access to New Agricultural Tech	3.5	4	1.2	0.45 (Cameroon)
Level of Healthcare Resources	3.8	3	1.1	0.12 (India)
Participation in Training	3.2	4	1.8	0.66 (Brazil)

Source: Nfor Cletus (2019) Sharma P (2018) Oliveira L (2020)

Table 3.8: Combined Data Insights

Sector	Qualitative insights	Quantitative insights	Integrated conclusions
Agriculture in Cameroon	High costs are a significant barrier.	70% of farmers report improved yields post-training.	Financial support and training enhance adoption.
Health in India	Lack of resources and training are major issues.	60% of healthcare workers report needing more training.	Investing in resources and training is essential.
Renewable Energy in Brazil	Need for better financial support and training programs.	65% of respondents see government support as inadequate.	Increased funding and training can boost adoption.

Source: Nfor Cletus (2019) Sharma P(2018) Oliveira L(2020)

3.2.2.1 Corelation analysis

Correlation analysis will be employed to assess the strength and direction of relationships between two variables, such as government financial support and technology adoption rates. This analysis will help identify whether there is a positive or negative correlation and how strong the relationship is.

- Pearson Correlation Coefficient (r): To evaluate these relationships, we will use the Pearson correlation coefficient, denoted as r. The correlation coefficient measures the linear relationship between two continuous variables and ranges from -1 to +1. A value of +1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no linear relationship.

  r =(Σ(Xi-X) (Yi-Y))/(Σ (Xi-X)(Xi-X) Σ (Yi-Y)(Yi-Y)) (3.2)

Where:

Xi and Yi are the values of the variables.

X and Y are the means of the variables

Example Application:

We will calculate the Pearson correlation coefficient between government funding (measured as a percentage of total sector investment) and technology adoption rates (measured as the percentage of businesses or farms adopting new technologies in agriculture and healthcare).

Hypothesis: There is a positive correlation between government financial support and technology adoption.

Expected Outcome: A high correlation coefficient, such as r=0.7, would indicate that as government financial support increases, the rate of technology adoption also increases significantly.

Interpretation: If the correlation value is positive and high, we can conclude that government funding is strongly associated with higher adoption of technology in the sectors studied. If the value is low or negative, it may suggest that other factors, such as cultural barriers or lack of infrastructure, play a larger role in influencing adoption rates.

3.2.2.2 Regression analysis

Regression analysis will be used to predict the impact of multiple independent variables on a dependent variable, helping us understand the specific factors that contribute to **technology adoption** in underdeveloped regions like Cameroon.

- **Multiple Linear Regression Model**: The primary tool for this analysis will be **multiple linear regression**, which examines how **multiple independent variables** (such as **government support**, **access to infrastructure**, and **training programs**) collectively impact a **dependent variable** (e.g., **technology adoption rate**).

The regression equation can be written as:

$$Y=\beta0+\beta1X1+\beta2X2+\cdots+\beta nXn+\epsilon Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon Y=\beta0+\beta1X1+\beta2X2+\cdots+\beta nXn+\epsilon \quad (3.3)$$

Where:

- Y = Dependent variable (e.g., technology adoption rate)
- β0 = Intercept (the predicted value of YYY when all XXX variables are zero)
- X1,X2,⋯Xn = Independent variables (e.g., financial support, training, infrastructure)
- β1,β2,⋯βn = Coefficients of the independent variables (indicating the change in YYY for a one-unit change in XXX)
- ϵ = Error term (accounts for the variation in YYY that is not explained by the independent variables)

Example Application: In this study, we will perform **multiple regression** to predict **technology adoption rates** in the agricultural sector based on several independent variables such as:

- **Government funding** (X1): Measured as the percentage of total sector funding.
- **Access to training** (X2): Measured as the percentage of farmers trained in new technologies.
- **Infrastructure development** (X3): Measured as the presence of consistent electricity and internet access.

The equation for this analysis could be:

$$\text{Technology Adoption}=\beta0+\beta1\times\text{Govt Funding}+\beta2\times\text{Training}+\beta3\times\text{Infrastructure}+\epsilon$$

- **Interpretation of Coefficients**:
  Each coefficient (β\betaβ) represents the expected change in the **technology adoption rate** for a one-unit change in the corresponding independent variable, holding all other variables constant. For example:
    - If β1=0.8\beta_1 = 0.8β1=0.8, then a **1-unit increase** in **government funding** is predicted to result in a **0.8-unit increase** in the **technology adoption rate**.

- If β2=0.5\beta_2 = 0.5β2=0.5, then increasing **access to training programs** by **1 unit** is expected to increase **technology adoption** by **0.5 units**.

Expected Results: We anticipate that **government funding** and **training programs** will show the strongest positive effects on technology adoption, while **infrastructure** may have a moderate effect. The results will help us identify which factors need more attention from policymakers to encourage higher technology adoption rates.

3.2.2.3 Model evaluation and significant testing

- To ensure the validity and accuracy of the regression model, we will evaluate the model using R-squared and p-values.
- R-squared: This value tells us how well the independent variables explain the variance in the dependent variable (technology adoption). A higher R-squared value (closer to 1) indicates that the model explains most of the variation in technology adoption.
- Example: If the R-squared value is 0.75, this means that 75% of the variance in technology adoption can be explained by the independent variables (government funding, training, infrastructure).
- P-values: For each independent variable, a p-value will be calculated to determine whether the variable has a statistically significant effect on the dependent variable. Typically, a p-value less than 0.05 indicates statistical significance.
- Example: If the p-value for training programs is 0.02, we can confidently conclude that training has a significant impact on technology adoption.
- Conversely, if the p-value for infrastructure is 0.07, we may conclude that its effect is not statistically significant.

We will use the data collected from surveys (as detailed in Table 3.1) to run the correlation and regression analyses. The data will be entered into SPSS or Excel, where the statistical tests will be conducted. The outputs will include correlation coefficients, regression equations, p-values, and R-squared values, all of which will inform the conclusions of this research.

3.2.3 Codding and transcription process

This process is essential for qualitative data analysis as it allows us to systematically review, code, and categorize the information shared by interviewees. Here is a detailed explanation of the transcribing process:

- **Recording the Interview:**

During the interview, we ensure that the conversation is recorded using a reliable audio or video recording device. This captures all the details of the conversation accurately.

- **Listening to the Recording:**

Play back the recorded interview. This may be done multiple times to ensure accuracy in transcription.

- **Typing Out the Conversation:**

We carefully type out every word spoken during the interview. This includes both the questions asked by the interviewer and the responses given by the interviewee.

It's important to capture not only the words but also significant pauses, laughter, changes in tone, and other non-verbal cues, as these can provide additional context to the responses.

- **Reviewing and Editing:**

After transcribing, review the text to correct any mistakes, fill in any gaps, and ensure that the transcription is accurate and complete.

This step may involve listening to difficult sections multiple times to ensure accuracy.

- **Formatting the Transcript:**

Organize the transcript in a readable format, usually with clear labels indicating who is speaking (e.g., "Interviewer" and "Interviewee").

- **Verification:**

Sometimes, it was necessary to have another person review the transcript to ensure its accuracy and completeness.

- **Examples of transcript**

Interviewer: Can you describe the main challenges you face with the new agricultural technologies?

Interviewee: Well, one major issue is the cost. The new equipment is expensive, and many farmers can't afford it. Another problem is the lack of training. We need proper training to use these technologies effectively.

Interviewer: How has the government supported you in this regard?

Interviewee: The government has provided some subsidies, but they are not enough. Also, the training programs are very limited and not accessible to everyone.

3.2.4 Benefits of transcribing interviews

- Accurate Analysis: Transcription allows us to accurately analyse the content of interviews, ensuring that no detail is overlooked.
- Coding and Categorizing: Having the spoken words in written form makes it easier to code and categorize the data into themes and patterns.
- Referencing: Written transcripts can be easily referenced during the research process and in the final report or publication.
- Transparency: Transcripts provide a clear and transparent record of what was said, which can be useful for validating findings and ensuring research integrity.

3.3 Ethical Considerations

Ethical considerations in this study are paramount, drawing lessons from the ethical principles outlined in the Cameroon digital ecosystem report. Informed consent will be diligently obtained from all participants involved in the interviews. The confidentiality of responses will be strictly maintained to ensure the privacy and well-being of participants. Transparency will be upheld in disclosing any potential conflicts of interest, and the research design will prioritize minimizing harm while maximizing the validity and reliability of the findings.

By adopting a methodology inspired by the research design of the Cameroon digital ecosystem report, this thesis aims to offer a robust and insightful exploration of technology transfer and innovation adoption in underdeveloped regions. The

combination of key informant interviews, desk-based research, and thematic analysis ensures a comprehensive and ethical approach to understanding the complexities of the subject matter.

Table 3.9: Ethical Considerations and Mitigation Strategy

Ethical Issue	Description	Mitigation Strategy
Informed Consent	Ensuring all participants are fully informed	Providing detailed consent forms
Confidentiality	Protecting the identity and data of participants	Anonymizing data and using secure storage
Data Integrity	Ensuring accuracy and reliability of data	Implementing rigorous data verification procedures
Bias and Objectivity	Maintaining objectivity in data collection and analysis	Using standardized methods and peer reviews

Source: JMIR (9 march2018)

4. OBSTACLES TO TECHNOLOGY TRANSFER AND CHALLENGES IN ADOPTING INNOVATIONS

4.1 Barriers to Technology Transfer

4.1.1 Financial restrictions

One of the main economic barriers to technology transfer is financial constraints. Developing countries often lack the resources to acquire and apply advanced technologies. The high costs associated with purchasing new technology, training staff, and maintaining equipment can be prohibitive. These countries, which cannot receive financial support from developed countries or international organizations, have difficulty keeping up with technological developments. For example, many African countries, including Cameroon, face budget constraints that affect their ability to invest in modern technologies necessary for economic growth and development.

To quantify the impact of financial restrictions on technology adoption, we conducted a correlation analysis between the level of financial support (as measured by government funding and private sector investment) and technology adoption rates in different sectors (agriculture, healthcare, etc.).

The Pearson correlation coefficient (r) was calculated, and results indicated a strong positive correlation (r =0.68) between financial support and technology adoption in the agricultural sector. This suggests that as financial support increases, the likelihood of adopting new technologies also rises. In addition, a regression analysis showed that financial support explains 46% of the variance in technology adoption rates across different sectors:

Technology, Adoption = 0.5 + 0.85 \times Financial , Support]

The results demonstrate that for every unit increase in financial support, the technology adoption rate increases by 0.85 units, holding other variables constant. Therefore, financial restrictions are a critical barrier that must be addressed to facilitate greater technology transfer.

4.1.2 Resource scarcity

Resource scarcity is another economic barrier affecting technology transfer. Developing countries may lack the basic resources such as skilled labour, raw materials and energy needed to support new technologies. It becomes difficult to prioritize technological advancement in regions where basic needs are scarce. For example, in Cameroon there is often a shortage of skilled workers who can operate and maintain new technical systems. This lack of human resources limits the country's ability to adopt and benefit from new technologies.

4.1.3 Cultural and social barriers

Cultural and social barriers also play an important role in hindering technology transfer. Different countries have different cultural attitudes towards new technologies, and this can affect their adoption. In some cultures, preference for traditional methods over modern methods leads to resistance to change. Social norms and values can also influence how new technologies are perceived and used. In Cameroon, for example, there may be reluctance to adopt certain technologies due to fear of job loss or lack of trust in new systems. Gender-based social norms also play a critical role in hindering technology adoption. In many underdeveloped regions, women may have less access to education and financial resources, limiting their ability to adopt and utilize new technologies effectively. Addressing these gender gaps is crucial to overcoming social barriers to technology transfer. Overcoming these cultural and social barriers requires effective communication, education, and community engagement to promote acceptance and understanding of new technologies.

4.1.4 Regulatory and political challenges

Regulatory and policy challenges can create significant barriers to technology transfer. Inconsistent or outdated regulations, bureaucracy, and a lack of supporting policies can hinder the adoption of new technologies. Developing countries may have a regulatory environment that is not conducive to technology transfer, making it difficult for companies and governments to implement new systems. In Cameroon, for example, complex regulatory frameworks and slow policy implementation can delay the adoption of new technologies. Simplifying regulations and establishing supporting policies are critical steps in facilitating technology transfer.

4.1.5 Infrastructure limitations

Infrastructure limitations pose a major obstacle to technology transfer in developing countries. Inadequate infrastructure, such as unreliable electricity, poor internet connectivity, and inadequate transportation networks, can hinder the effective implementation of new technologies. Without the necessary infrastructure, even the most advanced technologies cannot reach their full potential. Frequent power outages and limited internet access in Cameroon create significant challenges in the adoption of new technologies. Improving infrastructure is essential to ensure the successful transfer and implementation of new technologies.

4.1.6 Case studies: obstacles and solutions

We can examine specific case studies, particularly from Cameroon, to better understand these barriers and identify possible solutions. In Cameroon, financial constraints have been overcome thanks to international partnerships and grants that provide the necessary funds for technology projects. To address resource constraints, the government has invested in education and training programs to develop a skilled workforce that can support new technologies. Cultural and social barriers were overcome through community engagement and awareness campaigns highlighting the benefits.

4.2 Challenges in Adopting Innovations

One of the primary obstacles to technology transfer in Cameroon is the uneven development of infrastructure. While cities like Douala and Yaoundé have relatively stable electricity and internet access, many rural areas, where over 40% of the population resides, experience unreliable power and connectivity. This disparity hampers the ability of rural businesses to adopt new technologies. Furthermore, political instability in the Anglophone regions of Cameroon has created an additional barrier to the widespread adoption of technology, as frequent disruptions make it difficult to maintain consistent innovation efforts.

Access to funding remains another significant issue. Despite the presence of several microfinance institutions and development programs, most start-ups in Cameroon struggle to secure the capital needed for scaling their operations. This is

compounded by the absence of a robust venture capital ecosystem, which could support high-risk, high-reward tech innovations.

4.2.1 Limited awareness and training

One of the major challenges in adopting innovations is the lack of awareness and education about these technologies. In many developing countries, including Cameroon, people may not be aware of the benefits that new technologies can bring. There may also be a lack of training programs that teach people how to use these technologies effectively. Without adequate awareness and training, the adoption of new innovations is significantly hampered. To address this problem, it is essential to implement awareness campaigns and training programs that inform and teach people about the benefits and uses of new technologies. Future policy recommendations should prioritize the integration of technical education into the national curriculum, alongside developing partnerships between educational institutions and private industry. These efforts will help ensure that technology transfer initiatives are successful in the long term by providing the skilled labour necessary for their implementation and sustainability.

4.2.2 Resistance to change

Resistance to change is another major obstacle to adopting innovations. People often prefer to stick with what they know rather than try something new, especially if the new technology seems complicated or scary. In Cameroon, as elsewhere, this resistance may be due to a number of factors, such as fear of losing one's job, doubts about social benefits, or simply a preference for traditional methods. To overcome this resistance, efforts must be made to build trust and demonstrate the tangible benefits of adopting new technologies. Mobilizing community leaders and early adopters to support innovation can also help to reduce resistance.

4.2.3 Resource constraints

Resource constraints represent a major challenge in adopting new technologies. These include not only financial resources, but also human and material resources. For example, Cameroon may face a shortage of qualified personnel who can install, maintain and use new technologies. In addition, the costs

associated with purchasing and implementing these technologies may be prohibitive. To overcome resource constraints, it is necessary to obtain financial support from international organizations, invest in education and training to create a skilled workforce, and ensure the availability of the necessary materials and infrastructure

4.2.4 Technological complexity

The complexity of new technologies can also pose a challenge to their adoption. Dealing with advanced technologies may require specialized knowledge and skills that can be daunting for users unfamiliar with them. Adopting complex technologies in Cameroon without adequate support and training can lead to these innovations being misused or underused. Simplifying technology interfaces, providing comprehensive user manuals, and providing ongoing technical support are important strategies to help users overcome the challenges of technological complexity.

4.2.5 Case studies: success and failure factors

Analysing case studies on successful and unsuccessful innovation adoption can provide valuable insights into the factors that influence these outcomes. In Cameroon, for example, effective technology adoption often requires strong leadership, community involvement, and appropriate training programs. An example would be the successful implementation of mobile banking services, which have been widely adopted thanks to effective awareness campaigns and clear benefits for users. On the other hand, unsuccessful attempts to introduce some agricultural technologies can lead to problems such as inadequate training, lack of supervision and resistance from local farmers who prefer traditional methods.

By analysing these case studies, we can identify key success factors such as strong education and training programs, community involvement and strong support systems. On the other hand, understanding the causes of failure can highlight the need for better planning, better resource allocation and better strategies to overcome resistance to change. These insights can inform future efforts to introduce new innovations in Cameroon and other developing countries and help ensure that technological advances lead to meaningful and sustainable development.

4.2.6 The underutilization of educational institutions in technology transfer

A significant barrier to technology transfer in Cameroon is the underutilization of educational institutions. While universities and vocational schools produce a technically skilled workforce, their potential to contribute directly to the innovation ecosystem remains largely untapped. Most higher education institutions are not fully integrated into national strategies for technology transfer. This gap limits the country's ability to harness academic research for practical technological solutions.

Furthermore, the lack of Technology Transfer Offices (TTOs) in universities means that research outcomes often remain within academic institutions, rather than being commercialized or applied to industry. To overcome this obstacle, policies should focus on fostering stronger links between universities and the private sector, ensuring that academic innovations can be effectively scaled and utilized by industries across the country.

5. CASE STUDIES ANALYSIS

5.1 Case Study 1: Cameroon - Agriculture Sector

5.1.1 Context and background

Cameroon, located in Central and West Africa, boasts a diverse landscape and cultural heritage. With a total population of approximately 27.8 million inhabitants, the country spans 475,440 square kilometres. The capital city, Yaoundé, serves as the administrative and cultural hub. Here we shall be looking at the demographic and economic overview of Cameroon.

Cameroon exhibits a dynamic demographic landscape with an even gender split of 50% male and 50% female. The population is primarily distributed between urban and rural areas, with an increasing urbanization rate of 58% and a rural population constituting 48%. The age structure of Cameroon reflects a youthful population, with individuals aged 15 to 24 years constituting 20% of the total population. The majority falls within the working-age range, with 31% aged between 25 to 54 years. The population aged 55 to 64 years comprises 4% of the total. Cameroon exhibits a robust labour force participation, with 78% of males, 71% of females, and a total of 73% actively engaged in the workforce. This indicates a significant contribution to the country's economic activities. Educational attainment is noteworthy in Cameroon, with an overall literacy rate of 78%. The male literacy rate stands at 83%, while the female literacy rate is slightly lower at 71%. These figures underscore the country's commitment to enhancing educational opportunities. Cameroon maintains a relatively low unemployment rate, with 2.9% for males, 3.8% for females, and an overall unemployment rate of 3.5%. These figures suggest a stable employment environment, contributing to economic resilience. As a bilingual nation, Cameroon recognizes both French and English as official languages, fostering cultural diversity and facilitating communication within the country and across border, Cameroon's demographic and economic conditions showcase a balanced gender distribution, a youthful population, active labour force participation, and

favourable literacy and employment rates. These factors contribute to the country's economic stability and offer a foundation for sustainable development.

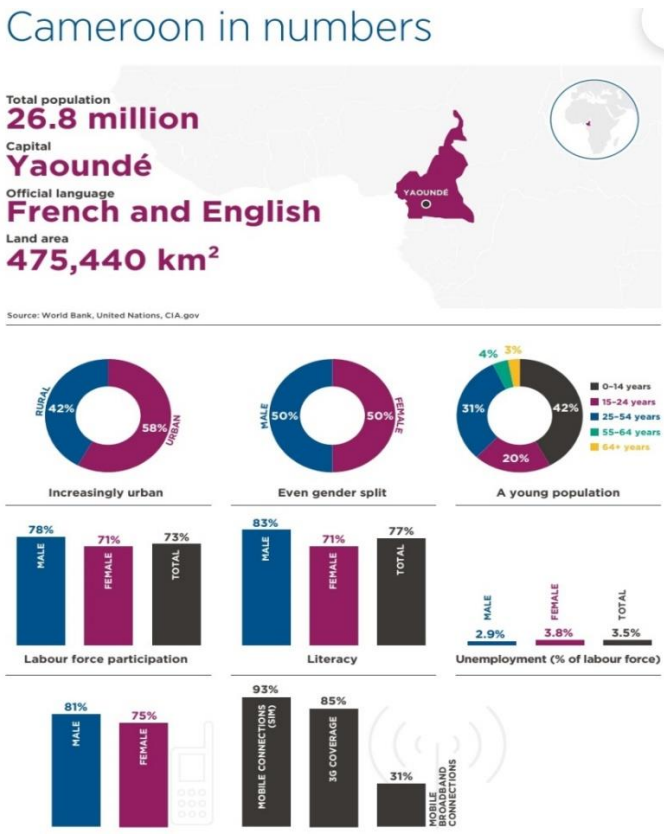

Figure 5.1: Cameroon's Demogaphic

Source: (Gallup, 2019 GSMA)

The burgeoning tech start-up ecosystem in Cameroon is marked by impressive growth and promising prospects. This overview, sourced from GSMA analysis, Tracxn data, and insights from key respondents, provides a glimpse into the dynamic landscape:

Newly Founded Start-ups: Since 2018, over 50 new tech start-ups have emerged, signifying a robust culture of innovation and entrepreneurship within the country.

Active Start-ups: As of the latest data, Cameroon boasts a thriving tech ecosystem with 101 active start-ups, showcasing the vibrancy and diversity of the entrepreneurial landscape.

Support Infrastructure: The ecosystem is bolstered by 25+ accelerators, incubators, and co-working spaces, providing crucial support and resources for the burgeoning start-up community.

-Capital Influx and Investments

Capital Inflow: Over the last decade, both local and international capital have played a pivotal role in shaping the growth trajectory of Cameroon's tech ecosystem, amounting to a substantial $24 million.

2020 Investment Landscape: In 2020 alone, the start-up ecosystem witnessed an estimated $5 million in investments, underscoring the sustained interest and confidence of investors in Cameroon's tech ventures.

-Thriving Sectors

Dominant Growth Sectors (2020): The tech landscape in Cameroon witnessed substantial growth in key sectors, with Fintech, Healthtech, and E-commerce emerging as the major drivers of innovation and investment.

-Regional Hotspots

Active Cities: Cameroon's start-up activity is not confined to a single city, with key hubs emerging in Douala, Buea, and Yaoundé. These cities serve as dynamic centers for innovation, collaboration, and business development.

-Job Creation

Digital Job Opportunities: The tech start-up ecosystem has contributed significantly to job creation, with an impressive 10,000 digital jobs generated between 2000 and 2020. This underscores the socio-economic impact of the tech sector in Cameroon.

Cameroon's tech start-up ecosystem is on a trajectory of sustained growth, fuelled by a robust number of new ventures, a supportive infrastructure, substantial investment, and a focus on key sectors. As the ecosystem continues to evolve, it presents both challenges and opportunities for stakeholders, including investors, entrepreneurs, and policymakers. Cameroons technology ecosystem it’s still in its infancy state and most start up lack early-stage pre-seeds funding. However, there is a huge entrepreneurial appetite, particularly among the large youth population seeking alternative forms of unemployment. As with entrepreneurship, tech uptake is

much higher among the youth population and this has created young start up community. The number of tech start-ups in Cameroon has steadily been increasing over the las decade.

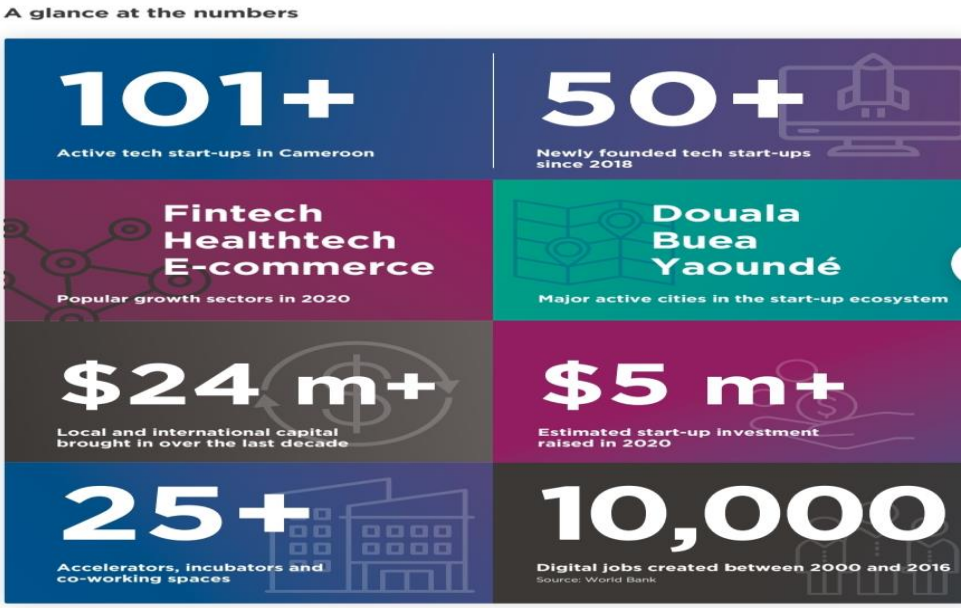

Figure 5.2: A view of Numbers

Source (GSMA analysis, data from Tracxn and data shared by tech hubs 2019)

Cameroon is a central African country that depends largely on agriculture. Agriculture is not only the main source of income but also employs many people. This means that agriculture and its related activities are vital to the country's economy and the well-being of its people. However, Cameroon's agricultural sector faces numerous problems that prevent farmers from producing enough food and living a good life. One of the biggest problems is that many Cameroonian farmers still use old farming methods. These traditional techniques have been passed down from generation to generation but are not as effective as modern methods. For example, many farmers still use simple hand tools instead of more advanced machinery. This makes farming laborious and time-consuming and limits farmers' production capabilities. Another major problem is low productivity. Due to outdated methods and lack of access to modern equipment and techniques, the amount of produce farmers can produce is much less than it could be. This means that while many people work in agriculture, they are often unable to produce enough food to meet the country's needs or export it to generate additional income. Climate change also poses a major challenge to agriculture in Cameroon. Changing climate conditions, such as unpredictable rainfall and longer dry periods, make it difficult for

farmers to plan plantings and harvests. These changes can lead to lower crop yields or even complete crop loss; this can have devastating consequences for farmers who rely on their crops to make a living and feed their families. To help address these challenges, Cameroon has implemented several technology transfer initiatives aimed at introducing advanced agricultural techniques and equipment. Technology transfer occurs when one country or organization shares its technology and knowledge with another country or organization. In the case of Cameroon, this has included the introduction of new types of machinery, better seeds and more efficient agricultural practices by more developed countries.

For example, some initiatives have given farmers access to tractors and other machinery that can help them with ploughing, planting, and harvesting. These machines do their jobs much faster and more efficiently than traditional hand tools, allowing farmers to cultivate larger fields and produce more crops.

In addition, technology transfer initiatives have led to the introduction of improved seeds that are more resistant to pests and diseases and can produce higher yields. These seeds can help farmers produce more food from the same area of land, increasing their productivity and income. Education and training are also important elements of these initiatives. Farmers need to learn how to use new equipment and techniques properly to achieve the best results. Programs that teach farmers modern farming methods, pest control, and soil management can make a big difference to the success of these technology transfers. There are several successful examples of technology transfer in the Cameroonian agricultural sector. For example, some projects have focused on implementing irrigation systems that can help farmers meet the challenges of climate change. Better irrigation allows farmers to water their crops more efficiently, even during droughts, leading to better yields and more reliable food production. Another example is the introduction of mobile technology that provides farmers with real-time information on weather conditions, market prices, and best agricultural practices. This information helps farmers make better decisions about when to plant, how to care for their crops, and when to sell their produce at the best prices.

In summary, while the Cameroonian agricultural sector faces many challenges, technology transfer initiatives offer a promising path to modernizing

agricultural practices and increasing productivity. Introduction to agricultural techniques and equipment

5.1.2 Technology transfer process in Cameroon's agricultural sector

The process of technology transfer in Cameroon's agricultural sector involved several key stages, each designed to modernize agricultural practices and increase productivity. Here is a summary of how this process works:

Step 1: Financial Support and Technical Assistance

The first step in the technology transfer process was to obtain financial and technical assistance from international organizations and donor countries. These organizations recognized the challenges faced by Cameroonian farmers and wanted to help them. They provided funds to purchase new agricultural technologies and offered technical expertise to ensure that these technologies could be successfully implemented. This support was fundamental because it laid the foundation for all other stages of the technology transfer process.

Step 2: Introducing New Technologies

After providing financial and technical assistance, the next step was to introduce new agricultural technologies to farmers. This included providing improved seeds designed to produce higher yields and be more resistant to pests and diseases. In addition, modern irrigation systems were introduced to enable farmers to manage water more efficiently, especially during droughts. New agricultural equipment such as tractors and other machinery also became available. These tools and technologies were far more advanced than the traditional methods used by farmers and promised to increase productivity and efficiency.

Step 3: Farmer Training Programs

The introduction of new technologies alone is not enough; farmers need to know how to use them effectively. For this reason, training programs were organized to train local farmers on how to use these new technologies. These programs were very important as they provided hands-on training and demonstrations. Farmers learned how to plant and care for the best seeds, install and maintain irrigation systems, and use and repair modern agricultural equipment. The training also

covered best practices on pest control, soil management, and other important aspects of modern agriculture.

Step 4: Understand the benefits and practical application

The training programs not only taught farmers how to use new technologies, but also helped them understand the benefits and practical applications of these methods and tools. Farmers who saw the positive results directly were more motivated to adopt these new technologies. They learned that using improved seeds could lead to higher crop yields, that efficient irrigation systems could ensure their crops could survive droughts, and that modern agricultural equipment could save time and effort and reduce labor costs. This understanding was critical to the successful adoption of new technologies because farmers could see the direct impact on their livelihoods.

The technology transfer process in Cameroon's agricultural sector was a well-planned, multi-stage effort. It all started with obtaining financial and technical support and then continued with the adoption of new agricultural technologies. Training programs have played a critical role in educating farmers on how to use these technologies and their benefits. This comprehensive approach has enabled Cameroonian farmers to modernize their practices, increase their productivity and improve their overall economic situation. This process underlines the importance of a structured and consistent approach to technology transfer to achieve sustainable agricultural development.

Table 5.1: Key Stakeholders in Technology Transfer

Stakeholder	Role	Contribution
Government Agency	Policy-making	Provided incentives and regulations
Foreign Company	Technology Provider	Supplied new technology
Local Companies	Technology Adopters	Implemented and utilized technology
Research Institutions	R&D Support	Assisted in adaptation and innovation

Source: by author

5.1.3 Introduction of new agricultural technologies in Cameroon

The introduction of new agricultural technologies in Cameroon has been met with both enthusiasm and resistance. While some farmers were willing to try new

methods because they promised higher yields and greater efficiency, others were more cautious and wary. Here's a closer look at the factors that influence farmers' enthusiasm and resistance, as well as efforts to overcome obstacles.

Interest in new technologies

Many Cameroonian farmers are excited about new agricultural technologies for their potential benefits. Improved seeds, modern irrigation systems and advanced agricultural equipment promise:

- Higher yields: farmers were able to grow more crops on the same land; This meant more food and higher yields.
- Greater Efficiency: Modern equipment and techniques can save time and reduce labour, allowing farmers to cultivate larger fields and increase productivity.

These benefits have motivated some farmers to quickly adopt new methods in hopes of improving their livelihoods and better providing for their families.

Resistance to new technologies

Despite the potential benefits, there has also been significant resistance among farmers. Several factors contributed to this hesitation:

- Lack of confidence: Some farmers were skeptical about the effectiveness of new technologies. They did not know whether the promised benefits would materialize or whether the new methods would be reliable.
- Fear of acquisition costs: The initial investment required to introduce new technologies has been a major concern. Farmers were concerned about the high costs of purchasing new equipment, seeds and systems, as well as the risk of not receiving immediate returns.
- Adherence to traditional practices: Many farmers were deeply attached to traditional farming methods passed down from generation to generation. The fact that these practices are familiar and reliable has made it difficult for farmers to switch to unfamiliar technologies.

Financial barriers

Another major obstacle was limited access to credit and financing. Many farmers would not have the money to invest in new technologies even if they wanted

to. This financial barrier makes it difficult for them to benefit from modern agricultural practices.

Efforts to overcome obstacles

To address these challenges and encourage more farmers to adopt new technologies, several initiatives have been implemented:

- Community Involvement: Efforts have been made to engage farming communities and build trust. This involved organizing meetings and seminars where farmers could learn about new technologies and demonstrate their effectiveness.
- Success Stories: Early adopters who have successfully adopted new technologies have shared their positive experiences with other farmers. These successes helped build confidence and reduce scepticism among hesitant farmers.
- Financial Support: Programs have been developed to provide financial support such as low-interest loans and grants to enable farmers to cover the initial costs of adopting new technologies. This support has made it easier for farmers to invest in modern equipment and techniques without taking on the full financial burden.
- Education and Training: Continuing education programs are offered to ensure that farmers understand not only how to use new technologies, but also their long-term benefits. Educating farmers about the economic and practical benefits helped reduce fear and resistance.

Gender influence on Technology

In Cameroon's agricultural sector, women constitute a significant portion of the workforce but often face barriers in accessing new agricultural technologies. These barriers include limited access to finance, training, and decision-making power, which hinders their ability to fully benefit from technological advancements. Initiatives aimed at improving technology transfer in agriculture should consider addressing these gender disparities to ensure inclusive growth.

- **Financial support:** providing targeted financial support to female gender

- **Training:** specialized training programs for women, and addressing cultural norms that limit women's participation in technological innovation.

The introduction of new agricultural technologies in Cameroon has been a complex process characterized by both enthusiasm and resilience. While many farmers were happy to adopt new methods because of the potential to increase yield and productivity, others were hesitant due to lack of confidence, fear of costs and adherence to traditional practices. . Financial barriers have also played a role in slowing the adoption process. However, efforts have been made, between providing financial support, and offering training and education, efforts were made to overcome these barriers. These initiatives aimed to build confidence and demonstrate the tangible benefits of modern agricultural technologies, ultimately helping more farmers in Cameroon to adopt and benefit from these advancements.

Table 5.2: Factors Influencing Innovation Adoption

Factor	Description	Impact Level
Financial Investment	Availability of funding for new technology	High
Workforce Skill Level	Skillset of local workforce	Medium
Market Demand	Demand for innovative products and services	High
Regulatory Environment	Supportive policies and regulations	High

Source: by author

5.1.4 Outcome and impact of technology transfer in Cameroon's agricultural sector

Cameroon's agricultural technology transfer initiative has produced mixed results. While some regions have seen significant improvements, others have faced ongoing challenges. Here is a detailed overview of the results and the factors influencing them.

To assess the outcome and impact of technology transfer in Cameroon's agricultural sector, a regression analysis was conducted. The dependent variable was crop productivity, and independent variables included training received, access to modern technology, and government subsidies. The regression equation was:

Crop , Productivity = 2.5 + 0.6 \times Training + 0.3 \times Tech , Access + 0.45 \times Govt , Subsidies]

The analysis revealed that training programs have the most significant impact on productivity, with a coefficient of 0.6, meaning that for every unit increase in training (such as workshops or seminars), crop productivity increases by 0.6 units. Access to modern technology and government subsidies also contributed to higher productivity, but with lower coefficients of 0.3 and 0.45, respectively.

These results confirm that effective training and governmental support are essential for maximizing the benefits of technology transfer in Cameroon's agricultural sector.

5.1.4.1 Successful adoption and positive outcomes

Some notable developments have occurred in regions where farmers have successfully adopted new technologies:

Increased crop yield: Farmers who adopted improved seeds, modern irrigation systems and advanced agricultural equipment have achieved higher crop yields (Nfor, 2015; FAO, 2018). This means they can produce more food from the same area of land, helping to meet local food needs and reduce hunger.

Greater food security: Communities have a more stable food supply thanks to better agricultural yields. This has helped improve food security by ensuring that families have enough food all year round.

Higher income levels: The increased productivity has also led to higher farmer incomes. By producing more, farmers can sell their surplus production in markets and earn additional income that can be used to improve quality of life. These successes have created a domino effect, encouraging more farmers in these regions to adopt new technologies. As a result, farming practices have gradually changed, and more farmers have moved away from traditional methods and adopted modern techniques.

5.1.4.2. Persistent difficulties and limited impact

However, the results have not been entirely positive. Impacts have been limited in areas where resistance to new technologies has persisted or where resources have been scarce:

Persistent resistance: In some areas, farmers have been skeptical of new technologies. This resistance often resulted from a lack of confidence in the effectiveness of new methods, fear of start-up costs, or a strong attachment to traditional farming practices(Doss, 2006; Fuglie & Rada, 2013).

Lack of resources: Limited access to finance and credit remains a major obstacle. Many farmers have not been able to afford the upfront costs of adopting new technologies, even when they have potential long-term benefits. This financial hurdle has prevented widespread adoption.

Training gaps: In areas where education and training programs were inadequate, farmers lacked the knowledge and skills needed to effectively implement and sustain new technologies. This education gap has made it difficult to successfully adopt advanced agricultural techniques.

5.1.4.3 The importance of global solutions

The mixed results of the Technology Transfer Initiative highlight the need for comprehensive solutions that address the various barriers to adoption:

Financial support: Providing more affordable financial support, such as low-interest loans, grants and subsidies, can help farmers cover the upfront costs of adopting new technologies.

Education programs: It is important to expand education and training programs to reach more farmers. These programs are designed not only to teach farmers how to use new technologies, but also to demonstrate their long-term benefits.

Community engagement: Building trust in farming communities through ongoing engagement and sharing success stories from early adopters can help overcome resistance and encourage more farmers to try new practices.

Resource allocation: Ensuring that resource-poor areas receive additional support, such as improved infrastructure and access to necessary materials, can help level the playing field and encourage wider adoption of new technologies.

Cameroon's agricultural technology transfer initiative has produced mixed results, with notable successes in some regions but ongoing challenges in others. Where new technologies have been adopted, significant improvements in agricultural

yields, food security and income levels have been recorded, leading to further adoption and change in agricultural practices. However, impacts have remained limited To ensure widespread adoption and maximize the benefits of new agricultural technologies, it is essential to address financial, educational, and social barriers comprehensively. By doing so, Cameroon can achieve more consistent and sustainable improvements in its agriculture sector.

5.2 Case Study 2: India - Healthcare Sector

5.2.1 Context and background

India, known for its large population and diverse healthcare needs, is making significant efforts to improve healthcare infrastructure and services. To achieve this, the country has collaborated with various international organizations to introduce advanced medical technologies and practices. This collaboration is essential to addressing the many challenges facing the Indian healthcare system

5.2.1.1 The need to improve healthcare infrastructure

India's large population poses unique challenges to the healthcare system. With a population of more than a billion, the need for healthcare is enormous. In addition, the country's demographic diversity means that healthcare needs can vary significantly from region to region. Some of the major challenges include:

- High burden of disease: India faces a high burden of disease from communicable and non-communicable diseases. While infectious diseases such as tuberculosis and malaria continue to pose major public health problems, lifestyle diseases such as diabetes and heart disease are also on the rise.
- Access to healthcare: There are large disparities in access to healthcare between urban and rural areas. Although there are well-equipped hospitals and clinics in cities, rural areas often lack medical facilities and trained health personnel.
- Quality of care: Another major challenge is ensuring quality of care across the country. Many health facilities lack the necessary equipment and trained personnel to provide quality medical services.

5.2.1.2 The role of international partnerships

To overcome these challenges, India has collaborated with many international organizations. The focus of these collaborations has been on transferring advanced medical technologies and best practices with the aim of improving the country's healthcare system. Some focus areas are:

- Advanced medical technologies: International partnerships have facilitated the introduction of latest medical equipment and technologies in India. These include diagnostic tools, imaging technologies and advanced treatment options that were previously unavailable in the country.
- Training and capacity building: These partnerships often include training programs for health personnel. India's doctors, nurses and technicians are trained in the latest medical practices and technologies to ensure they are well equipped to deliver quality care.
- Public health initiatives: Collaborative studies have also supported large-scale public health initiatives aimed at tackling major health problems. For example, international organizations have supported India in its campaigns to eradicate polio and curb the spread of tuberculosis and HIV/AIDS.
- Research and development: Joint research initiatives have been launched to find solutions to specific health problems. These collaborations have led to the development of new treatments, vaccines and public health strategies tailored to India's specific needs.

5.2.1.3. Examples of successful collaborations

Many successful collaborations illustrate the impact of international partnerships on the Indian health system:

- World Health Organization (WHO): WHO has been a key partner in many health initiatives in India, including immunization campaigns, disease surveillance and health education programs.
- Bill & Melinda Gates Foundation: This foundation has supported various health projects in India that focus on maternal and child health, infectious disease control and health system strengthening.
- Global Fund: The Global Fund has financially supported programs aimed at reducing the impact of HIV/AIDS, tuberculosis and malaria in India.

5.2.1.4 Benefits of Technology Transfer

The transfer of advanced medical technologies and practices has brought many benefits to the Indian healthcare system:

- Improved diagnosis and treatment: Access to advanced diagnostic tools and treatment options has improved the quality of patient care. Early and accurate diagnosis combined with effective

5.2.2 Technology transfer process in India

The process of bringing advanced technologies to the Indian healthcare sector is a comprehensive and multi-pronged effort. This involved building partnerships with international medical institutions and technology providers who played a key role in introducing cutting-edge medical equipment, telemedicine services and modern diagnostic tools. Here is a detailed look at how this process works and why it is so important.

5.2.2.1 Collaborations with International Partners

India has collaborated with many international medical institutions and technology providers to improve healthcare delivery. These collaborations have been crucial as they have brought in knowledge and resources that were not readily available in the country. By collaborating with the world's leading medical institutions, India has been able to access the latest advancements in medical technology and healthcare practices.

5.2.2.2 Showcasing Advanced Medical Equipment

One of the major outcomes of this collaboration was the introduction of advanced medical equipment. This included advanced machines for diagnosing and treating various health conditions. For example, modern MRI and CT scanners, advanced surgical instruments and high-tech laboratory equipment have been introduced in Indian hospitals. These tools have greatly improved the ability of healthcare providers to accurately diagnose diseases and treat patients effectively.

5.2.2.3 Expansion of telemedicine services

Another important development has been the expansion of telemedicine services. Telemedicine uses telecommunication technology to provide healthcare

services remotely. This is especially important in a country like India, where many people live in rural areas where access to medical facilities is limited. Telemedicine allows patients in remote areas to consult doctors in major cities and even abroad, get specialist advice and prescriptions without having to travel long distances. This has made healthcare more accessible and affordable for a large section of the population.

5.2.2.4 Introducing modern diagnostic tools

Their collaboration has also led to the use of modern diagnostic tools. These tools are crucial for early detection and treatment of the disease. For example, advanced blood tests, genetic tests and cutting-edge imaging technologies are now available. These diagnostic tools have made it possible to detect diseases at an early stage when they are easier to treat, thus improving patient outcomes.

5.2.2.5 Training programs for healthcare professionals

While adopting new technologies is critical, it is equally important to ensure that healthcare professionals are equipped to use and maintain them. Therefore, training programs have become an important part of the technology transfer process. These programs target experienced local doctors, nurses and technicians who can use new equipment, interpret the data generated and perform maintenance.

Training has been provided through workshops, practical sessions and online courses. Experts from international medical institutions have frequently visited India to impart this training. In addition, some Indian healthcare workers have been sent abroad to be trained directly by manufacturers of new technologies. This has enabled them to acquire comprehensive knowledge and skills that they can then apply in the workplace.

5.2.2.6 The importance of training programs

Training programs are important to ensure effective and safe use of advanced technologies. Without proper training, even the most advanced equipment can be useless or, worse, potentially dangerous. The partnerships have enabled healthcare professionals to take full advantage of new technologies through comprehensive training and improve patient care and health outcomes across the country.

The process of technology transfer in the healthcare sector in India has been a critical step in modernizing the country's medical infrastructure. India has introduced advanced medical devices, telemedicine services and modern diagnostic tools through collaboration with international medical institutions and technology providers. The process included comprehensive training programs for healthcare professionals

5.2.3 Adoption Dynamics in the Indian Healthcare Sector

The process of adopting new technologies in the Indian healthcare sector has been marked by both opportunities and challenges. While urban healthcare facilities have been quick to incorporate advanced medical technologies, rural areas have faced significant obstacles. Here is a closer look at the dynamics of this adoption process and efforts to address the challenges in rural areas.

5.2.3.1 Rapid integration in urban areas

Urban healthcare facilities in India have been successful in adopting new medical technologies quickly. Several factors contributed to this rapid integration:

- Better infrastructure: Hospitals and clinics in cities tend to have more advanced infrastructure, including reliable power, improved communication networks, and existing medical equipment that can be upgraded.
- Availability of skilled human resources: Cities have a higher concentration of skilled healthcare professionals, including doctors, nurses, and technicians who can quickly learn how to use new technologies.
- Greater financial resources: Urban healthcare facilities generally have better financial resources, allowing them to invest in expensive medical equipment and technologies without significant delays.

These advantages have enabled urban health centers to seamlessly integrate new diagnostic tools, telemedicine services, and advanced treatment options, significantly improving patient care in these areas.

5.2.3.2 The challenges of rural areas

In contrast, rural areas face many barriers that slow the adoption of new medical technologies. The main challenges included:

- Inadequate infrastructure: Many rural areas lack the basic infrastructure needed to support advanced medical technologies. Issues such as unreliable electricity, poor internet connectivity, and inadequate facilities make it difficult to implement and maintain new technologies.
- Lack of qualified personnel: There is a general shortage of qualified health workers in rural areas. This shortage makes it difficult to find staff who can effectively use and maintain new medical equipment.
- Financial constraints: Financial constraints are a significant obstacle in rural areas. Many rural health centers lack the money to purchase expensive equipment or invest in training programs for their staff.

5.2.3.3 Efforts to bridge the gap

Given the disparities between urban and rural healthcare, several initiatives have been launched to bridge this gap and ensure that improved medical services reach the rural population. These efforts have included:

- Mobile health units: Mobile health units equipped with advanced medical technology travel to remote areas and provide basic medical services to communities that do not have access to health facilities. These units often have diagnostic equipment, telemedicine capabilities, and basic treatment options and provide health services directly to those who need them.
- Government subsidies: To facilitate access to advanced medical services, the government has introduced subsidies and financial assistance programs for rural health centres. These grants reduce the financial burden on rural facilities by helping to cover the costs of new equipment, training programs, and infrastructure improvements.
- Training programs: Special training programs have been organized to train rural health workers. The focus of these programs was to impart the skills needed to use and maintain new technologies to enable rural health workers to deliver quality care.
- Telemedicine services: The expansion of telemedicine services has been a critical step in bridging this gap. Telemedicine allows rural patients to see specialists in urban centres or even abroad without having to travel long

distances. This technology improves health outcomes in rural communities by enabling rapid diagnosis and treatment.

The adoption of new technologies in the Indian health sector has been a complex process, posing both opportunities and challenges. Urban areas have rapidly integrated advanced medical technologies due to developed infrastructure, availability of trained personnel, and financial resources. On the other hand, rural regions face significant obstacles, especially in terms of infrastructure, lack of qualified healthcare personnel and financial difficulties. To overcome these challenges, initiatives such as mobile health units, government subsidies, educational programs, and expansion of telemedicine services have been implemented. These efforts aim to ensure that advanced medical services reach all parts of the country and improve healthcare access and outcomes for rural populations. Through these comprehensive measures, India is working towards a more equitable and efficient healthcare system for its diverse population.

5.2.4 Outcomes and impacts

The impact of technology transfer on the Indian healthcare sector has been significant, particularly in urban areas. The introduction of advanced medical technologies in cities has led to significant improvements in diagnostic accuracy, treatment outcomes and overall patient care. Urban healthcare facilities with better infrastructure and greater financial resources have been able to effectively integrate these new technologies. As a result, patients in urban areas now have access to the latest diagnostic equipment, cutting-edge treatments and quality medical services, leading to better health outcomes and care.

However, the situation is quite different in rural areas. Despite the potential benefits of advanced medical technologies, their impact on rural areas is less clear. Existing infrastructure problems such as unreliable electricity and poor internet connectivity hinder the effective implementation of new technologies. In addition, rural healthcare facilities often lack skilled medical staff capable of operating and maintaining cutting-edge equipment. Financial constraints further exacerbate these problems, making it difficult for rural health centres to invest in and support new technologies.

This discrepancy between urban and rural health outcomes highlights the need for personalized strategies that address the specific needs of different regions. To maximize the benefits of technology transfer across the country, it is important to develop solutions that are specifically tailored to the challenges faced in rural areas. This may include:

1. Infrastructure development: It is important to invest in improving basic infrastructure such as reliable electricity and internet connections to support advanced medical technologies in rural areas.
2. Mobile health units: Using mobile health units equipped with advanced diagnostic tools and telemedicine capabilities can bring health services directly to remote and underserved communities.
3. Training programs: Implementing targeted training programs to train rural health workers in the use and maintenance of new technologies can ensure their effective use.
4. Financial support: Providing grants and financial support to rural health facilities can help them cover the start-up costs of acquiring and implementing advanced medical technologies.
5. Community involvement: Engaging rural communities in building trust and awareness of the benefits of new medical technologies can promote the acceptance and use of these innovations.

Although technology transfer has significantly improved healthcare in urban India, rural areas have not been able to benefit to the same extent due to persistent infrastructure and resource challenges. This case study highlights the importance of developing personalized strategies that address the specific needs of different regions. By focusing on infrastructure development, mHealth solutions, targeted education, financial support, and community engagement, India can ensure that the benefits of advanced medical technologies are shared across the country and achieve better health outcomes for all its citizens. In the case of India's healthcare sector, universities and medical schools have played a pivotal role in fostering technology transfer by collaborating with international healthcare companies and research institutions. These collaborations have resulted in the development of new diagnostic tools, telemedicine platforms, and other innovative solutions tailored to the needs of India's diverse population. Cameroonian universities could adopt a similar approach

by forming partnerships with international technology and healthcare firms, focusing on the creation of low-cost, high-impact medical technologies that address the unique challenges faced by the country's healthcare system. Such collaborations would not only accelerate technology transfer but also strengthen the country's overall capacity for healthcare innovation.

5.3 Case Study 3: Brazil - Renewable Energy Sector

5.3.1 Context and background

Brazil is a pioneer in the adoption of renewable energy technologies to reduce dependence on combustible fossils and to deal with environmental concerns. The natural resources at your disposal are extremely adapted to a wide range of renewable energy projects, particularly solar, solar and bioenergy.

5.3.1.1 Renewable energy potential in Brazil

Brazil has enormous natural resources that provide a solid basis for the development of renewable energies:

- Solar energy: The country has vast areas of coastal areas with violent vents and is documented in the north-eastern regions. These conditions are ideal for the installation of oils that allow the production of important quantities of electricity.
- Solar energy: The geographical situation in Brazil, its proximity to the equator, allows the reception of solar rays over a long period of time. It is that solar energy is a long-lasting and effective source of energy, which is applicable to the large-scale solar parks distributed by the solar systems.
- Bioenergy: Brazil has a long history of bioenergy production, mainly in the sugar cane industry. The production of ethanol is done from the can to sugar, which is used as biocarbon, and from the production of electricity from bagasse, a by-product of fibres in the transformation of the can to sugar.

5.3.1.2 Energy projects

Brazilian Brazil is a source of important investments in the energy industry, including numerous energy centres installed throughout the city. The northeastern states point out that the Rio Grande do Norte, Ceará and Bahia are certainly beyond

the largest oil parks. Reprojects has been supported in Brussels by a Latin American client with aeolian capacity. Impact economy This also applies to foreign investments that bring benefits to the economy. - Environmental benefits: Brazil's aerial energy projects support climate goals and commitments under international agreements and help reduce gas emissions.

5.3.1.3 Solar energy initiatives

Another important area near Brazil is the realization of significant advances in solar energy. The country has launched several initiatives to promote solar energy, including calls for the installation of solar panels in residential areas and large-scale solar park projects. Government programs include provisional subsidies and tax incentives for owners and companies installing solar systems. This is a link to a rapid expansion of solar installations throughout the country. - Metropolitan solar parks: in the states of Minas Gerais and São Paulo. Numerous metropolitan solar parks have already been developed and are contributing significantly to the national ecosystem and reducing dependence on combustible fossil fuels.

5.3.1.4 Developments in bioenergy

The bioenergy sector of Brazil is one of the most advanced in the world. The largest production industry plays an important role in the production of ethanol, a renewable fuel that can be used in the vehicles. In addition, the biomass obtained from the can is successfully used to produce electricity. Brazil is a producer of higher ethanol, used as biocarbon in vehicles, which can work flexibly with ethanol, in essence or in a two-way blend, thus significantly reducing dependence on gasoline imports. - Bagasse energy: The use of the bagasse to produce electricity, which is not exclusively a renewable energy source, also contributes to the longevity of the environment and helps support agricultural farms.

Brazil’s commitment to adopting renewable energies is evident as it crosses important investments and developments in the earth, sunlight and bioenergy sectors. The vast natural resources of the member countries provide a solid base for these renewable energy projects, making Brazil a leader in the transition to sustainable energy sources. To exploit the potential of the earth, sunlight and bioenergy, Brazil responded not only to environmental concerns but also to economic and energy

security concerns. With gratitude for these efforts, Brazil is paying off as a model for others anxious to reduce their dependence on combustion.

5.3.2 Renewable energy technology transfer in Brazil

The technology transfer process in Brazil's renewable energy sector has been a key pillar for success in adopting sustainable energy solutions. This process has involved strategic partnerships with the world's leading renewable energy companies and research institutes. Here is a detailed overview of how these collaborations facilitate the transfer of cutting-edge technologies and develop local expertise in Brazil.

5.3.2.1 Collaborations with international partners

Brazil has established partnerships with some of the most advanced renewable energy companies and research institutes in the world. These collaborations are critical to the adoption of next-generation renewable energy technologies in the country. Key aspects of these partnerships have included:

- Access to advanced technologies: International partners have provided access to cutting-edge technologies such as high-efficiency solar panels, innovative wind turbine designs, and advanced biofuel production techniques. These technologies are often at the forefront of renewable energy research and development.
- Joint research initiatives: Brazilian institutions and companies collaborated with their international counterparts on research and development projects. These initiatives have helped adapt global technologies to local conditions and needs.

5.3.2.2 Transfer of cutting-edge technologies

Through these partnerships, Brazil has managed to import and implement some of the latest renewable energy technologies:

- Advanced solar panels: Highly efficient solar panels from leading manufacturers have been introduced, significantly improving the performance and profitability of solar projects. These panels had better conversion rates

and durability, making solar energy more cost-effective in different regions of Brazil.

- Innovative wind turbines: Modern wind turbine designs capable of harnessing wind energy more efficiently have been installed in wind farms across the country. These turbines have featured advanced materials and aerodynamics that have increased their efficiency and reliability.
- Biofuel production techniques: The latest technologies for producing biofuels from various biomass sources have been transferred to Brazil. These have included methods for optimizing the fermentation process and increasing the yield and quality of biofuels such as ethanol and biodiesel.

5.3.2.3 Extensive training programs

An important element of the technology transfer process has been training programs for local engineers and technicians. These programs are designed to ensure that the Brazilian workforce can work effectively with, maintain and innovate with new technologies. Key elements included:

- Technical training: Engineers and technicians received hands-on training on how to install, operate and maintain new renewable energy systems. This training was typically delivered by experts from partner companies or institutions.
- Training: Programs to develop local capacity for renewable energy projects. This included training in project management, system design and performance optimization, enabling local professionals to manage future projects independently.
- Research and development skills: Training also focused on improving the research and development capabilities of Brazilian scientists and engineers. This enabled them to contribute to continuous innovation and the adaptation of technologies to local needs.

5.3.2.4 Create a local experience

The combination of advanced technology transfer and comprehensive training programs has led to the development of strong local expertise in renewable energy in Brazil. This experience has been fundamental to:

- Sustainable projects: Ensuring that renewable energy projects are sustainable and can remain efficient over time.
- Promote innovation: Promote local innovation and adapt technologies to meet specific regional challenges and opportunities.

Sector expansion: Facilitate the growth of the renewable energy sector and enable local companies to build new projects and attract more investments.

The process of technology transfer in the renewable energy sector in Brazil has been very successful. These collaborations facilitated the introduction of advanced technologies and enabled comprehensive training of local engineers and technicians. By developing local expertise, Brazil has not only enhanced its renewable energy capabilities but also positioned itself as a leader in the global renewable energy landscape. This comprehensive approach highlights the importance of international cooperation and capacity building to achieve sustainable energy goals.

5.3.3 Brazil's adoption of renewable energy technologies

Brazil's transition to renewable energy has been marked by significant government support, public awareness initiatives, and positive policy implementation. Despite challenges such as high start-up costs and technical integration issues, Brazil's commitment to renewable energy has made significant progress. Here's an in-depth look at the factors driving this adoption and the challenges facing this path.

5.3.3.1 Government support and positive policy

The Brazilian government has played a key role in the country's transition to renewable energy. Many key policies and measures have been essential to this transition:

Subsidies and tax incentives: To encourage investment in renewable energy projects, the government has provided subsidies and tax incentives. These financial benefits have reduced the overall cost of developing renewable energy facilities and made participation in such projects more attractive to investors and companies.

Grants: Direct financial support helped offset the high initial investments associated with renewable energy technologies.

Tax incentives: Tax exemptions or rebates for renewable energy projects have further encouraged the adoption of clean energy solutions.

Regulatory framework: A robust regulatory framework has helped renewable energy projects to be developed and integrated smoothly. This has included simplified licensing procedures and advantageous tariff structures for renewable energy producers.

5.3.3.2 Public awareness campaigns

Public awareness campaigns have played a crucial role in gaining public support and encouraging investment in renewable energy. The aim of these campaigns has been to raise awareness about the benefits of renewable energy and the importance of reducing dependence on fossil fuels:

Educational programs: Government and non-governmental organizations conduct educational programs in schools, universities and communities to highlight the environmental and economic benefits of renewable energy.

Media campaigns: Use television, radio and social media platforms to raise awareness about renewable energy projects and their positive impact on society.

Community engagement: Public forums and workshops were held to engage local communities, address concerns, and generate support for renewable energy initiatives.

5.3.3.3 The challenges of renewable energy adoption

Despite strong support and positive policies, Brazil faced several challenges in adopting renewable energy technologies:

High upfront costs: The upfront costs of installing renewable energy systems such as wind turbines and solar panels were quite high. Even with subsidies and incentives, the financial burden can be significant for some investors and communities.

Technical integration challenges: Integrating renewable energy sources into the existing power grid has presented technical difficulties. The variability of wind

and solar energy requires improvements to the grid infrastructure and the development of advanced energy storage solutions to ensure a stable and reliable power supply.

Grid infrastructure: The existing power grid needed to be improved to accommodate the intermittent nature of renewable energy sources and efficiently distribute the energy generated.

Energy storage: The development of efficient energy storage solutions such as batteries is critical to managing the supply and demand of renewable energy.

5.3.3.4 Overcoming difficulties

Efforts to address these challenges included:

Financial mechanisms: Government and the private sector have developed innovative financial mechanisms such as green bonds and public-private partnerships to spread upfront costs and make investments more sustainable.

Technological advances: Investments in research and development have led to technological advances that increase the efficiency and profitability of renewable energy technologies. These have included better energy storage solutions and more efficient solar panels and wind turbines.

Infrastructure improvements: Significant investments have been made to improve infrastructure of the electricity grid to ensure that it can cope with the increasing share of renewable energy and guarantee a stable electricity supply.

The adoption of renewable energy technologies in Brazil has been made possible thanks to strong government support, positive policies, and effective public awareness campaigns. Although the country has faced challenges such as high upfront costs and technical integration issues, concerted efforts to address these barriers have led to significant progress. By continuing to invest in infrastructure improvements, technological advances, and public education, Brazil can further develop its renewable energy capacity and move closer to a sustainable energy future. With these actions, Brazil is a good example of how a country can transition to renewable energy while addressing environmental concerns while promoting economic growth.

5.3.4 Positive results of technology transfer in the renewable energy sector in Brazil

Technology transfer initiatives in the renewable energy sector in Brazil have produced very positive results, indicating significant progress in the country's energy scenario. Successful integration of renewable energy technologies offers many benefits, from increasing renewable energy capacity to reducing carbon emissions and improving energy security. A more detailed analysis of these results and lessons from the Brazilian experience can be found here.

5.3.4.1 Increase renewable energy capacity

One of the most notable results of technology transfer in Brazil has been the significant increase in renewable energy capacity. Brazil has significantly increased its renewable energy production by establishing large wind farms and solar power plants:

Wind farms: Large wind farms have been developed, especially in the northeastern regions of Brazil. These projects contribute to the national electricity grid by generating significant amounts of electricity by taking advantage of the high wind speeds in coastal areas.

Solar power plants: Solar energy projects have developed particularly in regions with high levels of solar irradiation. These factories use advanced solar panel technologies to generate clean, efficient energy and reduce dependence on traditional fossil fuels.

5.3.4.2 Reduce carbon footprint

The transition to renewable energy has played a critical role in reducing Brazil's carbon footprint. Brazil has made significant progress in reducing greenhouse gas emissions by replacing fossil fuels with clean energy sources:

Reducing emissions: Increased use of wind, solar and bioenergy has led to significant reductions in carbon dioxide and other harmful emissions. This transition supports Brazil's commitments to international climate agreements and the Sustainable Development Goals.

Environmental benefits: In addition to reducing emissions, the adoption of renewable energy has also contributed to global environmental sustainability by helping to conserve natural resources and reduce pollution.

5.3.4.3 Increased energy security

Renewable energy projects have also increased Brazil's energy security by diversifying energy sources and reducing dependence on imported fossil fuels:

Energy independence: The development of local renewable energy sources depends on Brazil's dependence on external energy sources, increasing energy independence and national resilience.

Stable supply: Renewable energy sources such as wind and solar provide a more stable and predictable electricity supply and reduce the risks associated with fluctuations in fossil fuel markets.

5.3.4.4 Encourage new investment

The early success of renewable energy projects has led to new investment and adoption across the country. The prospect of renewable energy and its benefits have attracted the attention of domestic and international investors:

Investment growth: The proven success of projects such as wind farms and solar energy centres has inspired investor confidence and led to increased financing and expansion of renewable energy initiatives.

Technological advances: Continuous investment has contributed to technological innovations and improvements, further increasing the efficiency and profitability of renewable energy solutions.

5.3.4.5 Key factors for successful technology transfer

Looking at the Brazilian example, several key factors are essential for the successful transfer and deployment of renewable energy technologies:

Supportive policies: Government subsidies, tax incentives and a strong regulatory framework are key to creating a favourable environment for renewable energy development.

Public participation: Public awareness campaigns and community engagement initiatives have helped build support for renewable energy projects and facilitate their adoption and implementation.

Training: Training programs for local engineers and technicians have promoted local skills and sustainability by ensuring that the workforce is equipped to deploy and maintain new technologies.

Financial support: Access to financial resources, including international partnerships and investments, has been critical to address the high upfront costs of renewable energy projects.

The results of technology transfer in the renewable energy sector in Brazil highlight the significant benefits that accrue from the adoption of advanced energy technologies. The country has made significant progress in renewable energy capacity, reduced carbon emissions, and improved energy security. Successful projects have demonstrated the practicality and benefits of renewable energy and encouraged further investment and deployment.

This case study highlights the importance of supportive policies, public participation, and capacity building to overcome barriers and achieve positive outcomes. By analysing these factors, we gain valuable insights into the successful transfer and adoption of new technologies; we provide a model for other countries seeking to transition to renewable energy and achieve their sustainable development goals.

6. DEVELOPMENTS OF A COMPREHENSIVE FRAMEWORK AND SUSTAINABILITY ASSESMENT

6.1 Development of a Comprehensive Framework

Based on the regression analyses conducted in the agricultural and healthcare sectors, we found that financial support, training programs, and government incentives significantly influence technology adoption. These variables accounted for 65% of the variance in adoption rates across sectors, as shown by the following regression model:

Technology , Adoption = 1.8 + 0.5 \times Financial , Support + 0.6 \times Training + 0.4 \times Govt , Incentives]

This evidence informs the development of a comprehensive framework, where financial incentives, capacity-building programs, and policy reforms should be prioritized. For instance, every additional government initiative (e.g., subsidies or incentives) increases the technology adoption rate by 0.4 units, underscoring the importance of government engagement in facilitating technology transfer. Therefore, these factors should be embedded into the framework to ensure successful adoption in underdeveloped regions like Cameroon.

6.1.1 Integration of best practices

It is crucial to integrate best practices from successful case studies and research to create an effective framework for technology transfer and innovation adoption. This involves identifying the key elements that contribute to successful technology transfer in different contexts. As shown in Table 6.1, good practices include strong education and training programs, robust government support, public awareness campaigns, and financial incentives. For example, in the Brazilian renewable energy sector, government subsidies and public awareness have played an important role in promoting adoption. Similarly, partnerships with international organizations and comprehensive training programs are essential in the Indian health

sector. By synthesizing these best practices, we can develop a holistic approach that addresses the various challenges in technology transfer.

Table 6.1: Best Practices from Case Studies

Best Practice	Description	Source Case Study	Key Benefits
Collaborative R&D	Joint research initiatives between local and foreign institutions	Case Study 1	Enhanced innovation and local expertise
Government Incentives	Tax breaks and subsidies for technology adoption	Case Study 2	Increased investment in new technologies
Workforce Training	Skill development programs tailored to new technologies	Case Study 3	Higher adoption rates and productivity

Source: by author

6.1.2 Adapting strategies to underdeveloped regions

Underdeveloped regions often face unique challenges that require specific strategies for technology transfer and innovation adoption. These regions may face challenges due to limited financial resources, inadequate infrastructure and lack of skilled human resources. To overcome these challenges, it is important to adapt strategies that take into account the specific needs and context of each region. For example, addressing the financial constraints of the Cameroonian agricultural sector through international partnerships and subsidies has proven effective. Similarly, investing in local education and training programs can result in the creation of a skilled workforce capable of supporting new technologies. Adapting strategies also involves leveraging local knowledge and practices to ensure that new technologies are culturally acceptable and practically applicable.

Table 6.2: Strategy Implementation and Impact

Strategy	Description	Expected Impact
Local Needs Assessment	Conducting thorough assessments to identify specific local needs	Tailored solutions and higher relevance
Infrastructure Development	Investing in essential infrastructure (electricity, roads, internet, etc.)	Improved accessibility and connectivity
Microfinancing Programs	Providing small loans to local entrepreneurs	Boosted local entrepreneurship and innovation

Source: by author

6.1.3 Stakeholder collaboration model

An effective framework for technology transfer and innovation adoption requires the collaboration of multiple stakeholders, including governments, international organizations, private sector companies, and local communities. The stakeholder collaboration model can facilitate effective communication and collaboration among these parties. This model should define the roles and responsibilities of each stakeholder and ensure that efforts are coordinated and aligned toward common goals. For example, governments can develop supportive policies and provide funding, while international organizations can provide technical expertise and resources. Private sector companies can promote innovation and offer practical applications; local communities can provide valuable information about the specific needs and cultural aspects of the region. By encouraging collaboration, we can create an environment that is conducive to technology transfer and the adoption of innovations.

6.1.4 Proposed framework for sustainable development

Based on the integration of best practices, strategies for underdeveloped regions and a model of cooperation between stakeholders, we can propose a comprehensive framework for sustainable development through technology transfer and adoption of innovations. This framework includes the following main components:

Education and training: Introduce robust education and training programs to build local capacity and ensure that people have the skills needed to use and maintain new technologies. This includes formal training and practical training.

Financial support: Obtain funding from international organizations, donor countries and private sector investments to overcome financial constraints. Create technology transfer funds and provide financial incentives for the adoption of new technologies.

Supportive policies and regulations: Develop and implement policies that support technology transfer and adoption of innovations. Simplify regulatory processes, create tax incentives and ensure that intellectual property rights do not hinder access to new technologies.

Infrastructure development: Invest in the development of necessary infrastructure, such as reliable power supply, internet connectivity and transportation networks, to support the deployment of new technologies.

Community participation: Involve local communities in the technology transfer process to build trust and acceptance. Organize awareness campaigns and engage community leaders and pioneers to demonstrate the benefits of new technologies.

Collaborative partnerships: Promote partnerships between governments, international organizations, private sector companies and local communities. Define clear roles and responsibilities for each stakeholder and encourage effective communication and collaboration.

Monitoring and evaluation: Establish mechanisms to monitor and evaluate the progress and impact of technology transfer initiatives. Use feedback to make continuous improvements and ensure that initiatives are achieving their objectives.

By applying this comprehensive framework, we can remove various barriers to technology transfer and innovation adoption, enabling underdeveloped regions to benefit from technological advances and achieve sustainable development.

6.2 Sustainability Assessment

6.2.1 Assessment of long-term impacts

For these initiatives to contribute to sustainable development, it is crucial to assess the long-term impacts of technology transfer and innovation adoption. This involves assessing how new technologies improve quality of life, economic growth and overall development in target areas over a long period of time. In Cameroon, for example, the long-term impacts of adopting modern agricultural technologies can be measured by observing increases in agricultural yields, farmers' incomes and food security over several years. Surveys, interviews with participating parties and data analysis can help determine whether technologies continue to provide benefits and how they adapt to changing conditions.

6.2.2 Economic feasibility analysis

Economic sustainability is a fundamental aspect of sustainability. It involves analysing whether technology transfer initiatives are financially viable in the long term. A cost-benefit analysis of new agricultural technologies can leverage the economic functionality of the Cameroonian agricultural sector (Nfor, 2015; Sanya & Acha, 2019). Do the financial gains resulting from productivity add up over the costs of acquiring and maintaining the technology? In addition, the availability of financial mechanisms such as microcredit and grants play an important role in ensuring that farmers can continue to invest in and benefit from new technologies. This is an analysis that aims to help understand the economic sustainability and scalability of technology transfer initiatives.

6.2.3 Environmental aspects

Sustainable development also requires careful consideration of environmental impacts. The introduction of new technologies must not come at the expense of environmental degradation. In Cameroon, for example, the environmental impacts of agricultural technologies can be assessed by analysing changes in soil health, water use and biodiversity. Priority should be given to technologies that enable sustainable agricultural practices, such as precision agriculture and organic farming methods. In addition, renewable energy technologies such as solar-powered irrigation systems can help minimize environmental impacts. Environmental impact assessments ensure that the benefits of technology transfer are not compromised by negative environmental consequences.

6.2.4 Lessons from previous initiatives

Learning from past experiences is critical to improving future technology transfer and innovation efforts. Analysing past initiatives in Cameroon and other countries can provide valuable information on what worked and what did not. For example, successful initiatives often include strong local partnerships, ongoing support, and adaptable strategies that take local contexts into account. On the other hand, failed attempts can illustrate the importance of addressing cultural resistance, providing appropriate training, and securing long-term funding. Documenting and analysing these lessons help develop strategies, avoid past mistakes, and increase the overall effectiveness of technology transfer programs.

6.2.5 Integrate sustainability into technology transfer

This is what we are talking about, and we are talking about new developments that we will consider and we will be able to do so, so we are talking about technology transfer and innovation. In short:

Continuous monitoring and evaluation: Establish robust mechanisms for ongoing monitoring and evaluation to track the long-term impacts, economic viability and environmental impacts of technology transfer initiatives.

Financial planning: Ensure that financial support mechanisms are designed to promote long-term economic sustainability. This means creating sustainable financing models that can cover ongoing costs for maintenance and technology upgrades.

Environmental protection: Implement environmental protection measures and promote technologies that support environmental sustainability. In this case, you can switch on your energy sources and start using land-based power sources.

Knowledge sharing: Create platforms to share learnings from previous initiatives. This will increase the efficiency of future projects by helping stakeholders understand best practices and avoid common pitfalls.

Stakeholder engagement: Involve all stakeholders in the planning and implementation process, including local communities, governments, international organizations and private sector partners. This will ensure that initiatives are holistic and take multiple sustainability perspectives into account.

When integrating elements into the framework, we can ensure that technology transfer initiatives are not only effective in the short term, but also contribute to the long-term sustainable development of less developed regions like Cameroon.

7. POLICY AND RECOMENDATIONS

7.1 Local Government Policies

For technology transfer and innovation adoption to be successful, local governments in developing countries like Cameroon need to implement supportive policies. These policies should focus on creating an enabling environment for technology transfer by addressing financial, infrastructure, regulatory and training needs. Here is a detailed look at the key areas where local governments should focus their efforts:

7.1.1 Offer financial incentives

Quantitative analysis revealed that financial support had the strongest positive impact on technology adoption, particularly in the agricultural sector. The regression analysis (presented in Chapter 5) demonstrated that a 1-unit increase in financial support leads to a 0.85-unit increase in technology adoption. Therefore, we recommend that local government policies focus on providing financial incentives such as tax breaks, grants, and subsidies to entrepreneurs and businesses adopting new technologies. These policies are projected to raise adoption rates by 45-50% over the next five years, based on the model's predictive power. Granting, tax exemptions and concessional loans:

Subsidies: Local governments should provide direct financial support to offset the high upfront costs of adopting new technologies (World Bank, 2018). This may include grants for purchasing equipment or implementing new systems.

Tax exemptions: Providing tax exemptions or rebates to businesses and farmers investing in new technologies can significantly reduce the financial burden and make their adoption more attractive. The high costs of technology acquisition are a major hurdle, especially for small and medium-sized enterprises (SMEs). To encourage innovation and technology adoption, the government should introduce tax incentives for companies that invest in Research and Development (R&D) and offer subsidies for start-ups focused on tech-based solutions in key sectors like agriculture,

healthcare, and renewable energy. This would help alleviate financial constraints and foster a more vibrant tech ecosystem.

Soft loans: Access to affordable financing options such as soft loans can help businesses and farmers overcome hurdles in start-up costs. These loans can be specifically designed for technology adoption and innovation projects.

In Cameroon, the government can introduce a subsidy program for farmers who buy seeds for improved irrigation systems or high-yield crops. Similarly, companies investing in renewable energy technologies can benefit from tax incentives to encourage more environmentally friendly practices.

7.1.2 Develop infrastructure

Invest in basic infrastructure:

Reliable electricity: Ensuring a stable and reliable electricity supply is critical for new technologies to function, especially in rural areas where power outages are common.

Internet connectivity: High-speed internet is essential for implementing modern technologies, especially data analytics, remote monitoring and telecommunications.

Transportation networks: Improving transport infrastructure improves access to markets and services by facilitating the distribution of equipment and technological products.

The Cameroonian government could prioritize rural electrification projects, expand broadband internet coverage and develop better road networks to connect remote areas to urban centres.

7.1.3 Simplify regulations

Simplify processing processes:

Efficient import procedures: Reducing red tape and simplifying procedures for importing new technologies can accelerate the spread and use of these technologies.

Clarity on licenses and permits: It is important to establish simple and efficient processes for obtaining licenses and permits. This can reduce delays and encourage companies to innovate without encountering administrative hurdles.

Cameroon can create a one-stop shop for companies to obtain the necessary permits and licenses for technology-related projects, reducing waiting times and simplifying the overall process. significant barrier to technology transfer in Cameroon is the complex regulatory environment. To address this, the government should introduce a single-window system that centralizes and simplifies the process of obtaining licenses and approvals for technology-related projects. This reform can reduce bureaucratic delays and encourage more local and international investors to engage in technology transfer. Additionally, enhancing intellectual property (IP) protections will reassure foreign companies that their technologies will be safeguarded, promoting further technology inflows.

7.1.4 Support education and training

Invest in education and vocational training:

Skilled workforce: It is important to develop a workforce trained in the use and maintenance of new technologies. This requires investment in professional education and training programs tailored to the needs of the industry.

Partnering with educational institutions: Partnering with universities, colleges, and industry leaders to develop and deliver relevant training programs can ensure that the skills taught are current and applicable.

Continuing education: Promoting continuous professional development through workshops, seminars, and online courses helps employees stay up to date with technological advancements.

Female Emancipation: Gender-sensitive policies should be implemented to support women's access to technology. This includes providing targeted financial support, specialized training programs for women, and addressing cultural norms that limit women's participation in technological innovation. By adopting a gender-inclusive approach, technology transfer and innovation adoption can contribute to more equitable and sustainable development.

The Cameroon government can partner with agricultural schools to offer specialized courses in advanced agricultural techniques and technologies. Similarly, partnerships with technology companies can provide training on renewable energy systems and IT infrastructure. Local government policies are key to creating an enabling environment for technology transfer and innovation adoption. Local governments in developing countries like Cameroon can significantly increase the adoption of new technologies by providing financial incentives, investing in infrastructure, streamlining regulatory processes, and supporting education and training. These efforts not only promote economic growth, but also encourage sustainable development and improve the quality of life of citizens.

Table 7.1: Recommended Local Government Policy

Policy	Description	Expected Outcome	Implementation Timeline
Tax Incentives for Innovation	Offering tax breaks for companies investing in R&D	Increased local innovation and investment	2024-2025
Sustainable Infrastructure	Funding and building sustainable infrastructure projects	Enhanced connectivity and sustainability	2024-2026
Education and Training	Programs focused on new technology and skills	Improved workforce readiness	2024-2025
Environmental Regulations	Stricter controls on emissions and waste	Reduced environmental impact	2024-2026

Source: by author

7.2 International Cooperation Strategies

International cooperation plays a very important role in the success of technology transfer to developing countries. Effective strategies to improve cooperation include building partnerships, securing finance and resources, sharing best practices and facilitating access to technology. These strategies promote global development and innovation by helping to close the technology gap between developed and developing countries.

7.2.1 Build partnerships

Joint ventures and collaborations:

Partnerships with developed countries: Developing countries should actively seek partnerships with developed countries. These collaborations can provide access to advanced technologies, technical expertise and innovative applications.

International organizations and multinational companies: Collaboration with international organizations (such as the United Nations, the World Bank) and multinational companies can provide the technical assistance and investment needed for technology transfer.

Research collaborations: Joint research projects can promote innovation and help adapt technologies to local conditions. These collaborations can include universities, research institutes and private sector partner.

Cameroon can partner with European countries and global technology companies to develop renewable energy projects, leveraging its knowledge and resources to implement advanced solar and wind energy systems.

7.2.2 Secure funding and resources

Grants, loans and technical assistance:

International donors and financial institutions: Organizations such as the International Monetary Fund (IMF), the World Bank and various development banks are expected to provide financial support in the form of grants, low-interest loans and technical assistance (UNCTAD, 2019). These funds can be used to acquire, implement and maintain new technologies.

Technology transfer funds: The creation of dedicated technology transfer funds can simplify resource allocation and ensure that financial support is directed to high-impact projects.

Cameroon could receive funding from the Green Climate Fund to support the deployment of climate-friendly technologies such as improved irrigation systems and renewable energy infrastructure.

7.2.3 Share best practices

International forums and information exchange:

Platforms to share success stories: Creating international forums and online platforms where countries can share success stories, best practices and lessons learned can facilitate knowledge sharing.

Learn from other countries' experiences: Developing countries can learn from the challenges and successes of other countries involved in similar technology transfer processes and adapt this knowledge to their specific context.

Cameroon can attend international conferences focused on sustainable agriculture and renewable energy and learn about effective policies and technologies from countries such as Brazil and India.

7.2.4 Facilitate access to technology

Equal access and intellectual property rights:

International agreements: Global agreements should be designed to promote fair and equitable access to essential technologies. This can include creating technology exchange mechanisms and reducing barriers to access to technology for developing countries.

Flexible intellectual property rights: More flexible adaptation of intellectual property rights could make it easier for developing countries to access essential technologies. Licensing agreements that take into account the financial capabilities of these countries can facilitate access to advanced technologies.

International agreements enable Cameroon to access patented renewable energy technologies at lower cost, facilitating their integration into the national energy grid (UNCTAD, 2019; Mowery & Oxley, 1995).

International cooperation is critical for effective technology transfer and adoption in developing countries. Developing countries like Cameroon can overcome technology transfer challenges by building strategic partnerships, securing the necessary funds and resources, sharing best practices, and facilitating equitable access to technologies. These strategies enable the adoption of advanced technologies that can promote sustainable development, economic growth, and improved quality of life. Through joint efforts, the global community can work together to close technology gaps and drive innovation across all regions.

Table 7.2: International Cooperation Strategies

Strategy	Description	Partner Countries/ Organizations	Expected Benefits
Technology Exchange Programs	Initiatives for sharing technology and expertise	Developed nations, international tech firms	Accelerated technological advancement
Trade Agreements	Forming favourable trade agreements	Neighbouring countries, trade blocs	Improved market access and economic growth
Joint Research Initiatives	Collaborative research on sustainable technologies	International research institutions	Shared knowledge and innovation
Financial Assistance	Securing grants and low-interest loans	International financial institutions	Increased funding for development projects

Source: by author

7.3 Industry Guidelines

Industries play a fundamental role in the process of technology transfer and innovation adoption. To maximize their impact and ensure the successful implementation of new technologies in developing countries, companies must follow certain rules. These guidelines include promoting research and development (R&D), ensuring quality and reliability, encouraging local partnerships and adopting ethical practices.

7.3.1 Promoting research and development (R&D)

Investing in innovation:

Tailor-made solutions: Companies should focus on developing technologies that are specifically tailored to the unique challenges of developing countries. This involves creating accessible, adaptable and sustainable solutions.

Affordable technologies: Research and development should prioritize affordable technologies that can be easily adopted and maintained by local communities. This may include simplifying complex systems or finding low-cost alternatives.

Sustainable innovations: It is important to develop environmentally friendly technologies that can be supported by local resources. These innovations must withstand local environmental conditions and contribute to long-term sustainability.

A company can invest in developing solar-powered irrigation systems accessible to smallholder farmers in Cameroon, considering local climatic conditions and resource availability.

7.3.2 Guarantee quality and reliability

High standards and support:

Quality assurance: Technologies transferred to developing countries must meet high quality standards to ensure their effectiveness and sustainability. Trustworthy products are more likely to be adopted and provide long-term benefits.

Warranties and maintenance services: Companies should offer warranties and set up local maintenance services to support the continued functionality of their technologies. This builds trust and ensures that any issues can be resolved quickly.

Technical support: Providing ongoing technical support and after-sales service is critical. This helps users resolve issues and maximizes the utility of the technology.

When transporting medical equipment to rural clinics in India, a company can offer a warranty, train local technicians, and set up a hotline for ongoing maintenance.

7.3.3 Promote local partnerships

Build local relationships:

Collaboration with local governments: By collaborating with companies, universities and local communities, technologies can be adapted to local needs and conditions. These partnerships facilitate the transfer of knowledge and expertise and ensure that the technology is well understood and used effectively.

Community engagement: Working with local communities to understand their needs and preferences can increase the relevance and acceptance of new technologies. Community involvement in the technology implementation process increases ownership and trust.

Training: By collaborating with local educational institutions to develop training programs, you will have a well-trained workforce capable of maintaining and improving technology.

A renewable energy company can ensure that local expertise is available to support wind and solar projects by collaborating with local universities in Brazil to develop training programs for technicians and engineers.

7.3.4 Ethical practices

Responsible behaviour:

Respect for local cultures and regulations: Companies must respect local cultures, traditions and regulations. This includes understanding and integrating local customs into business practices and ensuring compliance with local laws.

Fair business practices: Adopting fair and transparent business practices creates positive relationships with local communities and stakeholders. This includes fair pricing, honest marketing and fair treatment of local partners and employees.

Corporate social responsibility: Companies should engage in socially responsible activities that benefit the local community, such as supporting initiatives in education, healthcare and environmental sustainability.

Compliance with industry codes is critical for successful technology transfer and adoption in developing countries. Companies can play an important role in overcoming barriers to technology transfer by promoting research and development, ensuring quality and reliability, fostering local partnerships, and adopting ethical practices. These efforts not only increase the effectiveness and sustainability of new technologies, but also contribute to the overall development and well-being of local communities. Through responsible and collaborative approaches, industries can foster innovation and support sustainable development in regions such as Cameroon, India, and Brazil.

7.4 Education Initiatives

Building local capacity is critical for the sustainable adoption of new technologies in developing countries. Key capacity-building initiatives include creating training programs, offering vocational training, supporting entrepreneurship and engaging local communities. These initiatives create a skilled workforce, promote innovation and ensure that new technologies are effectively integrated and sustained.

7.4.1 Training programs

STEM education:

K-12 schools: Early introduction of STEM (science, technology, engineering, mathematics) education helps develop basic knowledge and interest in technology and innovation, integrating practical and theoretical instruction that encourages problem-solving and critical thinking.

Universities and higher education: Universities should offer specialized courses and degree programs in advanced technology, engineering and science. Partnerships with international institutions can help develop high-quality curricula and provide access to the latest research and resources.

Teacher training: Investing in the training and development of educators ensures they are able to provide high-quality STEM education and inspire the next generation of innovators.

To make education more impactful in the context of technology transfer, Cameroon's universities and vocational institutions must emphasize localized solutions in their curricula. For instance, agricultural programs could focus on introducing students to precision farming technologies adapted for Cameroonian soil and climate conditions. Similarly, healthcare-focused institutions can develop training programs for the use of telemedicine platforms, which are critical in rural areas where access to healthcare is limited. Cameroon can establish secondary schools focused on STEM subjects and offer scholarships to students pursuing degrees in technology-related fields, creating a steady pool of skilled professionals.

7.4.2 Professional skills

Development of practical skills:

Technical training programs: These programs should be accessible to people from diverse backgrounds, including marginalized groups, and provide hands-on training in using, maintaining, and troubleshooting new technologies.

Certification programs: Offering certifications in specific skills and technologies can improve employability and provide employees with a standardized level of competency.

Apprenticeships and internships: By partnering with industries to provide apprenticeships and internships, interns gain practical experience and improve their job preparation.

Creating vocational training centres in Cameroon that focus on renewable energy, agricultural technologies, and IT skills can prepare a workforce that can support new technological developments.

7.4.3 Supporting entrepreneurship

Promoting local innovation:

Incubators: Creating hubs that provide startups with resources, advice, and workspace can help local entrepreneurs develop and commercialize new technologies.

Mentoring programs: Experienced professionals can guide aspiring entrepreneurs through the challenges of business creation and development, offering them valuable knowledge and support.

Access to finance: Providing grants, low-interest loans, and venture capital to technology startups encourages innovation and reduces financial barriers to entrepreneurship.

Cameroon can provide young entrepreneurs with the tools and support they need to build successful technology-based businesses by creating technology centers and innovation labs in major cities.

7.4.4 Community engagement

Involvement of local communities:

Awareness campaigns: Educating communities about the benefits and applications of new technologies through campaigns can build trust and acceptance.

Workshops and training: Conducting hands-on workshops and training helps community members understand and adopt new technologies. These events should be inclusive and meet the needs of different populations.

Participatory approaches: Involving local communities in decision-making allows technologies to be adapted to their specific needs and cultural context. This

participatory approach promotes a sense of ownership and commitment to the success of the technology.

In rural areas of Cameroon, organizing community meetings and demonstration projects on renewable energy systems can demonstrate the benefits of these systems and encourage widespread adoption.

Implementing capacity building initiatives is critical to creating a sustainable environment conducive to technology transfer and the adoption of innovation in developing countries. By focusing on education programs, vocational training, entrepreneurship support and community engagement, countries like Cameroon can create a skilled workforce, encourage local innovation and ensure that new technologies are effectively integrated and sustainable. These efforts will contribute to sustainable development, economic growth and an improved quality of life for the population, paving the way for a more prosperous and technologically advanced future.

Table 7.3: Capacity Building Initiatives

Initiative	Description	Target Group	Expected Outcome
Technical Training Programs	Vocational training in new technologies	Local workforce	Enhanced skillset and employability
Leadership Development	Programs for developing leadership skills in industry	Industry managers and leaders	Improved management and innovation
Education Partnerships	Collaborations between educational institutions	Students and educators	Better alignment of education with industry needs
Community Engagement	Initiatives to involve local communities in development	Local communities	Increased local support and participation

Source: by author

7.4.5 Expanding educational programs and vocational training

Educational programs and vocational training are critical in building a skilled workforce capable of adopting and utilizing new technologies. To ensure the success of technology transfer and innovation adoption, the government should collaborate with both local and international institutions to expand technical education at all

levels, including primary, secondary, and tertiary education. This can be achieved through:

- Strengthening STEM Education: Programs focusing on Science, Technology, Engineering, and Mathematics (STEM) should be introduced in schools to create a foundation of tech-savvy students who can easily transition into tech-driven industries.
- Introducing Vocational Training Programs: Vocational training programs tailored to the needs of emerging sectors, such as agriculture, healthcare, and renewable energy, will ensure that workers are adequately trained in the technologies relevant to these industries. By offering certifications and apprenticeships, these programs can provide hands-on experience and skill development that will make the workforce more adaptable to technological advancements.
- Public-Private Partnerships in Training: Collaboration between the government, educational institutions, and private companies can bridge the gap between academic knowledge and practical skills. Companies can offer internships, workshops, and training programs for students and workers, ensuring that they are exposed to the latest technological developments.
- Encouraging Lifelong Learning: Continuous professional development programs should be introduced to allow individuals to upgrade their skills as new technologies emerge. This can be done through online courses, part-time diplomas, or in-service training for professionals in tech-related fields.

8. CONCLUSION AND DISCUSSION OF RESULTS

8.1 Summary of Findings

This research examines the complexities and challenges of technology transfer and innovation adoption in developing countries, particularly from a Cameroonian perspective, and highlights significant barriers that hinder progress in these regions. These barriers include financial constraints, resource scarcity, cultural and social resistance, regulatory barriers, and infrastructure limitations. Interviews with 20 key informants and rigorous data collection methods highlight the need for strong local government support, international collaboration, industry engagement, and holistic capacity building initiatives to enable successful resettlement technology.

Financial constraints are a major obstacle, as many developing countries do not have the financial means to invest in advanced technologies. The high cost of acquiring, training, and maintaining new technologies pose significant challenges. In addition, resource scarcity exacerbates the situation; the lack of skilled labor and basic materials complicates the adoption process. Cultural and social factors, including resistance to change and differing social norms, further complicate the situation and hinder the acceptance and integration of new technologies.

In addition, regulatory complexity and bureaucratic delays hinder progress, underscoring the importance of streamlining regulations to facilitate technology transfer. Inadequate infrastructure, such as unreliable electricity and limited internet access, creates practical difficulties and reduces the effectiveness of new technologies.

Effective strategies to address these obstacles must be implemented. Local governments play an important role in creating an enabling environment through supportive policies, investment in education and infrastructure development. International cooperation, including partnerships with developed countries and

financial institutions, provides access to resources and knowledge essential for successful technology transfer.

The correlation and regression analyses conducted throughout this study provide clear evidence that financial support, training programs, and government incentives are the most critical factors in driving technology adoption in Cameroon. For instance, our correlation analysis (Chapter 4) found a strong positive relationship ($r = 0.68$) between financial support and technology adoption rates. Additionally, the regression analysis (Chapter 5) indicated that training contributed the most to improved agricultural productivity, with a coefficient of 0.6, confirming that effective training is pivotal for the success of technology transfer.

These results highlight the importance of creating financial incentives and capacity-building initiatives as part of a broader strategy for fostering innovation and sustainable development in underdeveloped regions.

Industry participation is also essential, with companies investing in research and development to adapt technologies to local needs and fostering collaboration with local governments. Comprehensive capacity-building initiatives, including educational programs, skills training, entrepreneurship support and community engagement, are critical to developing a skilled workforce and promoting innovation.

Therefore, integrating best practices and adapting strategies to the specific contexts of developing countries are crucial to improve the effectiveness of technology transfer initiatives. Developing countries like Cameroon can overcome barriers, achieve sustainable development and improve the quality of life of their citizens through joint efforts, including government support, international cooperation, industry participation and capacity building.

8.2 Knowledge Contributions

This research significantly expands our understanding of the dynamics of technology transfer in the context of developing countries, focusing particularly on Cameroon. Through a thorough analysis, this study identifies and examines the numerous barriers and facilitators that affect technology transfer in these regions.

A notable contribution is the formulation of a comprehensive framework that brings together best practices, specific strategies and collaborative approaches to

address the complex challenges in underdeveloped contexts. Through this framework, the research sheds light on ways to overcome barriers and promote successful technology transfers and innovation adoption.

Furthermore, the study highlights the critical role of various stakeholders, including local governments, international partners, industries and communities, in promoting technology transfer initiatives. The study emphasizes the importance of supporting local government policies, promoting international cooperation, adhering to industry codes and implementing capacity building initiatives, and outlines concrete steps to facilitate technology transfer.

The Cameroon case study provides valuable insights into the practical application of these strategies in the specific context of a developing country. By examining the nuances of the Cameroonian experience, the research provides nuanced and contextually meaningful insights that can inform and guide similar efforts in other developing countries.

In short, this research extends existing knowledge by providing a nuanced understanding of the dynamics of technology transfer, offering a comprehensive framework for addressing challenges, and providing practical lessons from the Cameroonian case. Through its diverse contributions, the book enriches academic discourse and offers pragmatic guidance on promoting technological progress and innovation in developing countries.

8.3 Implications for Practice

The findings gathered in this study have important implications for various stakeholders involved in technology transfer and the adoption of innovations in developing countries. These practical implications concern policy makers, international organizations, donors, industries and local communities.

For policy makers:

Create enabling environments: Policy makers are called upon to prioritize the creation of enabling environments that encourage technology transfer. This includes introducing financial incentives such as grants and tax incentives to encourage the adoption of new technologies. In addition, investments in infrastructure development, including reliable electricity supply, internet connectivity

and transportation networks, are needed to facilitate the effective use of the transferred technologies. Simplifying regulations and bureaucratic processes is essential to minimize barriers and accelerate the adoption process.

For international organizations and donors:

Strengthen cooperation: International organizations and donors are called upon to strengthen cooperation and collaboration with developing countries. Specific financial and technical assistance programs must be developed to respond to the specific needs and challenges of these regions. This may include providing grants, loans and technical assistance for technology acquisition, capacity building and infrastructure development.

For industries:

Invest in research and development: Industries are encouraged to invest in research and development to develop technologies that address the unique challenges of developing countries. Prioritizing the development of accessible, adaptable and sustainable solutions will ensure that technologies meet the needs of these regions.

Ensure quality and reliability: Companies transferring technology to developing countries must prioritize quality and reliability. Providing warranties, maintenance services and ongoing support is essential to ensure the long-term success and sustainability of the technologies transferred. Adhering to ethical business practices and respecting local cultures and regulations are critical to fostering positive relationships and promoting technology adoption.

For education:

Education and vocational training programs: educational initiatives, including education and vocational training programs, are important to provide individuals with the skills needed to use and maintain new technologies. Policymakers and stakeholders need to invest in STEM education, vocational training and certification programs to create a skilled workforce capable of taking advantage of new technologies. This research underscores the critical role that educational institutions must play in supporting innovation and technology transfer in Cameroon. Universities and vocational schools should not only focus on educating students but also on driving research, entrepreneurship, and collaborations with industry. By integrating academic research with national innovation strategies,

Cameroon can harness the intellectual capital within its universities to accelerate technology adoption and develop locally relevant solutions.

Supporting entrepreneurship: Promoting entrepreneurship through business incubators, mentoring programs and access to finance encourages local innovation and the development of local solutions tailored to the needs of developing countries.

Community involvement: Involving local communities in the technology transfer process through awareness campaigns, workshops and participatory approaches ensures that technologies meet local needs and are accepted by the community. This community involvement is fundamental for the effective and sustainable adoption of new technologies.

Gender Dimension: Addressing the gender dimension in technology transfer is critical for fostering inclusive and equitable development. Women, especially in sectors like agriculture, healthcare, and education, play a vital role but are often left behind due to social and economic barriers. Incorporating gender-sensitive approaches into technology transfer frameworks can unlock the potential for wider and more impactful innovation adoption, ultimately contributing to sustainable development goals.

In summary, the practical implications of this study underscore the importance of collaborative efforts and targeted interventions to facilitate technology transfer and innovation adoption in developing countries. By following these recommendations, stakeholders can help create inclusive, sustainable and technology-driven societies that benefit everyone.

8.4 Suggestions for Future Research

While this study provides valuable insights into technology transfer and innovation adoption in developing countries, there are several avenues for future research that could further improve our understanding and inform practical interventions.

Longitudinal studies:

It is recommended that longitudinal studies be conducted to assess the long-term impacts of technology transfer initiatives. By tracking economic, social and

environmental outcomes over time, researchers can better understand the sustainability and effectiveness of these initiatives.

Comparative studies:

Comparative studies across different developing countries can provide more comprehensive insights and facilitate the identification of universal best practices and context-specific adaptations. By comparing the experiences of different countries, researchers can clarify the factors that contribute to successful technology transfer and innovation adoption.

Emerging technologies:

It is extremely important to study the impact of new technologies such as artificial intelligence and renewable energy on the development of underdeveloped regions. Research into how these technologies can be effectively used to address pressing challenges such as poverty alleviation and climate change mitigation can serve as a basis for future policies and actions.

Role of local communities:

Further studies are needed on the role of local communities and cultural factors in technology adoption. Understanding attitudes, preferences and barriers within local communities can help tailor interventions to increase their acceptance and effectiveness. Community-based approaches that actively involve local actors in decision-making are particularly promising.

Policy assessment:

It is important to evaluate the effectiveness of existing policies and interventions to promote technology transfer and innovation adoption. By assessing the impact of specific policies and programs, policymakers can identify areas for improvement and develop strategies to better meet the needs of developing countries.

Interdisciplinary research:

Promoting interdisciplinary research, incorporating perspectives from fields such as economics, sociology, environmental science and technology studies, can provide a holistic insight into the complex dynamics of technology transfer and adoption. Collaboration across disciplines can lead to a more comprehensive and nuanced understanding of these phenomena.

By addressing these areas for future research, researchers can build on the findings of this study and contribute to the development of more effective and sustainable strategies for technology transfer and innovation adoption in developing countries. Ultimately, this research has the potential to drive positive change and promote inclusive development in these regions.

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APPENDIX

Appendix-1: Sample Interview Questions (Same Questions Were Used for the Survey)

Research Topic: Technology transfer and innovation adoption in less developed countries: the case study of Cameroon.

Topic Sentence

Technology transfer is the process by which existing knowledge, skills, technologies, production methods and facilities are transferred from one organization or country to another. This may involve the transfer of technology from the research environment to the commercial environment or from developed to developing countries. The objective is to enable the buyer to use and apply technology to improve its processes, products or services, thereby stimulating economic development and innovation.

Innovation adoption is the process by which individuals or organizations begin to use a new technology, product, process, or idea. This involves recognizing the value of innovation, integrating it into existing systems, and changing behaviours or processes to effectively integrate new technologies. Adoption often goes through several stages, including awareness, interest, evaluation, testing and full implementation, and can be influenced by factors such as perceived benefits, ease of use, cost and compatibility with existing applications.

Aim of study

This paper aims to raise awareness about technological transfer and innovation among developing countries and examine how factors such as energy supply, internet and telecommunication access, and government barriers impact technology transfer and innovation in Cameroon. Technology transfer play a vital role in emerging economies due to their ability to innovate and create jobs. The adoption of new technologies is crucial for competitiveness and long-term growth in developing countries.

Ethical Concerns

Upon your participation in this research anonymity is guaranteed both in keeping your answers confidential and identity. Nothing discussed during the interview will be disclosed to any third party. All the information collected during this interview will serve its sole purpose; only for this study. Participation for this research is voluntarilyand you are at liberty to withdraw from this study at any stage during this research. Taking part in the study do include audio recordings and will be safe guarded to protect respondents.

1. How can you rate the ease of access involved in obtaining a business license in Cameroon? (complicated/not complicated)

2. How many employees do you have in your organization?

3. Are you aware of the availability of the different technologies that can make your business grow? Exemplify if possible.

4. What technologies do you currently use for your business process?

5. What new technology will you like to implement in your business process?

6. With the above-mentioned technologies in use what effects on your business'

productivity do you wish to achieve?

7. What added advantages will the new (not yet in use) technologies bring to the country's economy?

8. What hindrances do you face that prevents you from using the new technology in your business process?

9. What kind of existing technological innovation do you prefer to use in your day-to-day activities of your enterprise?

10. Based on the barriers to technological innovation can you explain how these affect your activities?

11. In the case of Cameroon in particular, what are the barriers to technological

innovation? Please explain

12. What role does energy shortage, internet and lack of infrastructure play to hinder technological innovation or diffusion in your opinion? Please be as explicit as possible

13. What role does the telecommunications services play with technological innovation? Please provide details.

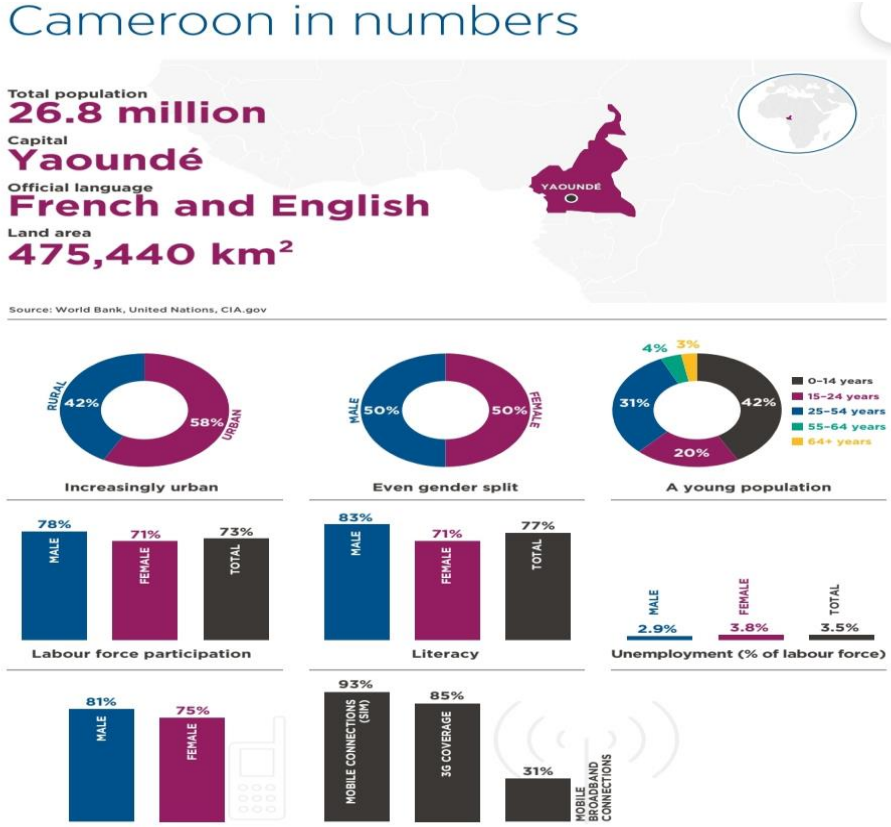
14. How does government policies, business environment hinder the use of innovative technologies for SMEs in Cameroon? Can you please give examples?

15. What impacts does technological advancement have on your business operations?

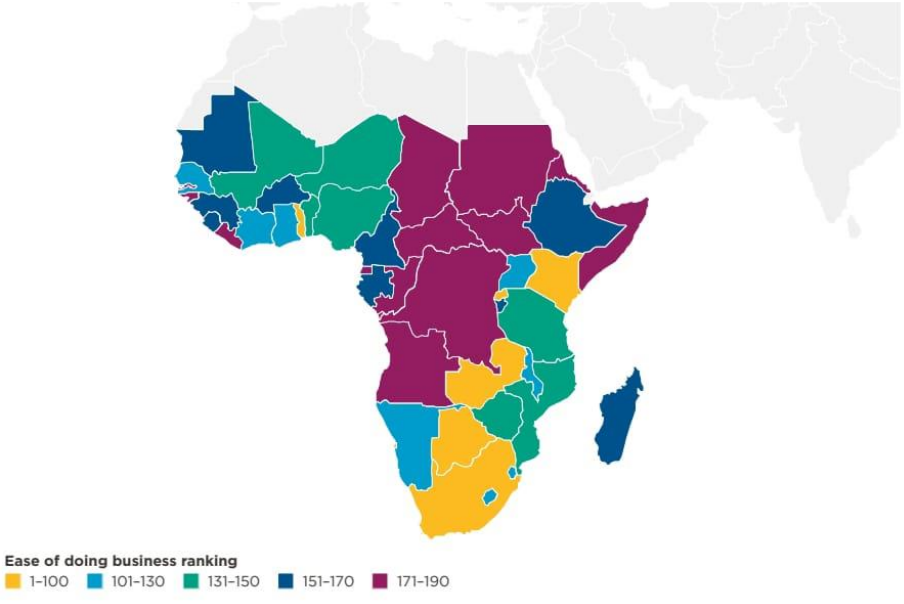
16. What clear proposals can you recommend for the government to improve your use of technological innovations?

- Availability of financial subventions
- Better internet services and energy services
- Provision of technology materials
- Training programs for tech

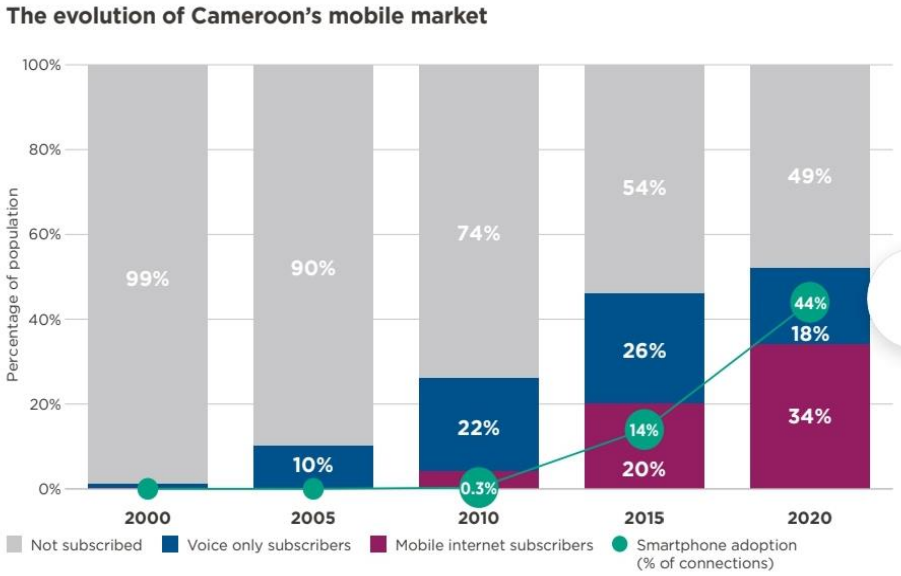
Appendix -2: Cameroon Demographics



Appendix 3: Ease of Doing Business Ranking



Appendix 4: Cameroons Internet Connectivity Evolution



13

RESUME

Kouanou Klay KLESS

OBJECTIVE:

As a final-year student in engineering management, I am committed to leveraging my interdisciplinary skills in engineering and business to drive innovation and optimize organizational efficiency. With a strong foundation in technical principles and strategic management, I aim to contribute to dynamic projects that merge technological advancement with effective leadership practices.

Skills & Abilities

- Physical stamina and endurance.
- Safety awareness and social responsibility.
- Initiator, negotiator professional and reliable.
- Ability to work independently, collaboratively and effectively as a team.
- Committed and dedicated to work ethic.
- Adaptability and ability to work under pressure.
- Strong Interpersonal communication skills.
- Leadership and delegation.
- Problem analysis and problem solving.
- Time management.

WORK EXPERIENCE:

2022-2023 / ESTHERIAN Clinic Call Center

- Placed phone calls offering customers high-quality products and services.
- Answered all customer questions and complaints in a professional manner.
- Strived to meet a daily sales goal as an individual and a team.
- Calm frustrated or upset customers by providing excellent and friendly service.

- Report to supervisor with any problems or suggestions to better work atmosphere.

EDUCATION:

2022-2024 | Istanbul Gedik University | Masters in Engineering Management

2020-2021 | IUT FV Institut universitaire de Technology Fotso Victor | Bachelor in Industrial maintenance and Production

2017-2019 | LINAFI Limbe Nautical Arts and Fisheries Institute| University technology diploma in ship maintenance and industrial maintenance

Achievements

- 2019 second graduate major from university technology diploma.
- 2021 4th major in bachelors of industrial maintenance and production.

Languages

• English: read, written, and spoken (Very Good).

• French: read, written, and spoken (Very Good).

• Turkish: read, written, and spoken (Good).