A FRAMEWORK FOR ENHANCING SUSTAINABLE COMPETENCY OF SMALL AND MEDIUM CONTRACTORS IN THE ETHIOPIAN CONSTRUCTION INDUSTRY

Thesis

Submitted in partial fulfilment of the requirement for the degree of

DOCTOR OF PHILOSOPHY

by

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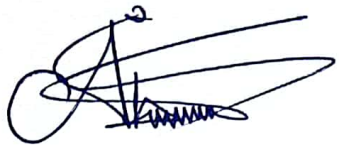
DECLARATION

I hereby declare that the Research Thesis entitled **"A Framework for Enhancing Sustainable Competency of Small and Medium Contractors in the Ethiopian Construction Industry"** which is being submitted to the National Institute of Technology Karnataka, Surathkal in partial fulfilment of the requirements for the award of the degree of **Doctor of Philosophy in Civil Engineering,** is a bonafide report of the research work carried out by me. The material contained in this Research Thesis has not been submitted to any University or Institution for the award of any degree.



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CERTIFICATE

This is to certify that the Research Thesis entitled **"A Framework for Enhancing Sustainable Competency of Small and Medium Contractors in the Ethiopian Construction Industry"** submitted by Mr. Abraham Aboneh Bekele (Register No. 197CV001) as the record of the research work carried out by him, is accepted as the Research Thesis submission in partial fulfilment of the requirements for the award of degree of **Doctor of Philosophy**.

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A B S T R A C T

Small and medium contractors (SMCs) are vital in promoting socioeconomic development, particularly in developing economies, as they constitute a significant portion of the construction industry (CI). Their significance lies in their ability to create employment opportunities, generate revenue, develop infrastructure, and have strong links with other sectors of the economy, which have multiple effects on the country's growth. While acknowledging their significant importance and contribution, it is evident that there is a need to enhance and maintain their competency in light of various challenges affecting their growth. This research aims to devise a sustainable competency development framework for enhancing the competitiveness of SMCs in the Ethiopian CI and establish management mechanisms to facilitate their business sustenance. The specific objectives are to: identify factors affecting sustainable competency of SMCs; assess the effectiveness of the development programs in enhancing progress in the CI; evaluate the prevailing opportunities to create sustainable SMCs and develop appropriate improvement mechanisms to exploit these opportunities; and develop sustainable competency development framework for SMCs. The study employed qualitative and quantitative research methods. This approach allowed for gathering input from industry stakeholders, which was then used to develop the framework. The findings of this study provide a comprehensive understanding of the factors impacting the sustainable competency of SMCs in Ethiopia. The study identified the major underlying factors or challenges, such as the lack of project management skills; low-profit margin due to high competition; inability to access plants and equipment; and the inability to access financial resources emanating from endogenic core sources. Additionally, the study also identified factors or challenges stemming from exogenic core sources including unfavourable financial policy, lack of trust between parties in the industry, and uncertainty in supplies of materials and prices. Furthermore, the study's findings offer valuable insights into potential improvements that could enhance the prospects of sustainable SMCs development in Ethiopia. These improvements encompass encouraging local construction material producers and enhancing their capacity, advocating for an industry-based education system, introducing sector-specific financing programs, and implementing project planning, scheduling, and performance tracking practices. The study's findings highlight priority areas for enhancing

competitiveness, providing valuable guidance for policymakers, regulators, entrepreneurs, and other stakeholders in making informed decisions.

Keywords: Construction industry, Impacting factors, Improvement mechanisms, Small and medium contractors, Sustainable competency development

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ABBREVIATIONS

CDP	Contractor Development Program
CI	Construction Industry
CIDB	Construction Industry Development Board
ECBP	Engineering Capacity Building Program
ERA	Ethiopian Road Authority
ECDSWCo	Ethiopian Construction Design and Supervision Works Corporation
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit
GTP	Growth and Transformation Plan
IHDP	Integrated Housing Development Program
ILO	International Labour Organization
MoFED	Ministry of Finance and Economic Development
MoUDC	Ministry of Urban Development and Construction
MoWUD	Ministry of Works and Urban Development
MSE	Micro and Small Enterprise
NCDP	National Contractor Development Program
NGO	Non-Governmental Office
OECD	Organization for Economic Co-operation and Development
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
SMC	Small and Medium Contractors
SME	Small and Medium Enterprises
TVET	Technical and Vocational Education and Training
UN	United Nations
UNCHS	United Nations Centre for Human Settlements
URRAP	Universal Rural Road Access Program
USD	United States Dollar

DEFINITION OF TERMS

Capacity refers to a comprehensive term denoting the inherent capability and available resources of a construction firm or project to effectively initiate, manage, and bring construction activities to successful completion. This multifaceted concept, as articulated by Arneson (2018), is shaped by a range of influential factors, including but not limited to workforce, equipment, and available resources.

Competency refers to an organization's capacity to execute tasks, activities, and functions with effectiveness and efficiency, resulting in performance excellence in and the achievement of its goals (Edgar and Lockwood, 2008). Stewart and Hamlin (1992) also defined competency as organizationally embedded abilities and capabilities that enable the efficient performance of a role or function. This concept encompasses a diverse range of attributes and capabilities that collectively contribute to the overall success of an organization. These include skills, knowledge, resources, processes, and various inherent capabilities of the organization.

Construction Industry: is a sector of the economy that encompasses a wide range of activities related to the planning, design, development, construction, and maintenance of physical structures and infrastructure (Lema, 1996). Hillebrandt (1985) further extends this definition to encompass other facets of the industry, such as the manufacturing and supply of materials and components, project financing, and the management of existing construction items.

Contractor Development Program is a structured initiative designed to enhance the capabilities, skills, and overall development of contractors or construction firms (Milford, 2009). These programs can vary in scope and scale but share the common objective of elevating the professionalism and capabilities of contractors.

Entrepreneurship is a comprehensive and dynamic process of identifying, creating, and pursuing opportunities through a series of strategic activities and mindsets aimed at establishing and operating a business, with the overarching goal of generating profit and achieving sustainable growth (Shane, 2007).

Endogenic Factors refer to internal elements and influences that directly impact the organization's operations, structure, and performance (Atibu, 2015). These factors originate from within the organization itself and are typically under its control.

Exogenic Factors are external elements and influences derived from the complex system of physical and social elements within the broader external environment in which the organization operates. These factors extend beyond the organization's direct control (Pearce and Robinson, 2000).

Purposive sampling is characterized by the deliberate selection of sampling units within a limited segment of the population (Guarte and Barrios, 2006). According to Guarte and Barrios (2006), this method focuses on obtaining the most in-depth information on the characteristics of interest, offering optimal insights into an issue about which little is known.

Quantitative research is a systematic empirical investigation that uses statistical, mathematical, or computational techniques to collect and analyze numerical data. It involves the systematic collection and interpretation of quantitative data to describe patterns, relationships, or causal connections within a specific population or phenomenon (Zegeye et al., 2009).

Qualitative research: an approach to gather non-numerical data and related ways of analysis where emphasis is on the qualitative results. It seeks to understand, interpret, and uncover the underlying meanings and patterns within human experiences, behaviors, and social phenomena (Zegeye et al., 2009).

Research is a human activity that involves intelligent and practical investigation or exploration in order to gain knowledge and uncover the truth. It employs a systematic approach that includes observation, study, and experimentation to arrive at specific facts and conclusions that can be applied to real-world problems (Kumar, 1999).

Sustainability, as defined by the Merriam-Webster Dictionary, it refers to the capability of being sustained. It is the ability of a business to endure and thrive over the long term by balancing economic, social, and environmental considerations.

CHAPTER ONE

INTRODUCTION

This thesis presents a comprehensive study that investigates the factors influencing the competency of small and medium contractors within the Ethiopian construction industry and aims to develop a framework for enhancing their sustainable competencies. This chapter provides an overview of the report, including the background and rationale for conducting this study, a concise discussion of the problem statement, research objectives, scope and significance of the study, research methodology, and the primary contributions to knowledge.

1.1. Background

1.1.1. A Historical Overview of the Ethiopian Construction Industry

The modern construction industry (CI) in Ethiopia can be divided into six distinct periods, as described by Jekale (2004). The first period, pre-1968, was characterized by the dominance of foreign companies. Construction projects during this time were mainly awarded to foreign contractors through international competitive bidding processes, leading to a significant reliance on overseas skilled workforce. Unfortunately, this practice failed to foster local capacity development, hindering domestic construction contractors' growth and ultimately causing stagnation within the Ethiopian CI. However, despite this setback, the Ethiopian Imperial Government proactively rejuvenated the CI by introducing the Imperial Highway Authority (IHA) as a semi-autonomous agency through Proclamation No. 115/1951. The central focus of the IHA was to undertake the rehabilitation, restoration, and expansion of Ethiopia's road network. In 1967, the IHA became official as the Road Transport Administration under Proclamation No. 256/67, and later, in 1976, it was restructured again as the Road Transport Authority under Proclamation No. 107/76. Two years later, in 1978, Proclamation 133/1978 facilitated the establishment of the Ethiopian Roads Authority (ERA). This newly established road authority included various departments, such as the Rural Roads and Highway Department (Murison, 2002).

The second phase covers periods from 1968 to 1982, characterized by the emergence of small-scale domestic construction companies. The government actively promoted private sector development during this period, establishing numerous such companies

nationwide. The government introduced various targeted measures to strengthen the capacity and competitiveness of emerging domestic construction companies. One such strategy involved facilitating their engagement in feeder road projects. Among the domestic contractors who benefited from these measures were BERTA Construction Company, National Engineers and Contractors (NEC), and Ethiopian Building Road Construction (ETBRC), all of which were prominent in the industry (Jekale (2004).

The third phase of Ethiopian CI history, which took place between 1982 and 1987, was marked by the dominance of state-owned construction companies. This era is commonly known as the "Parastatal company domination period," as the government took over private construction companies and converted them into state-owned entities. During this time, construction projects were awarded to state-owned companies without undergoing a competitive bidding process. This approach was heavily criticized as a missed opportunity for fostering a competitive CI in the country. Moreover, during the same period, the Ethiopian CI underwent changes, introducing a distinct phase for design services and construction. In 1977, the Construction Design Share Company (CDSCo) was established, followed by the Transport Construction Design Share Company (TCDSCo) in 1987 and the Water Works Design and Supervision Enterprise (WWDSE) in 1998. These entities provided planning, study, design, and supervision services for various building, transport, water, and hydropower projects. Later, the three aforementioned companies were consolidated to create a fully integrated, multi-disciplinary engineering consulting firm known as the Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo) in 2015. ECDSWCo was mandated under Council of Ministers Regulation No. 365/2015 to provide consultancy services in various areas, including Water and Energy, Building and Urban, Transport, Geotechnical, and Underground Works (Jekale, 2004).

The fourth phase of the Ethiopian CI evolution, spanning from 1987 to 1991, was characterized by fragmentation. During this period, specialized design firms emerged, focusing exclusively on providing design services, while construction companies directed their attention toward actual building processes. The fragmentation era represented a significant transformation toward a more specialized and diversified CI, with a heightened emphasis on implementing high-quality design and construction practices. This trend persisted and extended into subsequent periods as the industry matured and became more complex (Jekale, 2004).

The period from 1991 to 2001 marked the fifth phase in the history of the Ethiopian CI, coinciding with the rise of the EPRDF-led transitional government. This political transition brought about a renewed emphasis on privatization, transitioning the country from a command economy to a free-market system. As part of this shift, the government implemented various reform measures to support the growth of the private sector, including measures aimed at facilitating the establishment of private construction companies. Consequently, numerous private construction companies emerged and actively participated in various construction projects. Over time, the influence of public companies in the construction sector gradually declined, while private firms gained increasing prominence and influence. The shift towards a more privatized CI was a significant development during this period (Jekale, 2004).

The post-2001 period of the Ethiopian CI is characterized as a phase dedicated to capacity building. During this time, the primary objective was to strengthen the capabilities of construction companies by equipping them with skilled human resources and facilitating access to modern techniques, materials, and technologies. According to Jekale, 2004's observation, significant efforts were made to elevate the overall quality of construction practices within the industry, emphasizing the establishment of higher standards for both private and public companies.

Over time, the Ethiopian CI has made significant progress since its inception. The different periods of growth and evolution have played a vital role in shaping the industry into its current state. Although challenges and obstacles have been encountered along the way, the industry has exhibited remarkable resilience and adaptability, responding effectively to changing economic and political conditions. As the industry continues to expand and advance, it will be crucial to prioritize capacity-building efforts so that construction companies can acquire the requisite skills and resources to meet the demands of an ever-changing, complex, and competitive industry.

1.1.2. The Domestic Capacity of the Ethiopia's Construction Industry

The CI in Ethiopia is dominated by a large number of small contractors and a relatively small number of larger ones. Data from the Ethiopian construction contractors' registry in 2017 revealed that the vast majority of domestic contractors (96.34%) were classified as small to medium-sized. The registry showed 6,803 active contractors in the country, with the majority (64.81%) registered at lower grades ranging from Grades 6 to 10. Medium-

sized contractors (Grades 3 to 5) accounted for 31.24% (2,125 contractors), while large contractors (Grades 1 and 2) represented the smallest portion, with only 249 (3.66%) registered. In general, the capacity of domestic construction companies to meet the country's demand for construction is very low, as noted by Mengistu and Mahesh (2020). Foreign contractors are the predominant participants in the project pipeline for awarded contracts in Ethiopia. Chinese firms have the largest share among these contractors, followed by Turkish and Brazilian firms.

In Sub-Saharan Africa, Ethiopia boasts the highest number of Chinese-contracted projects, estimated at nearly USD 6 billion in 2018, a notable increase from USD 3.56 billion in 2013. Chinese contractors now secure the majority of capital and technology-intensive construction projects, including airports, highways, railways, and buildings exceeding 20 stories (Wolf and Cheng, 2018). Chinese projects in Ethiopia constitute 50% of public projects, 17.5% of energy and water projects, 16.3% of manufacturing projects, and 13% of telecommunication projects. In 2016 alone, Chinese contractors reported project revenues of USD 4.7 billion in Ethiopia, equivalent to 6.7% of the country's GDP. Furthermore, of the 32 international construction contractors operating in Ethiopia in 2017, 26 (81.25%) were Chinese contractors, outperforming both domestic and foreign counterparts (Wolf and Cheng, 2018).

Other significant stakeholders in the Ethiopian CI are construction consultants engaged in various design and supervision projects. However, it is essential to note that the number of consultants available and their level of expertise are relatively limited as noted by Mengistu and Mahesh (2020). Foreign consultants are mainly responsible for designing and supervising more extensive infrastructure and building projects, which limits the opportunities for local consulting firms to gain valuable experience and enhance their capabilities. The heavy reliance on foreign consultants, particularly for designing and supervising large-scale infrastructure and building projects, further exacerbates the issue and underscores the existing gap in local capacity (EAA, 2006).

Ethiopia's domestic construction companies struggle to meet the country's construction demands due to limited capacity and resources. This challenge is exacerbated by the increasing complexity and technological advancements of construction projects, which require specialized skills and knowledge. Unfortunately, domestic contractors often struggle to keep pace with these advancements, resulting in a significant supply and

demand gap. Domestic contractors' capacity can only cover less than 30% of the Gross Value of Production (GVP) for construction, leaving a substantial gap between supply and demand (Ethiopian Business Review Report, 2018). Additionally, domestic contractors face challenges such as limited financial resources, limited access to technology, and a shortage of skilled human resources.

Moreover, the construction project management system in the country is ineffective, and supply chains and procurement systems often suffer from unreliability and inefficiency. Corruption is also a significant issue, further impeding the progress of domestic construction companies (Mengistu and Mahesh, 2020). Additionally, there is a scarcity of consultants with limited capacity to supervise complex projects. This exacerbates the challenges faced by domestic contractors in completing intricate construction projects that demand specialized knowledge and expertise.

1.1.3. The Role of the Construction Industry in the Ethiopian Economy

The CI has a significant and far-reaching impact on the global economy (Ibrahim, 2010; Alaloul et al., 2021). According to the 2021 Global Construction Trends report, this industry supports over 100 million jobs worldwide, accounting for approximately 6% of the global GDP. It contributes around 5% to the GDP in developed economies, while in developing economies, its significance is even greater, contributing around 8%. Moreover, the Global Construction Market Report 2022 reveals that the construction market reached USD 7.28 trillion in 2021 and is projected to grow at a Compound Annual Growth Rate (CAGR) of 7.3%, reaching USD 14.41 trillion by 2030, underscoring the industry's significance.

In Ethiopia, the CI significantly contributes to the country's overall GDP growth, as reported by the African Economic Outlook (2017). It has been a critical driver of economic development, accounting for a substantial contribution of over 8.5% to the country's GDP. Another significant contribution of the CI is revenue generation for the government, both at the regional and federal levels. This revenue includes rental income, corporate and employee income taxes, and sales tax, all stemming from the industry's direct and indirect employment effects (ECIDP, 2018). Considering the importance of the CI to the national economy, the contribution of SMCs is substantial and cannot be overstated (MoUDC, 2017).

Over the years, the importance of SMCs has grown significantly on a global scale. With relatively low entry barriers to the business, they have the capacity to generate employment opportunities, drive infrastructure development, promote entrepreneurship, and establish robust inter-sectoral linkages, making them pivotal drivers of societal development (Ahiawodzi and Adade, 2012). Similarly, in South Africa's CI, more than 95% of entities are micro, small, and medium enterprises, generating 50% of employment opportunities (Chikeya, 2019). In Ethiopia, the CI is predominantly composed of SMCs, comprising more than 96% of the sector and playing a vital role in contributing to the country's GDP and employment rates. The construction sector contributes over 8.5% to the country's overall GDP growth, according to the African Economic Outlook (2017). Furthermore, the industry employs over 1.74 million people of the Ethiopian workforce, as reported in the Labor Force Survey (LFS) of the Ethiopian Central Statistical Agency (ECSA) in 2021.

1.2. Problem Statement

In most developing economies, including Ethiopia, SMCs are increasingly recognized as productive engines for economic development. Despite their potential and significance to the national economy, statistics indicate that most SMCs do not experience significant growth, primarily due to various factors. Thwala and Phaladi (2009) conducted an empirical study on the South African CI and discovered that three out of every five SMCs fail during the first five years of operation. Similar research by Venter et al. (2015) corroborates the findings of Thwala and Phaladi (2009), showing that 70% to 80% of SMCs fail during the first five years of operation due to various factors. However, there is still a lack of comprehensive understanding regarding the factors that determine their sustainable competency in the CI. Some studies have explored the various causes of poor SMCs performance. These causes include a lack of qualified and certified human resources, an unreliable and inefficient supply chain for construction materials, inefficient procurement systems, and a lack of institutional support mechanisms for credit facilities (MoUDC, 2012; Animut, 2019). Furthermore, factors such as insufficient business management skills, limited access to resources (Ogunbiyi et al., 2016), a weak CI network (Jekale, 2004), poor organizational culture and structure (Kulemeka et al., 2015), and a challenging social, political, and economic environment (Fida, 2008) have a negative impact on the competency of SMCs

Improving the sustainable competency of SMCs necessitates the implementation of comprehensive measures that target both the enterprises and their operating environment. At this point, Ethiopia has taken significant steps towards improving various internal and external challenges through a series of government-led interventions. Despite the interventions being carefully planned and implemented in addressing problems and providing policy directions, they often did not produce the desired outcomes. Hence, it is crucial to identify and address the root factors impacting their competency and develop a sustainable competency improvement framework to unlock untapped opportunities for sustainable development and enhance the performance of SMCs in the Ethiopian CI.

1.3. Objectives of the Research

The aim of this research is to devise a sustainable competency improvement framework for developing SMCs in the Ethiopian CI and establish management mechanisms to facilitate their business sustenance. With this aim, the following specific objectives were set:

1. Identify factors affecting sustainable competency of SMCs in Ethiopian CI;
2. Assess the effectiveness of the development programs in enhancing progress in the construction industry;
3. Evaluate the prevailing opportunities to create sustainable SMCs in the Ethiopian CI and develop appropriate improvement mechanisms to exploit these opportunities;
4. Develop a sustainable competency development framework for SMCs

1.4. Expected Contributions

Understanding the dynamics of factors that influence competencies and competitiveness in the business environment is essential for the success of SMCs. These factors encompass a wide range of elements that shape the capabilities and effectiveness of a firm. Hence, adopting a holistic and proactive approach to continuously assess and address these factors is essential. This study examines these factors and develops a competency improvement framework to enhance them. The outcomes of this study highlight priority areas for improving competitiveness. They also provide valuable insights for the government to make informed decisions when formulating, implementing, and monitoring policies, strategies, and regulatory frameworks to create a conducive business

environment for SMCs to thrive. Entrepreneurs can also benefit from a deeper understanding of essential competencies, influential factors, and improvement mechanisms. Furthermore, the expected outcomes can serve as a benchmark for further studies in the field, enabling a deeper exploration of the domains addressed in this research.

1.5. Research Scope

Ensuring the sustainability of SMCs is essential for the development and growth of the CI, whether the economy is developed or developing. Achieving sustainability requires SMCs to have a profound understanding of the factors that influence their performance and long-term viability. This study aimed to gain a comprehensive understanding of both endogenic and exogenic factors affecting the sustainability of SMCs and to provide a framework for improvement based on these factors. The endogenic factors encompassed various aspects, including organizational structure, culture, entrepreneurial characteristics, competitive strategy, resources, managerial skills, and contract administration. On the other hand, the study considered exogenic factors such as government policies, regulations, industry connections, and bidding culture. By considering both sets of factors, the study presented a holistic and integrated approach to improvement. The study proposed a comprehensive improvement framework that emphasizes the importance of entrepreneurial qualities, enhances institutional capabilities and operating conditions, fosters the development of construction technology and sustainable materials, and focuses on improving human resource development. The findings and recommendations from this study hold significant value in enhancing the sustainability of SMCs and the CI as a whole.

In order to collect a wide-ranging and thorough dataset, the research employed a combination of semi-structured interviews, document analysis, and a questionnaire survey involving SMCs and other key stakeholders in the industry. This approach ensured a robust foundation for developing the improvement framework. Due to time, logistics, and resource constraints for data collection, the research primarily focused on Addis Ababa and selected towns within the Oromia regional state. However, the study's findings and recommendations are relevant to SMCs operating in other regions.

1.6. Thesis Organization

This study consists of ten chapters and five appendixes. The first four chapters present the context and the research approach, while the subsequent five chapters explore the main research topics in depth. The final chapter provides a conclusion summarizing the main findings, implications, and recommendations for further research.

Chapter 1 provides a brief background, states the problems, and outlines the research objectives. It also explains the expected contributions and research scope.

Chapter 2 presents an overview of the research literature that explores the factors impacting the competency of SMCs and evaluates the trends and past experiences in developing the sustainable competency of SMCs. Furthermore, the chapter discusses various mechanisms for improvement in this context.

Chapter 3 develops conceptual frameworks for the study and hypothesizes the relationships among constructs important for the study's theoretical perspective. The framework summarizes the relationship between endogenic and exogenic factors and their impact on the sustainable competency of SMCs. It also outlines the improvement framework for sustainable competency in SMCs.

Chapter 4 provides a comprehensive understanding of the research methodology, including philosophical foundations, dominant research paradigms in construction management, and the rationale and evaluation criteria for the research design Furthermore, it details the data collection method, including population and target population, sample selection methods, sampling techniques, instruments for data collection, pilot testing, and validity.

Chapter 5 focuses on endogenic factors that impact the sustainable competency of SMCs. The chapter begins by providing an analysis of the descriptive statistics used to measure the impact of endogenic factors on the sustainable competency of SMCs. The factors are categorized based on their presumed sources, including organizational structure, organizational culture, entrepreneur characteristics, competitive strategy, organizational resources, managerial skill and competency, and tendering and contract administration. The findings from the interviews substantiated the findings from the survey questionnaire. Furthermore, the document analysis was also used to supplement the interview and questionnaire survey results.

Chapter 6 focuses on exogenic factors that impact the sustainable competency of SMCs. The chapter examines the following presumed sources of sustainable competency-impacting factors: government policies, regulatory framework, industry networks, a culture of competitive bidding, and technology and innovation. Like the endogenic factors, the interview results confirm the survey questionnaire's findings. In addition, the document analysis is also used to reinforce the findings from the interviews and surveys.

Chapter 7 evaluates the effectiveness of CDPs in sustaining the competency of SMCs in the Ethiopian CI. The study measures participants' satisfaction, knowledge gained, skills developed during the program, and institutional challenges encountered during and after the program. Results from both quantitative (questionnaire survey) and qualitative (document analysis and interviews) analyses are complementary, validating the findings.

Chapter 8 evaluates the prevailing opportunities to create sustainable SMCs in the Ethiopian CI and develop appropriate improvement mechanisms to exploit these opportunities. The chapter begins by highlighting the Ethiopian CI market size, prevailing opportunities in the infrastructure development, and discusses potential regulatory reforms and policy initiatives to enhance SMCs' development. It also presents the results of management mechanisms concerning the factors that impact the sustainable competency of SMCs. These management mechanisms encompass revaluing the firm's entrepreneurial features, enhancing institutional capability, the operating environment, construction technology development and innovation, sustainable construction material supply chain, and human resource development. Results obtained from quantitative and qualitative analyses reveal that the management mechanisms of each factor significantly influence the sustainable competency of SMCs.

Chapter 9 presents improvement frameworks, covering the roles of key industry stakeholders, including governments, academic institutions, research institutes, and industry organizations, in driving sustainable competency in SMCs.

Chapter 10 summarizes the study's key findings and presents the study's conclusions. The chapter also discusses the implications of these findings, highlights the significant contributions of the research, and concludes by acknowledging the study's limitations and suggesting areas for further investigation. The findings from interviews, surveys, and document analysis were consistent and supported the conclusions drawn from the study's earlier chapters.

CHAPTER TWO
LITERATURE REVIEW

This chapter provides a comprehensive review of the literature on endogenic and exogenic factors that impact the sustainable competency of SMCs in the CI and the improvement mechanisms. It also it examines the trends in SMCs development programs in Ethiopia.

2.1. Factors Affecting the Sustainable Competency of SMCs in the CI

Competency and sustainability are two critical elements for the success of any organization. Competency encompasses various factors such as skills, resources, information, technology, and corporate culture that enable an organization to achieve its goals, gain a competitive advantage, and achieve superior performance (Edgar and Lockwood, 2008). On the other hand, sustainability refers to a business's ability to maintain or support itself over time. Organizations must address certain critical factors that affect them to achieve sustainable competency and continuously align their competencies with their operating environment (Tiruneh and Fayek, 2018).

The ability of a business to compete in a competitive market depends on several factors affecting its competitiveness and how effectively it responds to them. Some of these factors are endogenic, meaning they are raised within an organization, and the company controls them. Other factors are related to exogenic sources, meaning the business environment raises them. To sustain competency, organizations must be mindful of internal and external factors and proactively address them to remain competitive.

The endogenic factors include access to resources, business management skills, the existence and choice of an appropriate strategy, the culture exercised within the organization, organizational structure, and more (Chilipunde and Shakantu, 2010; Donkor, 2011; Godfrey, 2012; Kulemeka et al., 2015; Offei et al., 2019). Exogenic factors encompass various aspects such as governmental policies, procurement and disbursement procedures, imports and foreign exchange transactions, the availability of human resources, materials, and plants, corrupt practices, customs, the general political climate, competitors, financial sectors, regulatory frameworks, and other institutions (Freeman, 2000). Contracts, rules and regulations, industry networks, competition, and access to finance also influence a firm's performance (Offei et al., 2019; Hardie and Newell, 2011).

Identifying and recognizing these factors and their relationship with the business allows for the development of necessary strategies and instruments.

2.1.1. Endogenic Factors Affecting the Sustainable Competency of SMCs in the CI

Endogenic Factors are internal elements and influences that directly impact the organization's operations, structure, and performance, typically arising within and under its control. This literature review section aims to comprehensively explore endogenic factors significantly affecting the sustainable competency of SMCs in the CI. These factors were chosen based on their significance in influencing SMCs' sustainable competency, analyzed from existing literature, and synthesized findings from various sources in construction management and entrepreneurship. The detailed discussion will cover organizational structure, culture, entrepreneurial characteristics, competitive strategy, resources, managerial skills, and contract administration.

2.1.1.1. Organizational Structure

The organizational structure pertains to the system that outlines how the company arranges its activities, defines job roles, and establishes internal connections (Daft, 1992). This structure dictates how the firm's activities are grouped and supported by its functions or management layers. It serves as a visual representation of the company and a basis for measuring its performance and competency. Furthermore, the organizational structure can impact a firm's performance and its ability to adapt to environmental changes (Eze, 2017). For instance, a decentralized structure with high levels of autonomy may be more flexible and responsive to changes in the market. In contrast, a centralized structure with strict procedures may be better suited for industries with high regulatory requirements. The degree of standardization can also affect a firm's ability to innovate, with highly standardized processes potentially hindering creativity and the development of new ideas. The degree of specialization within a firm can impact its level of expertise in a given area, while coordination mechanisms can influence how information and resources are shared and utilized within the organization (Wagner, 2021).

According to Nwachukwu and Chladkova (2019), the organizational structure of a company has the potential to influence its culture and values, ultimately affecting the way employees interact with one another. This, in turn, has implications for job satisfaction and the level of commitment employees have toward the organization. For instance,

consider a flat organizational structure characterized by a reduced number of management tiers. Such a structure places a strong emphasis on empowering employees and can create an environment that encourages collaboration and open communication among team members (Rezgui, 2007). Conversely, a hierarchical structure with clear lines of authority and formal procedures may promote a more disciplined and orderly work environment. Factors such as company size, age, industry, and strategic goals can influence the organizational structure. For instance, small and agile startups may choose a more fluid and adaptable structure to facilitate rapid growth and innovation. At the same time, larger firms may require a more stable and hierarchical structure to ensure consistent operations and financial stability. Moreover, highly regulated industries may need a centralized and bureaucratic structure to comply with legal and ethical standards. In contrast, creative industries may prefer a more flexible and decentralized structure to promote experimentation and risk-taking (Mathiasen, 1999).

Further, the communication flows within a company are influenced by its organizational structure. The structure determines the official channels for communication and how information is shared across different levels of the organization. For instance, in a hierarchical structure, communication is primarily top-down, with decisions made by higher-level management and then disseminated to lower levels. In contrast, a more horizontal or team-based structure can promote open communication and collaboration, with ideas and decisions flowing between peers and teams (Chi et al., 2021). The structure can also impact the organization's transparency and accountability level. A more centralized structure may result in limited transparency and a more hierarchical culture, while a decentralized structure can lead to greater transparency and a culture of empowerment and accountability (Men and Stacks, 2014). Another crucial aspect of organizational structure pertains to employee involvement in decision-making, the level of authority delegated, and the degree of employee participation. These factors can also impact employee motivation and organizational engagement (Meijaard et al., 2002). In addition, the researchers further assert that firms that involve their employees in decision-making and give them a sense of ownership over their work are more likely to have motivated and committed employees. Understanding a firm's organizational structure reveals the relationships between its management operations, roles, resources, and power distribution, aiding in comprehending the company's activities and stakeholder dynamics.

2.1.1.2. Organizational Culture

An organization's culture is a set of collective norms, basic assumptions, mental programs, and beliefs held by its members (Morgan, 1991). It is a critical component of an organization's success, and it can significantly impact its employees' attitudes, behavior, and performance (Nikpour, 2017). Cameron and Quinn's (1999) assessment tool provides insight into the cultural characteristics of an organization, which can help entrepreneurs understand how to align their strategies with the company's values and goals. Through the identification of dominant cultural traits, organizations can make informed decisions about how to improve their performance and achieve their objectives. Cameron and Quinn's (1999)'s model includes four cultural types: clan, adhocracy, market, and hierarchy. Clan culture is a positive culture type that values positive attitudes, participation, teamwork, and consensus-building. This culture fosters a strong sense of unity and shared work ethic among employees. However, an excessive focus on internal orientation can result in a lack of attention to external factors, hindering the organization's ability to adapt to changing market conditions. Adhocracy culture is a culture type that values creativity, innovation, and risk-taking to drive progress and growth. This type of culture is highly adaptable and able to respond quickly to changing market conditions. However, excessive risk-taking can result in costly mistakes that could negatively impact the organization's performance.

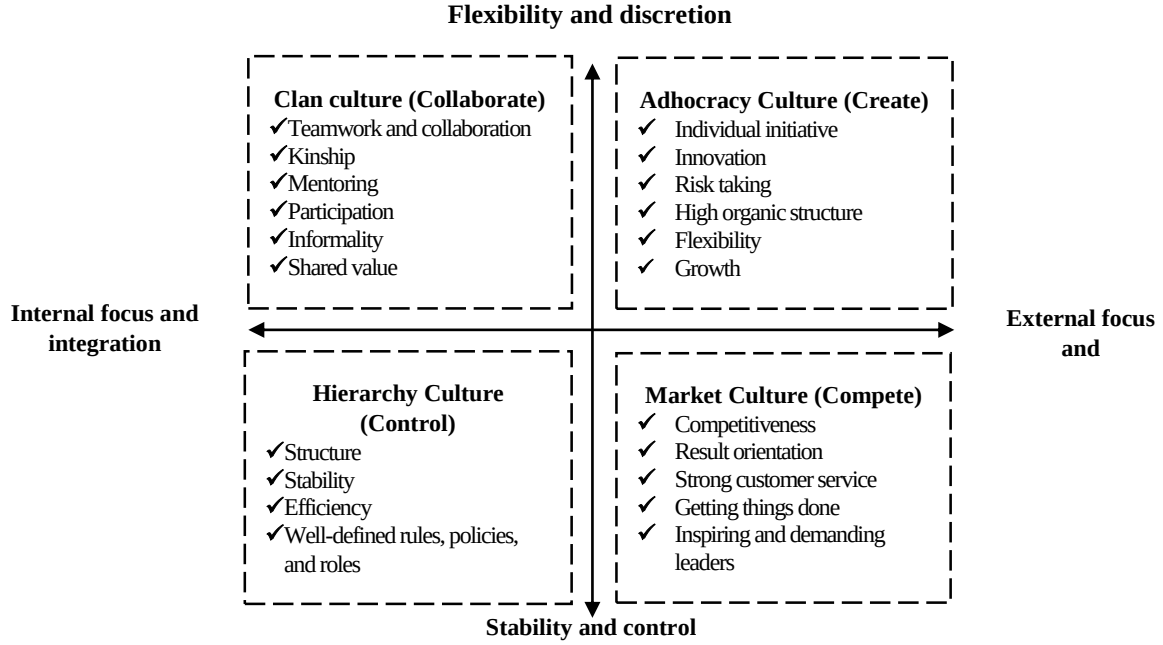

Figure 2. 1. Organizational Cultures Typology (Source: Cameron and Quinn (1999))

Market culture is a culture type that focuses on competitiveness and achieving measurable goals and targets, often through innovative and resourceful means. This type of culture can drive an organization's success, but an excessive focus on external orientation can lead to a lack of attention to internal factors, such as employee satisfaction and retention. A hierarchical culture prioritizes stability, efficiency, and the implementation of established formal regulations and procedures to uphold a structured and organized institution. This type of culture can be highly efficient and effective in accomplishing tasks. However, an excessive focus on inflexibility can hinder the organization's ability to innovate and adapt to changing circumstances. Within these culture types, there are positive and negative domains. For example, collective objectives and values can foster strong unity and a shared work ethic among employees. However, an excessive focus on these factors can result in a lack of attention to individual needs and aspirations. Similarly, stability and productivity are essential for an organization, but an excessive focus on these factors can result in a lack of innovation and resistance to change.

Understanding an organization's culture is vital for evaluating performance and developing strategies to improve it. Positive cultures promote cooperation, creativity, and innovation, while negative cultures arise when transparency, accountability, and communication are lacking, leading to low morale, high turnover, and poor productivity. A toxic work environment inhibits employee performance and hinders organizational success. Culture is not static, and it can change over time. Managers/entrepreneurs should proactively manage these changes by identifying areas that need improvement, implementing programs to promote positive behaviors, and aligning everyone in the organization with the company's values and goals (Schein, 2010).

2.1.1.3. Characteristics of Entrepreneurs

Entrepreneurs are driven by a strong urge to act and embrace risk to pursue objectives. These vital qualities manifest in various ways, such as creativity, self-reliance, adaptability, tolerance for uncertainty, a relentless pursuit of opportunities, and unwavering commitment (Neneh, 2011). Becoming inclined towards risk-taking and self-confidence also requires the development of specific traits. Risk-taking is a mindset characterized by a dedication to achieving desired outcomes and overcoming obstacles, positively impacting a company's growth potential and market share (Ainuddin and Sa'odah, 2001). On the other hand, self-confidence is the assurance in one's judgment,

ability, power, and expertise gained from experience. A confident entrepreneur is always prepared to tackle challenges with well-thought-out strategies, emphasizing adaptability and cost-cutting to outperform competitors (Snyder and Shane, 2009). Ultimately, entrepreneurs with the right blend of entrepreneurial characteristics are more likely to succeed.

Apart from possessing specific traits, entrepreneurs must also excel in recognizing and seizing emerging opportunities within their industries. They must demonstrate innovation and distinguish themselves from competitors through product differentiation, cost leadership, or focus strategies (Porter, 1985). Entrepreneurship is a dynamic and ever-evolving field, demanding agility and adaptability to navigate changes in the business environment. Strong leadership qualities are equally essential, as entrepreneurs often bear the responsibility of managing and motivating their teams (Alvarez and Barney, 2007; Hisrich et al., 2017). As entrepreneurship's significance in economic growth and job creation increases, many countries have introduced policies and initiatives to support and foster entrepreneurship. These initiatives include funding programs, mentorship opportunities, and regulatory reforms, aiming to assist entrepreneurs in acquiring the necessary skills and resources for success and contributing to the economy's growth. Overall, entrepreneurship is a challenging yet rewarding pursuit requiring distinctive skills and characteristics.

2.1.1.4. Competitive Strategy

A competitive strategy is characterized as an organization's long-term plan for gaining a competitive advantage over its business rivals. Its goal is to establish a defensive position while earning a high-return investment. Competitive advantage is gained through strategic resource management, competencies, capabilities, and responsiveness to external opportunities and threats (McGee and Sammut-Bonnici, 2015). Changes in the environment force SMCs to be strategically competent. This external pressure encourages them to engage in strategic planning to enhance performance (Yahya, 2015). Within this context, Porter (1985) proposed four competitive strategies: (1) A strategy of being less expensive than competitors (cost leadership strategy). This strategy can be effective for firms that operate in a price-sensitive market, where the lowest cost is an option. It involves optimizing production processes, reducing material costs, and cutting overhead expenses. However, this strategy may lead to lower profit margins and a potential decline

in quality. (2) A strategy aimed at offering unique products and services that are valued by buyers (differentiation strategy). This strategy can be achieved through a focus on innovation and quality, but it may also lead to higher production costs. (3) A strategy aimed at identifying a specific market segment and tailoring the company's products or services to meet their needs (focus strategy). This strategy allows the company to specialize in a niche market and can result in increased stakeholder satisfaction. However, focusing on a specific market segment may limit the company's potential for growth. (4) A strategy that involves creating and maintaining a strong image and reputation in the industry, which can lead to increased trust and loyalty (market strategy).

The optimal competitive strategy for a construction company is contingent on several factors, such as its objectives, available resources, and the competitive environment. A thorough analysis of these elements is vital in determining the most effective approach to attain a lasting competitive edge. Regardless of the specific strategy adopted, the organization must remain receptive to external opportunities and threats, necessitating adaptability and flexibility as the market evolves. Furthermore, the organization must cultivate and sustain the required competencies and capabilities to execute the chosen strategy effectively. This may involve investing in research and development, forging partnerships with industry stakeholders, and nurturing a skilled workforce (Barney and Hesterly, 2015; Grant, 2016; Hitt et al., 2019). Overall, the selection and execution of a competitive strategy is critical to any organization's success. Carefully considering available options and developing necessary resources and capabilities enables businesses to gain a sustainable competitive advantage and position themselves for long-term success in their respective markets.

2.1.1.5. Organizational Resources

The business success of SMCs depends heavily on the availability, accessibility, and effective management of resources (Kulemeka et al., 2015). These resources encompass various types, including human, financial, physical, and information resources. They are integrated, utilized, and transformed throughout the business processes. Among these resources, human resource capability plays a crucial role in the development and competitive advantages of SMCs. Human resource capability is crucial for SMCs because it encompasses the knowledge, skills, and abilities required by employees to attain organizational objectives. As Mengistu and Mahesh (2020) note, the progressive development of human resource knowledge, abilities, skills, attitudes, and behaviors is

essential for organizational performance. Furthermore, the efficient utilization and enhancement of employees' knowledge and abilities have a profound impact on the company's overall performance. For example, investing in employee training and development programs can improve the efficiency and effectiveness of the workforce, leading to better organizational performance and competitiveness in the market (Anwar and Abdullah, 2021; Nguyen, 2020).

Financial resources refer to all the monetary funds available to the organization in cash, liquid securities, shares, bonds, credit lines, and other financial instruments. Sufficient financial resources are vital for ensuring efficient and successful business operations. However, SMCs often face financial resource challenges. These financial challenges can significantly hinder the development and growth of SMCs (Phaladi and Thwala, 2008). Limited access to financial resources can lead to reduced productivity and affect their competition with larger companies, as they may not have the same access to capital or resources. Inadequate budget allocations and poor cash flow management can lead to financial instability, hindering the organization's ability to invest in growth opportunities or make necessary upgrades. Additionally, high interest rates and complex financing procedures can restrict the organization's access to the capital necessary for business expansion.

Furthermore, financial resource challenges can also affect the ability of SMCs to attract and retain talent, as they may struggle to provide competitive salaries. As a result, SMCs may struggle to provide competitive salaries, which can, in turn, hinder their ability to develop and effectively utilize human resource capabilities (Moo and Eyiah, 2019). Physical resources, including plants, equipment, technology, and infrastructure, are vital for streamlining business operations, a key factor for SMCs to stay competitive. However, acquiring and managing such resources can be a significant challenge for SMCs, especially in the CI, where specialized equipment and machinery are necessary (Kulemeka et al., 2015). This can create a significant barrier to entry for new businesses and limit the growth potential of existing ones.

2.1.1.6. Managerial Skill and Competency

Running a construction business is challenging, and without the necessary experience and expertise, failure becomes unavoidable (Ajayi et al., 2019). As a manager or entrepreneur in this industry, one must grasp the cycles, technical aspects, and management processes

associated with construction and meet certain expectations to ensure its success. Managers must skillfully influence people's behavior to efficiently achieve organizational goals through resource management, including planning, organizing, leading, and control (Papula, 1995). This necessitates having the capacity for creativity to explore new solutions. It also requires discipline for self-control and regulation, along with the ability to handle stress and uncertain situations cautiously. Piškanin et al. (2006) identified several essential capabilities for fulfilling managerial duties. These include technical skills associated with management methods and techniques, interpersonal skills for motivating and handling conflicts among people, conceptual skills in perceiving the organization, and communication skills focused on effective information dissemination and reception. Managers are also required to maintain skills related to business management, financial management, cash flow management (including cash flow forecast and cost-benefit analysis), supply chain planning and management skills, as well as an understanding of strategic planning and performance management practices (Neneh, 2011).

2.1.1.7. Tendering and Contract Administration

In a competitive CI, tender documents are evaluated first based on technical and financial criteria. Before the technical and financial evaluation, bidders must pass the prequalification criteria. SMCs often struggle to meet prequalification criteria and technical thresholds due to resource limitations, including equipment, human resources, and office space. Additionally, most tender invitations often do not take into account the technical capacity of small contracting firms (Shifidi, 2010). Similarly, as noted by Shakantu (2003), participating in competitive bidding places a significant financial burden on SMCs, exacerbating their challenges. These expenses encompass purchasing tender documents, transportation, communication costs for obtaining supplier quotations, estimator time, tender guarantees, and postage for tender document submission. Shakantu also highlighted that poorly prepared tenders or estimates are among the significant causes of failure for SMCs in the competitive bidding process. SMCs in the competitive CI face challenges that extend beyond prequalification criteria and technical thresholds, encompassing contract management and adherence to rules and regulations.

Furthermore, SMCs face numerous challenges in contract management within the CI. Compliance with contract rules and regulations is a significant concern. Complexities in

construction contract documents often result in incomplete, inappropriate conditions, and unresolved disputes. Inadequate supervision, weak contract rule enforcement, and insufficient estimating and job costing contribute significantly to SMCs' challenges. Moreover, the absence of preferential or affirmative procurement policies exacerbates the difficulties faced by SMCs in this industry. As a result, SMCs encounter increased hurdles in effectively managing contracts and adhering to contract rules and regulations, ultimately impacting their ability to secure and execute contracts (Fida, 2008; Laryea, 2010; Rodrick, 2010; Amoah et al., 2011; Kulemeka et al., 2015; Offei et al., 2019).

2.1.2. Exogenic Factors Affecting the Sustainable Competency of SMCs in the CI

The CI operates as part of a complex system of physical and social elements that significantly influence decision-making and impact a firm's ability to achieve its development objectives (Pearce and Robinson, 2000). These factors encompass a wide range of aspects, including policies, procedures, competitors, financial sectors, regulatory frameworks, socio-cultural and economic environments, technological advancements, and industry networks (Aniekwu, 1995; Freeman, 2000; Osisioma, 2009; Offei et al., 2019; Hardie and Newell, 2011). Examining and monitoring these factors individually is essential for a comprehensive understanding of their inter-relationships and their impact on a firm's operations and performance. Key external factors in the operating environment that affect the CI include government policies, regulatory frameworks, industry networks, the culture of competitive bidding, and construction technology and innovation.

2.1.2.1. Government Policies

Government policy consists of principles and action plans formulated to guide decision-making toward positive outcomes. These include fiscal and monetary policies, microeconomic policies, registration-related policies, and licensing policies. Policies should foster a business-friendly environment that encourages active industry participation (Fida, 2008). Financial support policies alleviate SMCs' financial challenges (Nguyen and Wongsurawat, 2012), while procurement-related privileges promote their active participation in public procurement (Loader, 2018). However, as findings from empirical studies indicate, unfavorable financial policies (Friðriksson, 2000), inconsistent government policy (Ogunbiyi et al., 2016), and poor policy implementation (Offei et al., 2019) are among the most significant impediments to effective governmental policy-making. Additionally, inadequate supportive institutional arrangements (Fida, 2008),

bureaucracy, corruption, and a lack of appropriate technical and managerial skills to interpret policies (Land, 2000) further exacerbate these challenges. Since 2001, the Ethiopian government has developed specific policies for SMCs in both the road sector (Universal Rural Road Access Program (URRAP)) and the housing sector (Integrated Housing Development Program (IHDP)). These national plans prioritized human resource development, technology development and diffusion, equipment and technology capacity building, market development, financial and credit service support, and production and marketing facilities (MoFED, 2006a).

2.1.2.2. Regulatory Framework

The term 'regulatory framework' refers to the government's system of implementing political and legal measures to oversee market activities and ensure societal well-being within a specific economic context. This framework significantly impacts a company's growth by both presenting opportunities and shaping the operational landscape in which it operates (Mwelu et al., 2021). Regulations encompassing land use control, technical requirements, permits, inspections, financial legislation, wages, health and safety standards, remunerations, labor laws, professional and contractor classifications, and environmental standards can impact a firm's competitiveness and performance (Seker, 2010). As discussed by (OECD, 1997), the government can influence the operating environment through economic, social, and administrative regulations. Unnecessary regulations and bureaucracy make it difficult for contractors to maintain profitability and remain competitive (Seker, 2010).

Overall, regulatory frameworks are an essential aspect of the operating environment in the CI, and governments must establish regulations that foster a supportive environment for firms while safeguarding societal interests. To achieve this, governments should focus on developing coherent and unambiguous regulations, reducing bureaucratic procedures, and providing assistance programs to aid firms in meeting regulatory requirements and improving their competitiveness (Dar, 2017; Ruchkina et al., 2017). Furthermore, regular review and revision of government regulatory frameworks is crucial to keep them up-to-date and responsive to emerging concerns in the CI. This can be accomplished by involving stakeholders and by collaborating with industry experts and professionals.

2.1.2.3. Industry Networks

A network is a relationship among a distinct group of entities or people where there is a specific mutual benefit (Harris and Wheeler, 2005). Building and maintaining a strong and sustainable network is crucial for entrepreneurs to succeed in the commercial CI. For entrepreneurs in commercial CI, a practical and enduring industry network is essential to success. Tendai (2013) supports this notion by suggesting that as a business develops new methods of engaging with the industry, it gains access to a greater pool of resources and information, ultimately leading to improved performance.

Tendai (2013) highlights that businesses in the CI adopt innovative ways of engaging with the industry to gain access to valuable resources and information, leading to improved performance. Zhao and Aram (1995) and Jansen (2003) also point out that networking provides access to innovative technologies, potential clients and contractors, supply chain relationships, professional and industry associations, and financial institutions. Additionally, established networks with academic and research institutes can facilitate sustainable development by facilitating the flow of knowledge and skills (Barrett and Barrett, 2003). Creating a robust network requires entrepreneurs to actively seek potential partners and cultivate meaningful relationships, yielding tangible benefits such as new business opportunities, resource access, and increased knowledge and expertise. This involves connecting with potential clients, contractors, suppliers, and other industry stakeholders. Harris and Wheeler (2005) underscore the importance of mutual benefit as the foundation for an effective network. Moreover, entrepreneurs must consistently maintain and nurture these relationships over time by staying in touch, pursuing leads, and providing assistance and support as necessary.

2.1.2.4. Culture of Competitive Bidding

In a competitive bidding environment where the lowest bidder is chosen, participants must strike a balance between offering bids low enough to win the contract and high enough to achieve the expected profit margin (Kimms, 2007). At this point, various factors influence the decision to bid or not, with resource-related factors being the most significant. These include the accessibility and availability of construction materials and equipment, the availability of labor and its productivity level, as noted by Oladinrin et al. (2016). The bidding process also plays a crucial role, including the number of competitors and the intensity of competition, the procurement method, the time available for bid preparation,

and the percentage of work to be subcontracted, according to Dey et al. (2018). Bouazza et al. (2015) also highlighted that unfair competition from non-official sectors exerts influence. The non-official sectors in the industry, being unregistered legally, can bid at lower prices, benefiting from savings on registration, licensing, and taxation. This grants them a substantial economic advantage. Other miscellaneous factors that can impact the bidding decision include inappropriate and high tax impositions regardless of income, a reduction in construction demand resulting from a collapsed national economy, and a company's inability to compete with peer competitors and larger construction firms, as highlighted by Donkor (2011); Shibia and Barako (2017).

2.1.2.5. Construction Technology and Innovation

Construction technology and innovation refers to the characteristics of existing technology and innovation used before and during a project's construction phase, enabling developments in construction materials, methods, techniques, and systems (Ofori, 1994). Its significance in the CI is paramount as it substantially enhances the efficiency and competitiveness of SMCs (Barlow, 2000; Mouchi et al., 2011). The integration of technology and innovative practices plays a crucial role in enabling SMCs to improve operational efficiency, optimize resource utilization, enhance labor productivity, and increase construction output. This, in turn, leads to improved project outcomes and reduced resource wastage (Durowoju, 2017; Dhareshwar, 2018).

However, in developing economies, the full potential of technology remains untapped primarily due to various challenges and constraints that require addressing (Amoah et al., 2011; Mengistu et al., 2023). The challenges faced by SMCs span various dimensions, including deficiencies in technology transfer and communication processes, ineffective technology implementation and management practices, inadequate infrastructure for technology development (Johnson et al., 2007; Easterby-Smith et al., 2012), lack of supportive macro-level policies, insufficient support for the adoption of new technologies, the fragmented nature of the industry, conservatism, the adverse impact of regulations, insufficient capital for technology investment, and low entrepreneurial drive (MoFED, 2014). Furthermore, insufficiently or poorly coordinated government agencies for promoting and supporting private sector initiatives, weak or non-existent R&D institutions, poor linkages between R&D institutions and industry, and a lack of mechanisms to facilitate technology transfer contribute to the issue (Ofori, 1994).

The reviewed papers presume a strong relationship among the determinant factors, and each factor is interrelated with shared variables. They are also mutually dependent, and improving one of the factors will improve the others. For instance, improving policies and regulatory frameworks will enhance the culture of competitive bidding and access to organizational resources. Similarly, evaluating the company's organizational culture and structure and then reforming the culture and structure using effective business management skills will significantly enhance the firm's competency. Considering the interrelationship of these factors, shared variables, and the specific context, and identifying which areas can benefit the most from action, the following improvement approaches are developed.

2.2. Trends in Small and Medium Contractor Development

A contractor development program (CDP) is a systematically designed and well-structured action plan aimed at identifying and removing barriers that impede the sustainable growth and development of contractors. Its objective is to enhance knowledge, skills, capacity, competitiveness, and performance (Milford, 2009). CDPs are customized to meet the specific needs of each country. However, the primary objectives of SMCs development programs are to enhance their sustainable competitiveness and improve their business performance. These objectives are achieved through training, knowledge acquisition, and skill development assistance. Empirical studies have shown that CDPs must focus on and prioritize specific fundamental knowledge and skill development areas. While the specific areas may differ based on the industry and market in which the SMCs operates, in general, CDPs should encompass domains like financial management, human resources management, management of construction materials, project management, etc. It is essential to regularly evaluate and update CDPs to ensure their effectiveness in meeting the changing needs of SMCs. Table 2.1 presents a summary of the skills and knowledge that have been identified as essential for CDPs to offer, according to several studies.

Table 2. 1. Summary of knowledge and skills areas necessary for CDPs to offer.

Core knowledge and skills areas	References
Construction materials management	
• Inventory, logistics and transportation management;	Aasonaa, 2022
• Material planning and scheduling; procurement management; storage and warehousing management;	Patel and Vyas, 2011
• Material handling and waste control;	Gulghane and Khandve, 2015
• Receiving, inspection, and quality control; documentation and record-keeping;	Kulkarni et al., 2017
• Material estimation and budgeting (cost control), communication and supplier relationship management	Eze et al., 2020
Construction site supervision	
• Compliance supervision, quality control, fault detection and mitigation, site data collection, project planning and monitoring, and report generation;	Ma, Z. et al., 2018
• Safety performance measurement and management;	Ayalew et al., 2016; Mjakuškina et al., 2019
• Communication and coaching	Kines et al., 2010
Construction equipment and plant management	
• Optimisation (decision making, spatial design, plant procurement), health and safety;	Zakeri et al., 1996; Edwards and Holt, 2009
• Cost control and budgeting;	Manikandan et al., 2018;
• Inventory management, maintenance and repairs, deployment and utilization	Sahu and Mohibullah, 2022
Construction Costing	
• Cost estimating, Planning and control processes; value engineering;	Ojo et al., 2022
• Quantity take-off, cost analysis, tracking expenses, cost forecasting, contract cost management, life cycle cost analysis	Thwala and Phaladi, 2018
Construction performance management	
• Talent management, performance monitoring, and evaluation;	Kaewnaknaew et al., 2022
• Performance management practices;	Neneh, 2011
• Performance recognition and rewards, training and development;	Daoanis, 2012
• Stakeholder satisfaction;	Hanák and Marović, 2022
• Performance improvement planning	Robinson et al., 2005
Human resource management	
• Training and development;	Mengistu and Mahesh, 2019
• Workforce planning, performance management, employee engagement and retention	Essien and Ezekiel, 2021
Financial management	
• Budgeting, cost control, cost forecasting, cash flow management, variation/change management;	Oyegoke et al., 2022
• Risk management, financing and capital management, financial analysis, financial planning, contract and payment management	Burtonshaw-Gunn, 2017
Cost effective construction	
• Quality control and assurance;	Salvi and Kerkar, 2020
• Value engineering	Chavan, 2013

Furthermore, CDPs often provide access to financing and mentorship opportunities, along with advocacy and policy support to improve the legal and regulatory environment. They also offer access to information, technology, and innovations, as well as opportunities for networking and collaboration with other firms. These benefits enable SMCs to expand their operations and make more efficient use of their resources (Dania, 2017).

Nations' experiences implementing CDPs for SMCs have varied, with some countries achieving more success than others. For example, developed economies like the United States have effectively employed CDPs through the Small Business Administration (SBA) to promote small businesses' growth and development, including contractors. Strategies such as improving access to government contracts, providing technical assistance, mentoring, and targeted training programs have been instrumental in addressing the unique challenges faced by small contractors. However, challenges persist in meeting complex regulations and stringent requirements associated with government contracts, as well as obtaining sufficient capital for business expansion, equipment procurement, and technology adoption (Dilger, 2013). Singapore serves as another successful example of a CDP. The Building and Construction Authority (BCA) of Singapore has effectively implemented the BCA Contractors Registration System (CRS), which aims to merge SMCs with larger global contractors and expand their presence in international markets (Teo et al., 2007). Through the CRS, SMCs have diversified into new markets, improved their competencies, received training in business management and technical skills, accessed mentorship opportunities, enhanced their reputation, acquired new technology and expertise, and strengthened their financial capacity. Despite these achievements, challenges include limited financial resources, regulatory compliance, and competition from larger firms (Teo et al., 2007).

In developing economies, CDPs have also been implemented to promote economic growth and development. For example, in India, the government has implemented various programs to support the development of small and microenterprises. These programs include the Pradhan Mantri Mudra Yojana (PMMY) and the Skill India Mission (Mahajan, 2019; Shah and Mali, 2019). These programs aim to provide access to finance and training opportunities to small and microenterprises, including construction contractors. In South Africa, the South African government has implemented programs through the Department of Public Works (DPW) to support the growth and development of SMCs. These programs, including the National Department of Public Works contractor incubator program, are also present in Eastern Cape, KZN, Western Cape, and eThekwini Vuk'upile Learnerships. They aim to promote inclusivity and enhance the capacity, competitiveness, and overall performance of SMCs. They offer capacity-building training, knowledge transfer, financial management support, compliance with quality and safety standards, access to procurement opportunities, and business development services.

The challenges faced by these programs include limited access to capital, coordination issues, inadequate monitoring and evaluation systems, scarcity of skilled trainers, limited resources, low participation, supply chain management problems, insufficient infrastructure, resistance to change, limited market information, and sustainability concerns (Bruce, 2003; CIDB, 2011; Mahlanga, 2018).

Similarly, in Nigeria, the Nigerian government has implemented various programs to support the development of SMCs. These programs, such as the Construction Skills Training and Empowerment Project (C-STEMP), National Directorate of Employment (NDE), and Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), aim to provide training opportunities, enhance skills and technical competencies, facilitate affordable financing options, offer business advisory services, and promote entrepreneurship and business development (Amadi et al., 2018). These initiatives have been instrumental in improving the technical and management skills of SMCs, enhancing their competitiveness. However, these programs also face several challenges. These challenges include economic factors like inflation, currency fluctuations, and market volatility, limited access to affordable loans and financing options, inadequate infrastructure such as poor road networks and limited access to utilities, inefficient procurement processes, limited networking opportunities, lack of access to modern construction technologies, and poor project management practices (Amadi et al., 2018).

The experiences of both developed and developing countries have demonstrated that the success of CDPs depends on program implementation and effectiveness. In certain cases, criticisms have arisen regarding CDPs' inability to address the specific needs of SMCs adequately and their insufficient support for sustaining growth. Therefore, it is crucial for countries to customize their programs to suit the unique needs of SMCs and provide adequate support for their sustainable growth. The following subsection explores past experiences with SMCs development in Ethiopia, examining the implemented development programs. This examination aims to offer insights into the effectiveness of these programs and shed light on the challenges faced by SMCs in the Ethiopian context.

2.2.1. Small and Medium Contractors Development in Ethiopia: Past Experiences

The history of Micro and Small Enterprises (MSEs) in Ethiopia began in 1977 when the Ethiopian government established the Handicrafts and Small-Scale Industries Development Agency (HASIDA) through Proclamation No. 124/1977 to promote cooperatives in small business operations. However, this initiative failed, and many cooperatives went bankrupt and were dissolved (Gebrehiwot and Wolday, 2006). Following the political transition in 1991, the government implemented the Agricultural Development Led-Industrialization (ADLI) policy in 1995, which included the establishment of the Federal Micro and Small Enterprises Development Agency (FeMSEDA) through Regulation No. 33/1998. FeMSEDA's objective is to support and organize institutions that provide services for MSEs' development across the country (MoUDC, 2013). FeMSEDA collaborates with regional organizations, NGOs, and the private sector to offer training, financing, and other business development services, contributing to the growth of the sector and the country's economy. In response to the challenges facing MSEs, the Ethiopian government has adopted various policies and strategies, as described by Abagissa (2021). This section aims to examine the development of SMCs in Ethiopia by analyzing three national development plans (i.e., PASDEP (2005/06-2009/10), GTP I (2009/10-2014/15), and GTP II (2015/16-2019/20)) and two SMCs related development programs (IHDP (2006) and URRAP (2010)) to better comprehend the dynamics of SMCs development in the Ethiopian CI.

These national plans and development programs have significantly shaped Ethiopia's economic landscape and promoted sustainable development. PASDEP focused on meeting the Millennium Development Goals (MDGs) by prioritizing rural and urban development, agricultural commercialization, and private sector development. It also recognized the importance of enhancing the capacity of micro and small enterprises (MSEs), including those in the CI, resulting in significant achievements such as job creation and capacity development training for MSE owners (MoFED, 2006a; MoFED, 2006b). GTP I aimed to transform the CI into a labor-intensive, market-oriented sector driven by the domestic private sector. It aimed to enhance infrastructure development, create employment opportunities, and stimulate economic growth (MUDC, 2013; MoFED, 2014). GTP II built upon the progress of its predecessor and aimed to elevate Ethiopia to a middle-income country through various strategies, including improving the competence of small and medium-sized contractors (SMCs) and fostering

industrialization (NPC, 2016a; NPC, 2016b). The following figure (Figure 2.2) visually represents the national plans and specific programs targeting SMCs within the CI.

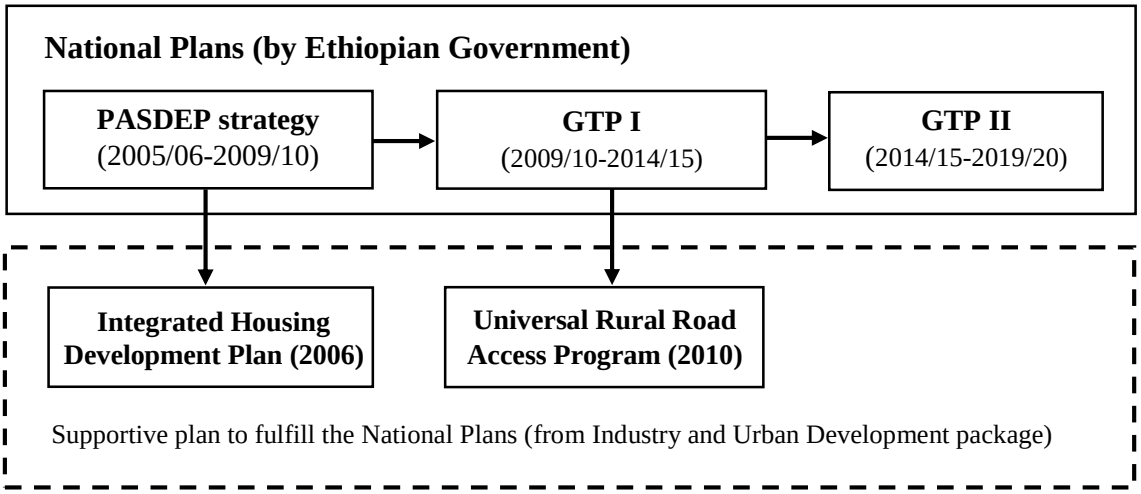

Figure 2. 2. National plans and supportive plans developed by the Ethiopian government to enhance the capacity of the CI

Alongside the aforementioned national strategies, targeted programs were also launched to specifically cater to the growth and development of SMCs, aiming to enhance their competency. As part of PASDEP, the Integrated Housing Development Program (IHDP) was initiated in 2006 to address the housing shortage and provide affordable housing solutions for low-income households (Ababa, 2006). Similarly, as part of GTP I, the Urban-Rural Road Access Program (URRAP) was launched in 2010 with the aim of enhancing rural accessibility by constructing and rehabilitating roads, thereby improving connectivity, trade, and social services in rural areas (ERA, 2010). These programs, along with the national plans, have played crucial roles in driving Ethiopia's socio-economic development and advancing the CI. The following table (Table 2.2) provides a concise overview of the abovementioned development plans and programs, outlining their primary goals and the challenges encountered in their execution.

Table 2. 2. Summary of national development plans and related programs

Development Plan/Program Name	Key Objectives of the Programs/Program	Challenges Faced
Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) (2005/06-2009/10)	✓ Targeted training programs for technical and managerial skills ✓ Conducting a comprehensive review of policies, systems, and regulations to establish an enabling environment ✓ Capacity-building for SMCs construction enterprises	✓ Finance challenges: Limited financial institution capacity, improper credit utilization, and insufficient loan management skills ✓ Human resource development issues: Underdeveloped entrepreneurial mindsets, dependency and rent-seeking behavior, and lack of collaboration with TVET colleges

(MoFED, 2006a; MoFED, 2006b; Haile, 2015, Mengistu, 2019)	✓ Remove regulatory and administrative barriers by revising licensing and registration system ✓ Establishing a comprehensive legal framework to ensure quality management and compliance with construction standards ✓ Enhancing the capabilities and effectiveness of construction industry associations ✓ Fostering and encouraging research and development initiatives	✓ Technology development and transfer challenges: Weak technology development and transfer capacity, lack of infrastructure, and limited technology market ✓ Market and marketing concerns: Reliance on government procurement and inconsistent procurement regulations affecting competitiveness in the market ✓ One-stop-shop service problems: Inadequate leadership, lack of competence and commitment, and insufficient government focus on policy implementation
The Integrated Housing Development Program (IHDP) (2006) *(Ababa, 2006; MoWUD, 2010; UN-HABITAT, 2011; Hiwot, 2012; Keffa, 2014)*	✓ Create job opportunities for SMCs and enhance the capacity of the construction industry	✓ Poorly designed training and technical support schemes ✓ Lack of timely construction material supply ✓ Lack of financial support ✓ Lengthy payment processing systems for completed works ✓ Lack of technical and managerial skills ✓ Poor academic and professional experience ✓ Labor unavailability
Growth and Transformation Plan I (2009/10-2014/15) *(MoFED 2010a; MoFED 2010b; MUDC 2013a; MoFED, 2014)*	✓ Transforming CI into a labor-intensive, market-driven industry led by domestic private sector ✓ Establishment of corruption resilient business environment ✓ Establishment of sustainable supply chain system for construction materials	✓ Inefficiencies in the supply chain of construction materials ✓ Poor access to financial resources and lack of adequate financial assistance ✓ Poor program implementation, monitoring and evaluation capacity ✓ Inadequate project management capacity ✓ Inadequate regulatory support and administrative processes, ✓ Corruption
Growth and Transformation Plan II (2015/16-2019/20) *(NPC 2016a; NPC 2016b)*	✓ Capacity building (skills and expertise) for construction industry professionals ✓ Enhancing the capacity to acquire and utilize construction equipment and technology ✓ Construction industry structure and organizational improvement ✓ Regulatory capacity improvement (registration and licensing)	✓ Limited access to financing ✓ Inadequate institutional governance structures and infrastructure ✓ Complex approval processes, bureaucracy, and lack of coordination among regulatory bodies ✓ Lack of access to training and capacity-building programs that are customized to meet the specific needs of the SMCs
Universal Rural Road Access Program (2010) *(ERA, 2010; Era et al., 2023)*	✓ Create job opportunities through labor-intensive road construction methods	✓ Absence of a monitoring, evaluation, and assessment process for the program ✓ Lack of specific objectives, methodology, and time-scale for measuring progress and effectiveness ✓ Inadequate capacity and skilled coordinators for managing the development program ✓ Communication gaps, lack of trust, conflicting interests, and strained relationships between URRAP contractors and consultants ✓ Delays and poor quality of locally assembled construction equipment ✓ Inconsistent provision of mentoring, coaching, and business management training ✓ Lack of continuous work opportunities for URRAP construction companies ✓ Failure to involve targeted financial institutions in program formulation for better access to finance and credit ✓ Corruption

Overall, the collective efforts of these national plans and targeted development programs have played pivotal roles in shaping Ethiopia's socioeconomic landscape and promoting the development of the CI. Despite facing various challenges, their influence on job generation, infrastructure expansion, and capacity enhancement has been significant. Hence, addressing these challenges and identifying priority areas for supporting SMCs is of utmost importance.

2.3. Sustainable Competency Improvement Mechanisms

The process of identifying improvement mechanisms to enhance the sustainability and competency of SMCs in the Ethiopian CI included examining both endogenic and exogenic factors. This led to the identification of five competency improvement mechanisms: enhancing institutional capability and the operating environment, revaluing entrepreneurial features of the firm, developing construction technology and innovation, establishing a sustainable construction material supply chain, and improving human resource development.

2.3.1. Revaluing Entrepreneurial Features of the Firm

Entrepreneurial traits are distinct characteristics that drive individuals to achieve their objectives as entrepreneurs. Engaging in entrepreneurship requires a combination of psychological and sociological qualities. These traits can either be inherent (born with) attributes like age, race, ethnicity, gender, and socioeconomic background or acquired (developed through personal decisions, efforts, and abilities) attributes such as the level of education, occupation, and work experiences (Cammelli and Ferrante, 2014). Entrepreneurs are often motivated by their competitive boldness, innovativeness, and pro-activeness (Setiawan and Erdogan, 2020). They possess ambition, assertiveness, creative motivations, and inquisitive minds, which play a central role in creating opportunities (Kuratko, 2005). External factors also shape an entrepreneur's characteristics. For example, Shane and Venkataraman (2000) note that favorable economic conditions foster entrepreneurship growth. Economic incentives such as tax benefits, financial opportunities, investment prospects, and access to information technology enhance entrepreneurial success (Infelise, 2014). Thus, understanding the relationship between entrepreneurs and their environment is crucial for meaningful enterprise development.

2.3.2. Enhancing Institutional Capability and Operating Environment

The effectiveness and survival of SMCs in the competitive business environment are strongly linked to a set of crucial factors. These factors revolve around the government's regulatory competence and the accommodating nature of the operating environment in which these businesses operate. The far-reaching impact of these factors extends deep and wide, encompassing a multitude of stakeholders who collectively shape the sustenance of SMCs, either propelling them toward success or presenting them with difficult challenges. Recognizing this complex interplay, it becomes evident that multifaceted and collaborative approaches are indispensable, involving coordinated efforts across various sectors to create a supportive environment conducive to sustainable business practices (Fox, 2003; Ofori, 2015). Table 2.3 below outlines the summary of key areas of improvement that can enhance the CI's competency, including SMCs in the context of developing economies like Ethiopia. These domains encompass diverse strategies and practices involving the government as a policy maker and industry regulator, financial institutions, academic and R&D institutions, professional associations, etc.

Table 2. 3. Summary of improvement areas to enhance institutional capability and operating environment

Improvement Areas	**References**
Improve access to finance	Tesha et al., 2017 Rakshit and Bardhan, 2023
Promote ethical practices and professionalism	Kuoribo et al., 2021; Hashimy et al., 2023)
Establish a business environment resistant to corruption	Mengistu, 2019; Soni and Smallwood, 2023)
Improve the Information and Communication Technology (ICT) infrastructure	Benjaoran et al., 2012; Chua et al., 2022)
Strengthening the capabilities of Research and Development (R&D) institutions	Aniekwu and Ozochi, 2010; Ofori, 2012
Create a conducive procurement environment and explore alternative project delivery systems	Francom et al., 2016; Pradhananga et al., 2023
Streamline administrative processes and reduce bureaucratic complexities	Upite et al., 2011; Loosemore, 2015
Harmonize regulatory frameworks	Mengistu, 2019; Shooshtarian, et al., 2021
Emphasis on adopting industry best practices and leveraging benchmarking	Wuni and Shen, 2020; He, Q., et al., 2021
Effective claim management and dispute resolution methods	Zaneldin, 2018; Mullen and Davison, 2019
Promote outsourcing of works for subcontractors	Zhang et al., 2020; Shi et al., 2023
Strengthen professional institutions and trade associations	Ofori, 1994; Osabutey and Croucher, 2018
Simplify business registration and licensing	Wirahadikusumah and Pribadi, 2011
Conducive contractor development programs and institutional support	Ofori, 1991; Thwala and Phaladi, 2009; Ofori-Kuragu, 2020
Introduce affirmative procurement and incentive mechanisms	Hawkins, 2011; Nzo, K., 2020

This holistic approach recognizes the complex interdependence and interconnectedness among these domains. It emphasizes the need for collaborative efforts among policymakers, industry stakeholders, and SMCs to drive positive transformation within the CI. Consequently, tackling these areas of improvement has the potential to enhance competence and promote comprehensive development within the CI. Moreover, it can create a more conducive environment in which SMCs can prosper, innovate, and make substantial contributions to the country's socioeconomic development.

2.3.3. Construction Technology Development and Innovation

Construction technology plays a crucial role in helping construction firms achieve sustainable development objectives and maintain a competitive advantage (Slaughter, 2000; Ofori, 1994). It enables efficient resource utilization, enhances decision-making, and leads to improved project outcomes (Bolanle et al., 2020). Firms must adopt technology development to achieve efficient manufacturing and consistent quality in a competitive operating environment. However, technology development in developing countries, including Ethiopia, remains immature and underdeveloped. Bridging these gaps requires comprehensive strategies, collaborative efforts, and supportive policies to facilitate technology transfer, knowledge exchange, and capacity building (Alashwal et al., 2011). These efforts empower SMCs to enhance their competitiveness and contribute to the overall development of the construction sector. Furthermore, it is crucial to carefully evaluate the suitability, affordability, innovativeness, and appropriateness of these technologies to ensure their long-term viability and acceptance within the industry (Ebolor et al., 2022). The following table (Table 2.4.) provides a concise overview of management mechanisms to address the challenges encountered in technology development and innovation within the CI.

Table 2. 4. Technology and innovation improvement mechanisms in the CI

Management Mechanisms	**References**
The practice of adopting capital-saving technology, labour-intensive technology, alternate technology, indigenous technology, and adaptive technology	Sianipar (2013)
The utilization of Information communication technology	Al-Tit et al., 2019; Apulu and Ige, 2011; Ofori, 2015
Harmonize and strengthen construction technology transfer policies	Ofori, 2015; Ganesan and Kelsey, 2006; Osabutey et al., 2014
Promote innovative procurement systems	Kumaraswamy and Dulaimi 2001; Suprun and Stewart, 2015; Mengistu et al., 2023
Promote industry network	Blayse and Manley, 2004; Asad et al., 2005
R&D on indigenous suitable technologies	Ofori (1994)
Technology domestication and incubation services	Aboneh and Mahesh, 2023

2.3.4. Sustainable Construction Material Supply Chain

Construction project costs are significantly influenced by construction materials, which typically account for a substantial portion, ranging from 35% to 60% or potentially even more, depending on the specific project's characteristics (Makwana, 2016). This cost element directly impacts decisions related to technology selection, capital investment, and labor utilization in the CI. The successful completion of any construction project heavily relies on the timely supply, ready availability, and easy access to construction materials of the necessary quality and quantity (Benton and McHenry, 2010). This consideration is crucial for SMCs, especially given their limited capacity to invest in extensive inventories or manage unforeseen material shortages. However, in developing countries, including Ethiopia, the CI often experiences frequent shortages of construction materials (Obodoh and Obodoh, 2016). These countries typically rely on conventional materials, and the absence of such materials necessitates imports, leading to increased construction costs and project completion delays. The heightened reliance on imported materials further exacerbates the issue by introducing additional expenses such as transportation, customs duties, and storage, significantly inflating overall construction expenditures (Al-Nuaimi et al., 2019). Moreover, depending on external markets for materials introduces uncertainties and disruptions in the supply chain, further hindering the seamless progress of projects (Pettit, 2008).

There has been a growing recognition of the importance of utilizing locally manufactured construction materials in recent times as a strategy to enhance the competitiveness and development of SMCs. This shift in perspective towards local materials is further influenced by factors such as reduced transportation costs, minimized carbon footprint, and increased resilience to external supply chain disruptions, as discussed by Hakeem et al. (2022). Furthermore, key actions identified to address supply chain management problems include enhancing the capacity of local construction material manufacturers (Osei, 2013; Langston and Zhang, 2021), improving supply chain management practices (Albaloushi and Skitmore, 2008; Nguyen et al., 2018; Ali et al., 2020; Le and Nguyen, 2022), standardizing locally manufactured construction materials (Mukiibi, 2015), and promoting collaboration among stakeholders (Balasubramanian and Shukla, 2018; Yoon and Pishdad-Bozorgi, 2022). These measures aim to overcome challenges within the SCM system, fostering a more efficient, resilient, and collaborative environment among stakeholders in the construction industry.

Standardizing locally manufactured construction materials involves developing comprehensive codes and standards to define acceptable size, quality, and performance criteria. This is essential to guarantee that materials adhere to industry standards and fulfill the necessary specifications for quality, performance, and compatibility, as emphasized by Mukiibi (2015). The process of standardization establishes a framework for assessing and comparing suitability, credibility, reliability, and marketability, thereby encouraging widespread adoption in construction projects (Marut et al., 2020). While the standardization of materials is crucial, it is equally important to strike a balance between standardization and flexibility to prevent hindering innovation and restricting the exploration of new materials and techniques.

Enhancing the capabilities of local construction material manufacturers is a key for overcoming supply chain challenges. Issues such as an insufficiently integrated industrial chain, a fragmented industry structure, a shortage of experienced manufacturers, and financial constraints (Cao et al., 2015; Derbie, 2018) require attention. Strengthening local construction material manufacturers involves providing support to various producer categories, engaged in the production of standard construction materials—materials that comply with industry standards, building codes, and regulations (including conventional or traditional materials) as well as local construction materials sourced from the immediate vicinity. This comprehensive approach ensures a steady and dependable supply, thereby improving supply chain efficiency. Support measures encompass technical assistance, training programs, and financial aid (Zhao et al., 2012; Ofori, 2018).

Technical assistance, training programs, and financial support can bolster the capabilities of suppliers and reduce reliance on imports (Zhao et al., 2012). Financial assistance can help suppliers expand their operations, invest in modern technologies, and upgrade infrastructure (Othman et al., 2015; Ofori, 2018). R&D efforts in construction materials also contribute to improving various industry facets. Academic and research centers should focus on developing materials suitable for local use, formulating production techniques, and providing guidelines for construction methods. Financial support for R&D initiatives is crucial for the sustainable development of SMCs (Ugochukwu et al., 2015; Ofori, 2018).

2.3.5. Human Resource Development

Human resources (HR) are the most valuable asset, particularly in labor-intensive industries like construction. The ability to attract, nurture, and retain skilled employees is essential for business success. Despite having abundant human resources, many developing economies face a shortage of qualified construction workers (Othman, 2012). This issue can be further exacerbated by SMCs, which often rely on labor-intensive methods and may not prioritize HR development (Ofori, 2015). While there is no one-size-fits-all solution to address HR constraints, several research studies suggest potential approaches to tackle HR development challenges. These include training and development, implementing a performance-based pay system, improving leadership styles (Mengistu and Mahesh, 2020), acquiring fundamental management skills, continuous professional development, employee career advancement, succession planning, and identifying key employees for organizational development (Fox, 2003), among others.

Similarly, ensuring adequate human resource development requires collaborative efforts from academic institutions, industry organizations, and the government (Mengistu and Mahesh, 2022). Academic institutions, in particular, must take a leading role in offering industry-focused educational programs to address HR challenges (Ofori, 2018). The government also plays a crucial role in continuously monitoring and periodically reviewing professional registration and licensing systems (Donkor, 2011).

2.4. Identified Research Gaps

Several studies have been conducted within the Ethiopian CI, exploring various facets of its development. These studies include Ayalew et al., 2016; Ofori, 2018; Mengistu, 2019; Cheng and Darsa, 2021; Mengistu et al., 2023, among others. These studies have provided valuable insights into the factors influencing the industry in a broad context. However, factors impacting the competitiveness and competency of SMCs are unique and require specialized attention. Some studies that did delve into SMCs also tended to cover broader factors influencing their competency. Examples include studies by Gebrehiwot and Wolday, 2006; Animut, 2019; Abagissa, 2021; Ferejo et al., 2022. Identifying and categorizing these factors into internal organizational issues, entrepreneurship-related issues, industry network and market-related challenges, managerial skill and

administrative-related issues, policy and regulatory barriers, and resource constraints provides a structured and detailed framework highlighting the specific needs and barriers SMCs face.

Furthermore, studies have examined specific programs within the Ethiopian CI, such as the URRAP and the IHDP by Hiwot, 2012; Addisu, 2013; Keffa, 2014; Borena, 2016; Era et al., 2023. While these studies have made valuable contributions by focusing on the challenges SMCs face within these programs, which is undoubtedly valuable, these studies may not have offered a comprehensive overview of policy dimensions. This study addresses this gap with a holistic analysis

2.5. Chapter Summary

The chapter highlights endogenic and exogenic factors that affect the sustainable competency of SMCs. Endogenic factors include the structure of the organization, its culture, the characteristics of its entrepreneurs, competitive strategy, resources available, managerial skills, and tendering and contract administration. On the other hand, exogenic factors involve government policies, regulatory frameworks, industry networks, a culture of competitive bidding, and innovation in construction technology. The chapter also provides context regarding the Ethiopian CI and the government's initiatives to enhance SMCs' sustainable competency through national plans (PASDEP, GTP I, and GTP II). Furthermore, it explores improvement mechanisms designed to enhance the sustainable competency of SMCs. In the subsequent chapter of this thesis, the study's conceptual framework and hypothesis development will be discussed in detail.

CHAPTER THREE

CONCEPTUAL FRAMEWORK OF THE STUDY

This chapter presents hypotheses regarding the relationships among constructs identified as crucial for the theoretical perspective's development and centers on developing the conceptual framework for this study. It establishes the foundation for data collection, analysis, and the subsequent discussion of findings.

3.1. Introduction

Scientific research has expanded our understanding of the world, enabling us to predict phenomena that were once considered unpredictable. This knowledge has also provided valuable insights into the progression and consequences of historical events and revealed useful patterns for anticipating future events or circumstances. Theories and concepts are essential components of scientific knowledge as they help formulate research questions, organize data, and bolster scientific arguments (Kumar, 1999). Grasping scientific knowledge involves understanding how theories and concepts are generated, recognized, applied, evaluated, refined, or replaced based on their ability to explain relationships between variables. One method to achieve this is by constructing a conceptual framework capable of investigating, understanding, and illuminating connections between variables.

Developing a conceptual framework involves scrutinizing existing knowledge to determine its adequacy in explaining specific phenomena. If existing knowledge proves insufficient, adjustments to prevailing theories or the creation of new theories may become necessary to account for these phenomena (Creswell, 2014). In this study, it is developed a conceptual framework to explore and empirically capture the potential impact of both endogenic and exogenic factors on the sustainable competence of SMCs. This framework delineates the theoretical relationships among these factors and serves as a foundational structure for their examination. The study focuses on investigating these factors, as illustrated in the following conceptual framework.

3.2. Conceptual Framework of the Study

The conceptual framework for the study, as presented in Figure 3.1, illustrates the connections between the considered constructs and guides the research. These constructs have been extensively discussed in the preceding Chapter 2 and are synthesized here to offer a clearer understanding of the research's conceptual framework, as depicted in Figure 3.1. The framework developed for this study demonstrates that both endogenic (organizational structure, organizational culture, competitive strategy, characteristics of the entrepreneur, managerial skills and competency, organizational resources, and tendering and contract administration) and exogenic factors (government policies, regulatory framework, industry networks, culture of competitive bidding, and technology and innovation) impact the sustainability of competency in SMCs.

The improvement conceptual framework is created by amalgamating the effects of these factors (endogenic and exogenic) as determinants of sustainable competency. This framework incorporates the concepts of self-sustainability, organizational competence, and the development of the operating environment. It encompasses the revaluation of entrepreneurial attributes within the firm, the enhancement of institutional capability and the operating environment, the advancement of construction technology and innovation, the establishment of a sustainable construction material supply chain, and human resource development.

3.3. Hypotheses Development

Following a comprehensive review of the theoretical foundations in Chapter 2, this subsection presents the central propositions derived from the mentioned theories and explains the constructs through testable hypotheses.

3.3.1. Relationship between Organizational Structure and Competency of SMCs

Organizational structure plays a crucial role in influencing work quality, employee motivation, and coordination within a company. Key elements of organizational structure include formalization, centralization, and complexity. Formalization measures the extent to which rules and procedures govern behavior, while centralization relates to the concentration of power and control within the organization (Bozkurt et al., 2014). Complexity, on the other hand, refers to the intricacy and complication of the

organizational structure (Rodell et al., 2009). Establishing an effective organizational structure is essential for maintaining efficiency and focus within a company. Empirical research conducted by HassabElnaby et al. (2012) has demonstrated the significant impact of organizational structure on the performance of SMCs. Therefore, understanding and implementing these fundamental elements of organizational structure can help companies enhance their efficiency and focus, ultimately influencing work quality, employee motivation, and coordination.

3.3.2. Relationship between Organizational Culture and Competency of SMCs

The organizational culture plays a significant role in shaping the behavior and interactions of its members toward achieving shared objectives. Research conducted by Alvesson (2002); Koesmono (2005); Daft (2007); Robbins and Judge (2007); Gibson et al. (2009); Suharsaputra (2013); Ate (2014); Odor (2018) highlights the strong connection between organizational culture and employee performance, work motivation, job satisfaction, and, ultimately, organizational performance. A strong and clearly defined organizational culture is vital in determining the success of an organization.

3.3.3. Relationship between Characteristics of Entrepreneur and Competency of SMCs

Entrepreneurial success is genuinely linked to a spectrum of competencies, covering traits, behaviors, skills, and knowledge, as emphasized by Boyatzis (1982) and Shane et al. (2003). Furthermore, the values, attitudes, and psychological attributes of entrepreneurs play crucial roles in contributing to the growth and competitiveness of SMCs, as stated by Badi and Badi (2008). Hence, Sarwoko et al. (2013) suggest that construction business owners should consider hiring individuals with strong entrepreneurial characteristics and confidence to effectively manage key business variables, thereby enhancing their business growth.

3.3.4. Relationship between Managerial Skill and Competency of SMCs

A study conducted by Makros and Papulova (2007) revealed a significant link between managerial skills and enterprise development. The research indicated that entrepreneurs with low managerial skills encounter difficulties in growing their enterprises, while those with high-level skills excel in the same field. Similarly, Skilling and Nonaka (1993) concluded that competent managers can establish a positive reputation, cultivate strong

relationships with potential clients, influence clients' decisions, set appropriate goals, support team efforts, and lead by example. These findings underscore the importance of managerial skills in achieving successful enterprise development.

3.3.5. Relationship between Competitive Strategy and Competency of SMCs

Competitive strategies, also called business-level strategies, play a vital role in ensuring a business's profitability and long-term performance (Nandakumar, 2008). Scholars have diverse interpretations of strategy, but generally, it encompasses the methods used by a business to attain and sustain a competitive advantage over its competitors (Porter (1996); Teece et al. (1997); Barney (1997); Hitt et al. (2003); Crook et al. (2008)). SMCs, in particular, heavily rely on their ability to compete in the business environment to achieve success effectively. However, competition in the current business landscape is intense, necessitating SMCs to identify the right competitive strategy to gain a sustainable competitive advantage (Becker et al., 2018).

3.3.6. Relationship between Organizational Resources and Competency of SMCs

The availability of resources does not solely determine growth for a construction firm; rather, it depends on the effective combination and utilization of these resources to achieve desired outcomes. The resources a construction firm needs fall into categories such as human, financial, technological, and informational resources. Financial resources encompass available funds, including cash, which can be utilized to pursue the firm's growth objectives. Equity finance involves funds that grant ownership privileges to providers. Access to public physical infrastructure services, such as water, roads, electricity, and communication facilities, is crucial for firm start-up, growth, and development. In today's knowledge-driven economy, information resources are vital for firms, and the rapid development of information and communication technology (ICT) presents significant challenges for construction SMCs (Osisioma, 2009).

3.3.7. Relationship between Tendering and Contract Administration and Competency of SMCs

Effective tendering and contract administration are essential for successful project delivery, particularly for SMCs in the CI. Research by Dada and Akindele (2020) has shown a positive correlation between the level of competency in tendering and contract administration and SMCs' project performance and client satisfaction. Another study by

Odeyinka et al. (2012) suggests that SMCs with proficiency in contract administration are better equipped to manage project costs, comply with contract terms, and meet stakeholder expectations. On the other hand, contractors lacking competence in contract administration may encounter difficulties in managing contract risks and achieving project objectives. Arain and Pheng (2017) further stress the significance of developing contract administration competence for SMCs to effectively handle project risks, ensure contract compliance, and satisfy stakeholders.

3.3.8. Relationship between Government Policy and Competency of SMCs

Government policies are crucial in shaping the business environment for SMCs and encouraging their contribution to economic growth through wealth and job creation (Tende, 2014). Supportive institutions, such as government support agencies, provide implementation, funding, and supportive policies to improve the situation of SMCs (Bouazza et al., 2015). These policies aim to achieve maximum development objectives and create a conducive environment for SMCs growth and development (Oviatt and McDougall, 2005; Omar et al., 2020). Financial policies, monetary policies, taxation policies, trade policies, import and export controls, and infrastructure policies are examples of critical policies that support SMCs. Such supportive policies enable them to expand their business, enter new markets, identify and capture opportunities, raise capital, use information effectively, and establish international contacts aligned with their organizational strategies. Hence, sound government policies are essential for SMCs success.

3.3.9. Relationship between Regulatory Framework and Competency of SMCs

Governments provide various types of support, such as tax incentives and reduced regulations, to enhance smaller businesses' economic and technological environment, aiming to facilitate their establishment, sustainability, growth, and potential evolution into internationally competitive enterprises. However, excessive regulation can impede the survival and expansion of small firms (Bartlett and Bukvič, 2001). In many countries, governments do not effectively target or implement regulations for SMCs in a way that removes obstacles to their survival and growth, transforms them into competitive entities, or aligns with broader social objectives. SMCs are disproportionately impacted by bureaucratic processes, as they have limited capacity to manage regulatory complexities and cannot spread compliance costs across large-scale operations.

3.3.10. Relationship between Culture of Competitive Bidding and Competency of SMCs

According to Lu and Zhang (2019), a culture of competitive bidding positively affects the sustainable competency of SMCs. It enhances their technical and managerial capabilities, optimizes resource allocation, and improves project performance. Moreover, competitive bidding promotes transparency and fairness, reducing corruption and favoritism and creating a level playing field for SMCs. However, SMCs face challenges due to limited resources, lack of experience, and competition from larger firms, making government and stakeholder support crucial through training, capacity building, and financial assistance. Lee and Gao (2014) also found that a competitive culture influences SMCs' strategic choices and performance, motivating investment in human resources, project management, and innovative technologies enhancing competitiveness through knowledge and experience acquisition. Mistrust and unfair competition can negatively impact SMCs' confidence and ability to compete effectively. This underscores the significance of understanding cultural norms and practices associated with competitive bidding to develop and sustain competency.

3.3.11. Relationship between Industry Network and Competency of SMCs

The significance of business networks in enhancing the competency of SMCs is well-established and extensively studied. According to Dubois and Gadde (2000), being part of business networks provides contractors with valuable resources such as knowledge, finance, technology, and support from other network members like suppliers, subcontractors, industry associations, and clients. This access to resources enables contractors to improve their technical skills, adopt innovative practices, stay updated with industry trends, and enhance their overall capabilities. Moreover, exchanging information, experiences, and best practices within business networks fosters a continuous learning and improvement culture among contractors, ultimately boosting their competency and competitiveness (Tendai, 2013).

3.3.12. Relationship between Construction Technology and Innovation and Competency of SMCs

Research in the construction and engineering fields and insights from industry experts highlight the critical role of SMCs in keeping abreast of the latest construction technology trends and innovations. In order to achieve sustained growth and success within the CI, it is crucial for SMCs to carefully select the most suitable and appropriate technologies (labor-intensive and capital-intensive technologies or the use of an appropriate mixture that utilizes both technologies). This underscores the significance of collaboration between researchers, extension services, policymakers, and other stakeholders who can provide the support and resources necessary for SMCs to thrive. Furthermore, SMCs must avoid using outdated or unsuitable technologies and practices to maintain their competitiveness and achieve sustainable competency development. However, these technologies' suitability, affordability, innovativeness, and appropriateness must be thoroughly evaluated to ensure their sustainability and acceptance within the industry. Moreover, industry policies and procedures, such as their flexibility, implementation methods, and availability of tools, can significantly impact the success of SMCs (Ofori, 1994; Barlow, 2000; Mouchi et al., 2011; Ofori, 2015; Aboneh and Mahesh, 2023).

3.4. SMCs' Competency Improvement Mechanisms

In a competitive market, a firm's ability to succeed hinges on a multitude of external and internal factors. Recognizing the multifaceted nature of factors influencing a firm's competitiveness and strategically aligning development instruments with these insights are critical for achieving long-term success in a competitive market. To elevate sustainable competency, a holistic strategy encompassing diverse elements is essential. This entails ensuring access to quality education and training facilities, establishing well-equipped research and development programs, fostering strong connections among industry stakeholders, implementing affirmative procurement practices, and ensuring a steady and dependable supply of resources. Contractors should be offered financial assistance, and the flow of finance to them should be improved by streamlining contract documents and simplifying approval procedures. The public client could be used to introduce and encourage appropriate technology; strengthen local contractors; establish training schemes and encourage innovation; abandon inappropriate statutory regulations; and introduce appropriate construction labor laws and safety regulations. Wise

combinations of labor-intensive methods with mechanization should be established. Fair and equitable contract conditions should be formulated. Construction-related information should be systematically and continuously collected. The quality of professional institutions and trade associations should be enhanced (Ofori, 1999).

As a significant proprietor and industry regulator, the government is expected to design guiding principles that bind all industry stakeholders together for meaningful impact and sustainable competency development. These guiding principles should be developed to create an enabling environment; facilitate human resource development; promote research, innovation, and development; and establish a harmonized regulatory and institutional framework based on existing industry context, priority areas, and distinct time frames. The improvement strategic framework for the selected thematic areas is summarized in Figure 3.1.

Hypothesis: Variables measuring "endogenic factors," "exogenic factors," “effectiveness of contractor development programs,” and "management mechanisms to improve competency of SMCs" significantly affect the competitiveness of SMCs in the Ethiopian CI. For each variable, the null hypothesis (H0) posited that the variable had no significant impact on the measured aspect, while the alternative hypothesis (HA) suggested that the variable did have a meaningful impact on the measured aspect.

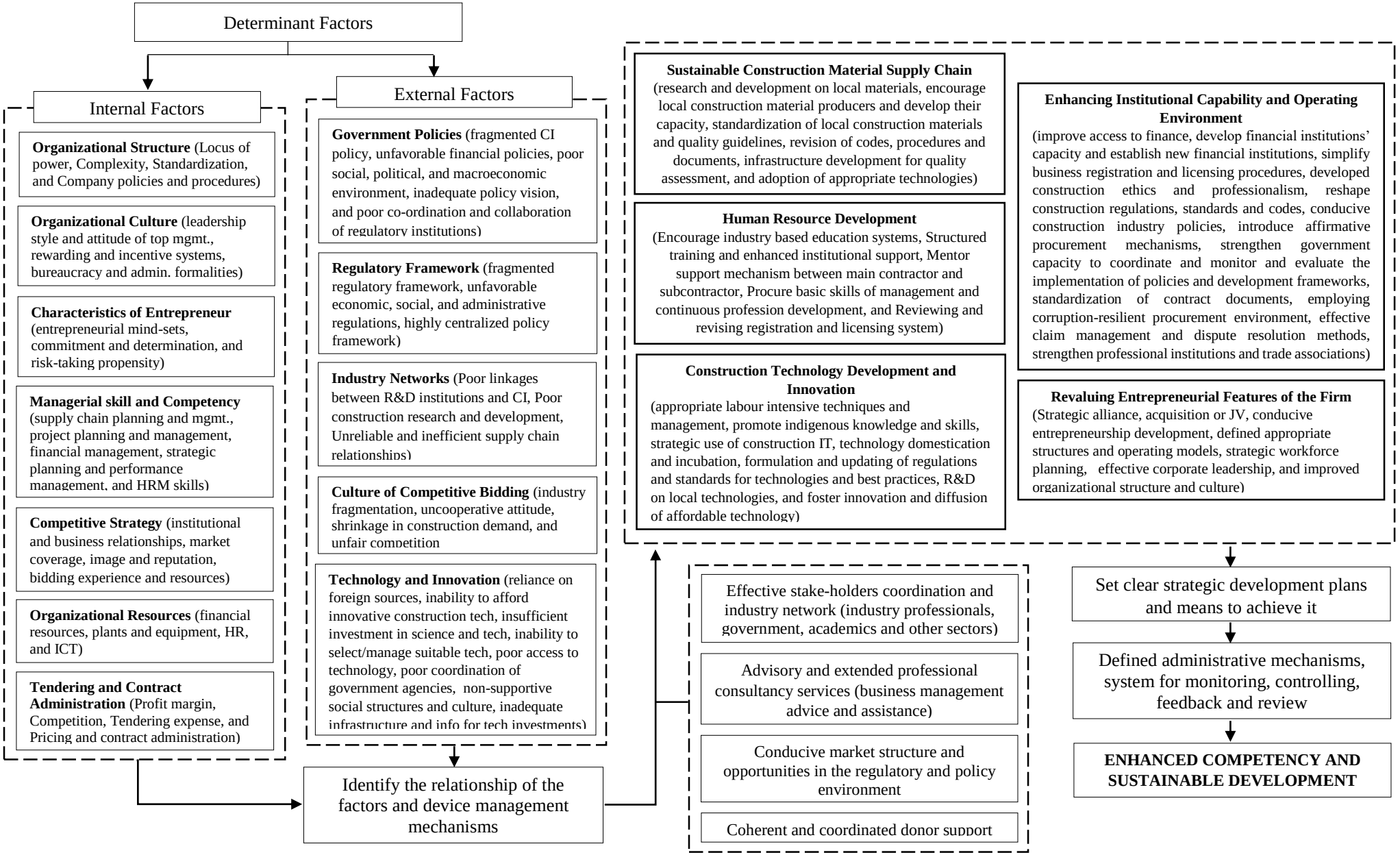

Figure 3. 1. Conceptual Framework to create SMCs Sustainable Competency

3.5. Chapter Summary

The sustainable competency development of SMCs can be influenced by various factors, which can have positive or negative effects depending on how the firm responds to them. These factors encompass both endogenic and exogenic variables. On the one hand, endogenic variables stem from the organization and include organizational structure, organizational culture, entrepreneur characteristics, managerial skill and competency, competitive strategy, organizational resources, tendering, and contract administration. These aspects can significantly impact the competency development of SMCs. On the other hand, exogenic variables originate from the surrounding environmental elements and include factors like government policy, regulatory framework, the culture of competitive bidding, industry network, construction technology, and innovation. How SMCs navigate and adapt to these factors can be crucial in shaping their sustainable competency development. SMCs must acknowledge the impact of the abovementioned variables and tactically respond to them to nurture their long-term success and competency. In fostering the competency development of SMCs, it is necessary to identify comprehensive approaches and improvement frameworks in areas such as entrepreneurial features, industry structures, business environment, stakeholders' core capacity building and development, R&D in the CI, integrated contractor development and support initiatives; and construction resource and technology development. In the subsequent chapter of this thesis, the research methodology and data analysis techniques will be described in detail.

CHAPTER FOUR

RESEARCH METHODOLOGY

Investigating the impacts of various factors and developing strategies for sustaining the competency of SMCs is a complex task involving interconnected parameters. Hence, a thorough methodology is essential for data collection and analysis to ensure accurate results that elucidate these impacts and provide improvement suggestions. This chapter aims to justify the research methodology and techniques proposed by this study to achieve its objectives. The chapter begins by outlining the philosophical foundation of the research approach and discussing the dominant research paradigms within the construction management field. It then examines the reasoning behind the research design and the criteria used to evaluate it. The chapter also covers the method of data collection, including population and target population, sample selection methods, sampling techniques, instruments used to collect data, pilot testing, internal and external validity, and data analysis.

4.1. Introduction

Research is a human activity that involves intelligent and practical investigation or exploration in order to gain knowledge and uncover the truth. It employs a systematic approach that includes observation, study, and experimentation to arrive at specific facts and conclusions that can be applied to real-world problems (Kumar, 1999). It is a well-organized, controlled, empirical, and critical investigation of natural, behavioral, and social phenomena. In simple terms, research is a methodical process that involves identifying a problem, formulating a hypothesis, collecting and analyzing data, and arriving at certain conclusions. The primary objective of the researcher is to enhance our understanding of the phenomenon being studied and to disseminate that knowledge to others. The overarching goals of the research are to predict, observe, and describe events and identify and explain the reasons behind them (Zegeye et al., 2009).

"Research methods" and "Methodologies" are interchangeably used and conflated. There is a significant distinction between research methods and research methodology. A method is a specific research approach, encompassing procedures, schemes, steps, and algorithms. It is a specific research tool used to comprehend the phenomenon comprehensively. Examples include observations, theoretical techniques, experimental research, surveys, interviews, numerical schemes, statistical methodologies, etc. Research methodology is a method for solving a research topic that outlines how the investigation should go. Research technique refers to the procedures that researchers employ to describe, explain, and forecast events. The procedures by which researchers go about their business of describing, understanding, and predicting occurrences are referred to as research techniques. It is eager to explain why the study was conducted, how the research topic was identified, how and in what way the hypothesis was created, what method was used to collect data, why a particular data analysis approach was utilized, and other similar questions (Kumar, 1999; Zegeye et al., 2009). The following section provides an overview of the research philosophy and paradigm of scientific research employed for the present study.

4.2. Research Approach

Construction management integrates multiple disciplines, including social sciences, natural sciences, management, and engineering, to meet specific needs (Dainty, 2008; Fellows and Liu, 2008). Research can be categorized based on goals, specific objectives, approaches, types of data used, field of study, and design (Zegeye et al., 2009). Research approaches include quantitative, qualitative, and mixed methods, with the choice depending on the research question, data type, and intended conclusions (Naoum, 1998). The mixed methods approach combines quantitative and qualitative approaches to understand research problems better and address a broader range of research questions (Johnson et al., 2007; Creswell, 2003; Creswell and Garrett, 2008). This study employed both qualitative and quantitative research approaches. This combination aimed to enhance the overall quality of results, improve credibility and validity (Easterby-Smith et al., 2012), and facilitate the integration of theories and perspectives for stronger and more diverse inferences.

The literature review conducted for this study developed a framework applicable to the research context. It was utilized to identify factors affecting the sustainable competency of SMCs, examine government strategies, evaluate development opportunities, and identify research gaps. Various sources were examined, including journals, reports, and government plans (Zegeye et al., 2009). A survey was conducted, gathering numerical data efficiently and economically, and supported by qualitative and quantitative methods. The case study approach focused on URRAP and IHDP companies, using multiple data sources to ensure reliability and quality (Yin, 2014).

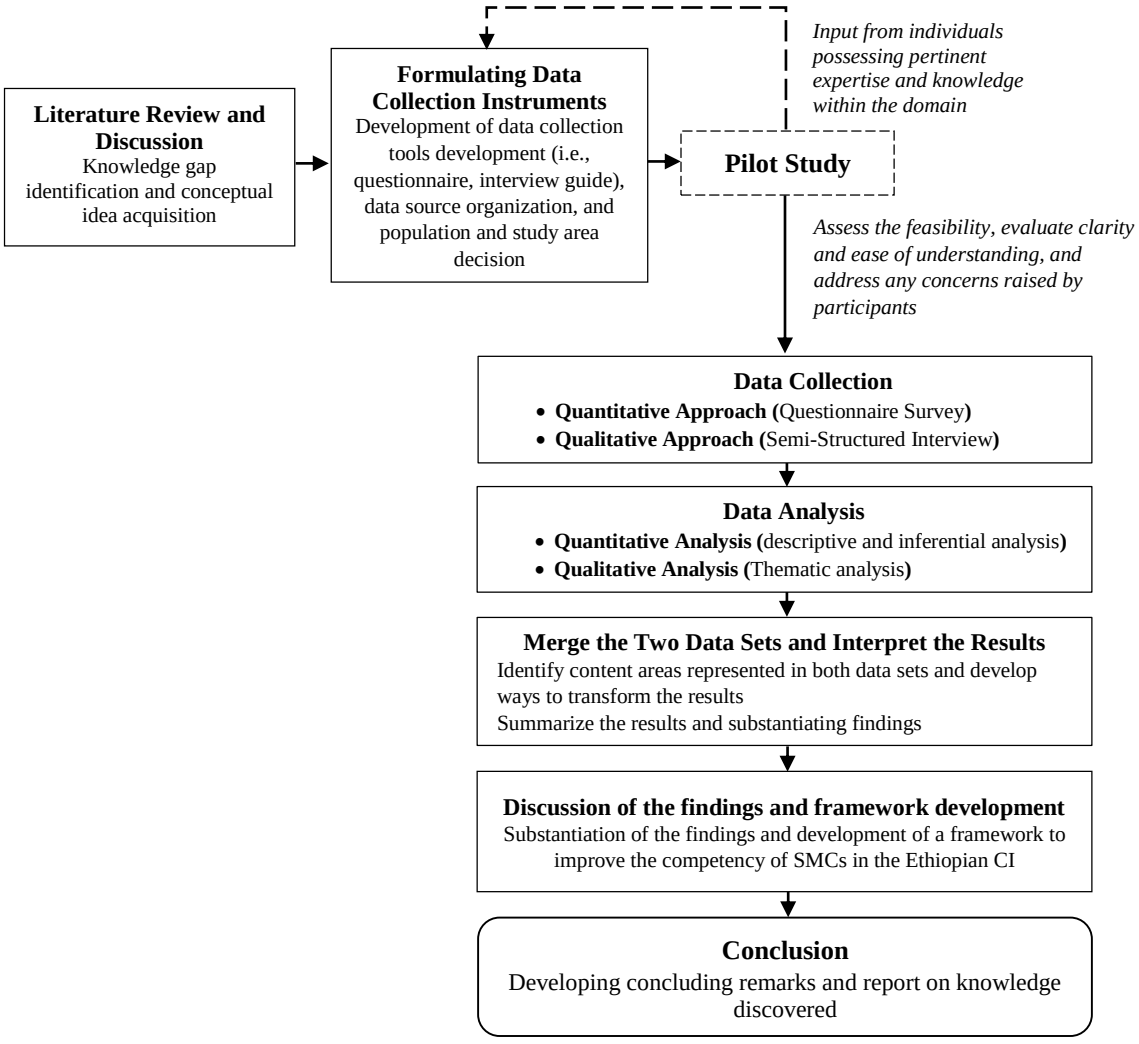

Figure 4. 1. Research Methodology Flowchart

4.3. Quantitative Approach

Quantitative research was carried out using a questionnaire survey approach to ensure precise and relevant responses. The following section will provide detailed information on the development of the questionnaire and the sampling, data collection, and analysis techniques employed in the study.

4.3.1. Questionnaire Development

According to Naoum (1998), questionnaires are valuable tools for gathering primary data directly from respondents, allowing researchers to gain insight into their attitudes and concerns. Closed or fixed questions are commonly used in questionnaires, providing respondents with predetermined answer options that facilitate the efficient collection of straightforward information (Zegeye et al., 2009). This study used closed questions to effectively capture participants' perceptions, which is essential in construction management research, where maximizing response rates is important (Xiao, 2002). The questionnaire was designed to be user-friendly, ensuring that it was easy to understand, thereby improving response rates.

For this study, two questionnaires were developed to identify the factors influencing sustainable competency in SMCs and to explore the development strategies used within the Ethiopian CI. *Questionnaire One* was designed to measure the impact of variables affecting SMCs' sustainability and improvement mechanisms based on 166 variables from 17 sources. The questionnaire was divided into three sections covering the introduction, demographic information of the respondents, and factors affecting SMCs' sustainable competency and improvement mechanisms. The questionnaire targeted all CI stakeholders in the Ethiopian CI and included the option for respondents to list and rate additional factors or management mechanisms not included in the questionnaire.

Questionnaire Two was developed to measure the effectiveness of contractor development programs on the sustainability of SMCs in the Ethiopian CI. It was based on a detailed investigation of national plans and specific development programs, such as IHDP and URRAP. The questionnaire was designed for SMCs that participated in the program. It was divided into three sections: an introduction to research objectives, demographic information

of the respondents and their companies, and measures of overall satisfaction, knowledge gained, and challenges faced during and after the development program (see Chapter 7).

Respondents were requested to indicate their level of agreement regarding the identified variables based on their experience, using a five-point Likert scale (where [1] = Strongly Disagree, [2] = Disagree, [3] = Moderate, [4] = Agree, and [5] = Strongly Agree). The questionnaire format used a running grid with one variable per row and five response cells per column to increase the efficiency of data collection.

4.3.2. Pilot Testing the Questionnaire

The primary objective of pilot testing is to assess the feasibility of a survey, identify potential weaknesses in the research design, and demonstrate the methodological rigor of the survey before administering the main questionnaire survey (Munn and Drever, 1990; Kothari et al., 2011). It also provides a valuable opportunity to evaluate the clarity, comprehensiveness, and understandability of the questionnaire, estimate the time required to complete it, and address any concerns raised by respondents (Hassan et al., 2006). The pilot survey participants included 12 industry professionals and academicians, ensuring that the feedback and insights obtained were from individuals with relevant expertise and knowledge. This diverse pool of participants provided valuable perspectives and contributed to the refinement of the survey instruments, enhancing their applicability and effectiveness in capturing the necessary data for the study.

4.3.3. Study Population and Sampling Technique

In this study, the population comprised various stakeholders including contractors, consultants, government agencies, academicians, and industry professionals. As their threshold level is unknown, calculating the sample size becomes a bit more challenging. However, a maximum variability assumption was employed, allowing for a conservative estimate of variability within the population. A two-stage sampling approach was employed to select participants from the CI, including contractors, consultants, government entities, and professionals. In the first stage, a purposive sampling method was employed to specifically select individuals with in-depth knowledge of the investigated topic, as suggested by Zegeye et al. (2009). In the second stage, random sampling was employed

within the pool of potential participants identified through purposive sampling to ensure a representative sample and minimize bias. Through the combination of purposive and random sampling, this study aimed to balance expertise and representation in the sample. The following formula, adapted from Czaja and Blair (1996), was used to calculate an acceptable sample size:

$$\text{Sample size} = \frac{z^2 p(1-p)}{e^2}$$

Where

z = standardized variable

p = percentage picking a choice, expressed as a decimal

e = desired level of precision (i.e. the margin of error)

In order to attain a sample size with a specific level of accuracy, a worst-case percentage choice decision of 50% was opted for, following the guidance provided by Oyewobi (2014). A 95 percent confidence level was also selected (with a significance threshold of = 0.05 and a z-score of 1.96). Balancing sample size, margin of error, and confidence level is crucial in conducting a population survey to obtain dependable results while utilizing resources and time efficiently. Hence, in this study, a 10% margin of error was chosen to optimize accuracy and economy, which is in line with the position of (Mengistu and and Mahesh, 2019), who also used a 10% margin of error in their study.

$$\text{Sample size} = \frac{1.96^2 \text{x } 0.5(1-0.5)}{0.10^2}$$

The minimum required sample size for the questionnaire survey was taken 96. Three hundred twenty-eight (328) questionnaires were distributed, and one hundred seventy-seven (177) responses were fully completed with an effective rate of 53.96%.

4.3.4. Questionnaire Administration and Collection

Traditional (paper-based) and web-based approaches were used to administer the survey questionnaire. The paper-based questionnaire was distributed to the respondents in person, while the web-based survey was created using Google Forms and disseminated to

respondents via their emails and/or social media addresses. In total, 328 questionnaires were distributed using these methods. To ensure data quality, a data cleansing process was undertaken, addressing various issues such as incomplete responses (missing or insufficient data), skipped questions (where respondents did not answer specific items), cases where respondents exhibited a pattern known as "straight-lining" (involving the selection of the same response option for multiple questions without genuine consideration), identification and handling of response outliers that significantly deviated from the overall pattern, and exclusion of responses from unqualified survey participants who did not meet the predetermined criteria. After completing the data cleansing step, 177 (53.96%) completed responses were obtained and utilized for subsequent analysis.

4.3.5. Questionnaire Analysis and Interpretation

This study collected data from diverse stakeholders in the Ethiopian CI. The sample included contractors (public and private), consultants (public and private), public clients, research and academic institutions, and regulatory authorities. For contractors and consultants, the target respondents' lists were obtained from the Ethiopian Construction Works Regulatory Authority's database, a government body responsible for registering and licensing construction and consulting companies. This database provided reliable information and facilitated the identification and tracking of the target respondents.

Similarly, respondents from research and academic institutions, as well as regulatory authorities, were selected based on their direct exposure and involvement in the subject matter of the study. The aim was to include individuals with expertise and experience in the CI to provide valuable insights and perspectives. Due to the COVID-19 pandemic, the survey remained open for seven months, and at least two reminders were sent to respondents. Descriptive and inferential statistics, including mean scores, standard deviation values, factor analysis, and correlation analysis, were used to analyze the data. The data analysis was conducted using SPSS software version 20.

4.3.5.1. Descriptive Statistics

Descriptive statistics are a statistical method that provides concise summaries of a dataset by analyzing its features, such as the mean and standard deviation (Mann, 2007). This study used descriptive statistics to rank variables related to "endogenic and exogenic factors affecting the sustainability of SMCs in Ethiopian CI" and "management mechanisms to improve the factors affecting them." A scale of five ordinal measures of agreement was used to determine the mean score for each variable. The mean score for each construct was calculated using the formula employed by Chew et al., 2008; Jusoh and Parnell, 2008; Yamin et al., 1999. SPSS software version 20 was used for data analysis, and the significance level used for all testing was 0.05.

4.3.5.2. Factor Analysis

The statistical technique of Factor Analysis involves grouping variables into smaller dimensions related to a shared construct (Hair et al., 2010; Cooper and Schindler, 2011). In this particular study, Exploratory Factor Analysis (EFA) was used to reduce the number of correlated variables to a smaller set of uncorrelated artificial variables. There is no universally agreed-upon minimum sample size for factor analysis, but a sample size greater than 100 with a commonality of over 0.6 is often suggested (Field, 2013). The sample size used in this study was 177, which exceeds the recommended minimum and surpasses the statistical reliability threshold. The Kaiser Criterion method was used to determine the number of factors in this factor analysis. This method is widely used and is the default in many statistical software packages, including SPSS. Additionally, the importance of the extracted factors was evaluated by ranking their factor scores, following the method recommended by Fan and Fox (2009).

$$F_i = \frac{\sum_{j=1}^{n} A_{ij}}{n}$$

Where:

F_i = factor score; A_{ij} = mean score of the j^{th} variable of factor i and *n* is the number of variables associated with the factor.

4.3.5.3. Correlation Analysis

Correlation analysis is a statistical method that assesses the level of association between two variables. It produces a correlation coefficient ranging from -1 (indicating a perfect negative correlation) to +1 (indicating a perfect positive correlation). A high correlation value signifies a strong relationship, while a low value suggests no relationship between the variables (Swinscow and Campbell, 2002). This research employed correlation analysis to investigate the relationships among the different constructs under study.

4.4. Qualitative Research

Qualitative research aims to comprehensively understand various aspects of behaviour and other factors explored in the social sciences and humanities. This approach is characterized by its varied knowledge claims, inquiry strategies, and data collection and analysis methods (Creswell, 2003), acknowledging the socially constructed nature of reality. Qualitative research employs diverse methods and strategies to ensure the reliability and credibility of findings while allowing for the interpretation of actions, events, and perspectives from the standpoint of the individuals under study (Sverlinger, 2000). Furthermore, this approach is closely linked to phenomenological and interpretative research and frequently employs techniques like in-depth interviews, focus groups, and observations without formal measurement. This research used multiple data sources to complement the qualitative approach following Yin's (1994) recommendations. The research utilized various data sources to complement the qualitative approach, in line with Yin's (1994) recommendations. These methods, including interviews and document reviews, aimed to provide descriptive information and a thorough comprehension of the research topic. The following sections provide more details on the data sources used in the study.

4.4.1. Interview

The research utilized interviews as a flexible primary data collection method to investigate aspects that visual observation cannot capture (Odur, 2005). These interviews were semi-structured, employing open-ended questions to allow participants to share their opinions while adjusting the questions based on each interviewee's level of understanding. Two sets of semi-structured interview guides were used in the study. The first set of interviews

explored the CI from the perspective of SMCs. Its purpose was to identify the factors influencing the competency of SMCs and the mechanisms for enhancing these determining factors. The participants targeted for this interview included SMCs, consultants, larger contractors, regulatory authorities, and industry professionals. On the other hand, the second set of interviews specifically focused on examining development strategies. The participants targeted for this interview were regulatory authorities and contractors involved in previous development initiatives (e.g., URRAP and IHDP), including those who had experienced both failure and success.

4.4.2. Document Review

Document review is a method used to analyze physical and digital materials, complementing primary data sources. Secondary sources, such as documents, provide a variety of perspectives and comprehensive overviews of the subject being investigated (Yin, 1994). This study selected various documents, including CID and MSE development strategies and policies, legal requirements, directives, proclamations, and reports from different organizations. These documents are analyzed in conjunction with other research methods to enhance credibility and reduce bias through triangulation.

4.5. Quality of Research Design

In order to ensure the study's content validity and reliability, various tests were conducted to assess adherence to statistical assumptions. A content validity test was conducted using expert judgment to ensure the questionnaire's relevance and representativeness. The survey instrument's reliability was assessed using Cronbach's alpha coefficient, with a threshold of 0.60 or higher deemed acceptable, as recommended by Hulin et al. (2001). A one-sample t-test was utilized to ascertain the significance level of the variables. Furthermore, Spearman rank-order correlation analysis was also used to examine the agreement between respondents' perceptions and the variables derived from their core sources. All data testing and analysis were performed using SPSS software, specifically version 20.

4.6. Demographic Profile of Respondents

Understanding the characteristics of survey respondents is crucial for drawing reliable and representative conclusions about the larger population. It is equally important to thoroughly assess the demographic composition of study participants and accurately report this data in research publications. Therefore, Table 4.1 provides an overview of the respondents' profiles, representing key industry stakeholders.

Table 4. 1. Designation of the respondents

Description			**Frequency**	**Proportion (%)**
Company Category		Contractor	80	45.20
		Consultant	88	49.72
		Regulatory Authority	5	2.82
		Research and Academic Institution	4	2.26
Area of establishment		Building Construction	34	19.21
		Road Construction	41	23.16
		General (All infrastructure)	93	52.54
		Others	9	5.08
Work Experience		Less than 5	12	6.78
		6 – 10	75	42.37
		11 – 15	49	27.68
		16 – 20	22	12.43
		21 – 25	16	9.04
		Above 26	3	1.69
Grade of the Company	Contractor	G1 and G2 (Large Contractors)	28	15.82
		G3 – G5 (Medium Contractors)	33	18.64
		G6 – G10 (Small Contractors)	19	10.73
	Consultant	G 1	65	36.72
		G 2	19	10.73
		G 3	2	1.13
		G 4	1	0.56
		G 5	1	0.56
	Others		9	5.08

4.7. Identification of Sustainable Competency Improvement Mechanisms

The synergy between endogenic and exogenic factors maps the improvement mechanism and enhances the effectiveness of SMCs. For instance, the improvement of entrepreneurial features of the firm strengthens the organization's management and administrative systems, including financial, contract, and project management. This mechanism is endogenic, as it

relies on the characteristics of the organization's entrepreneurs and its competitive strategy. However, it also requires exogenic factors, such as access to finance, government support, and industry networks, to be effective. The influencing factors were mapped to generate a comprehensive understanding of improvement needs for SMCs in the Ethiopian CI. Identifying essential improvement mechanisms for enhancing the sustainability and competency of the Ethiopian CI involved analyzing both endogenic and exogenic factors. This led to the identification of five sustainable competency improvement mechanisms, which include enhancing institutional capability and operating environment, revaluing entrepreneurial features of the firm, construction technology development and innovation, sustainable construction material supply chain, and human resource development.

Overall, under the revaluing of the entrepreneurial features of the firm, all the endogenic factors were assessed, and it was determined that these factors are critical areas for competency improvement in the Ethiopian CI. Factors such as government policies, regulatory frameworks, industry networks, and culture were assessed under enhancing institutional capability and the operating environment. Furthermore, the gaps identified from three national development programs are reflected in construction technology development and innovation, sustainable construction material supply chain, and human resource development improvement mechanisms.

4.8. Chapter Summary

Selecting suitable methodological approaches and techniques is essential to fulfill the research objectives. This study employed a combination of qualitative and quantitative data collection methods to gain a comprehensive understanding of the phenomenon being investigated. Purposive sampling was utilized to carefully select specific participants for the quantitative aspect of the research, while qualitative methods like semi-structured interviews and document analysis were also incorporated. In the upcoming chapter of this thesis, a detailed discussion of the findings related to endogenic factors influencing the sustainable competency of SMCs in the Ethiopian CI will be presented.

CHAPTER FIVE

ENDOGENIC FACTORS AFFECTING THE SUSTAINABLE COMPETENCY OF SMCs

5.1. Introduction

This chapter focuses on the endogenic factors that influence the sustainable competency of SMCs, which are obtained through quantitative and qualitative analysis. The findings from this analysis are used to validate the conceptual framework and test the research hypotheses that were presented in Chapter Three. It first reports the analysis results obtained from descriptive statistics used to measure the impact of endogenic factors affecting the sustainable competency of SMCs and the stakeholders' perception of the factors. The affecting factors were categorized based on their presumed sources (i.e., organizational structure, organizational culture, characteristics of the entrepreneur, competitive strategy, organizational resources, managerial skill and competency, and tendering and contract administration), and respondents were queried about their perception of the factors.

The collected data underwent thorough checks for reliability and validity, and various statistical examinations were conducted to assess the significance of different factors and identify their fundamental components. Table 5.1 summarizes the results of KMO, Bartlett's Test of Sphericity, and Cronbach's Alpha, and the result indicates the appropriateness of the data. The survey results were corroborated by the interviews and document analysis and were utilized to validate the survey's findings. The chapter concludes with a concise overview of the results and their implications.

Table 5. 1. Test for appropriateness of data for factor analysis

S/No.	Sources of Variables	Alpha (α) value	KMO	Bartlett's Test of Sphericity	No. of Items
1	Organizational structure	0.786	0.819	Significant	8
2	Organizational culture	0.800	0.816	Significant	8
3	Characteristics of entrepreneur	0.835	0.857	Significant	11
4	Competitive strategy	0.846	0.851	Significant	9
5	Organizational resources	0.820	0.839	Significant	8
6	Managerial skill and competency	0.809	0.826	Significant	11
7	Tendering and contract administration	0.699	0.756	Significant	10

5.2. Findings from Questionnaire Survey

5.2.1. Variables Emanating from Organizational Structure

The influence of organizational structure on the sustainable competency of SMCs was measured using eight variables. The variables under this category were analyzed using descriptive statistics, and the results are presented in Table 5.2. The employees' strategic and operational decision-making capacity (i.e., decentralization), received the highest ranking in the aggregated results, as indicated by its mean score value. This finding suggests that empowering employees and involving them in strategic and operational decision-making processes significantly impact the firm's success, aligning with the findings of previous studies (Christie et al., 2003; Wong et al., 2011; Legge, 2020). According to Legge (2020), involving employees in decision-making will empower them to make effective decisions and contribute to an organization's success. No single individual can be defined as responsible for organizational success, as success depends on the combined efforts of everyone participating in the process. The result is also corroborated by the position of Ghoshal and Bartlett (2000), who stated the positive impact of the decentralized decision-making process on organizational development. Ghoshal and Bartlett (2000) stated that creating an environment of high decentralization can promote a culture that allows people to work with independence and creativity. This atmosphere can motivate individuals to acquire new knowledge and skills, explore novel ideas and solutions, develop new strategies, and even transform the organization.

Company demographics (age of the firm, stage of maturity, number of employees, and geographic region) ranked second, indicating that these collective demographic characteristics significantly impact and contribute to the organization's competencies. This finding is consistent with Kimberly and Bouchikhi's (1995) assertion that companies' competencies change over time as they evolve from inception to maturity and adapt to their environment. Similarly, Korkmaz and Messner (2008) argued that firms operating in active business geographical regions would gain a competitive advantage and superior performance over their rivals as they can easily acquire necessary resources and market opportunities, in contrast to those who are not.

Company policies and procedures and suitability of the organization structure (i.e., number of existing organizational units and their hierarchical levels), third and fourth, respectively. Furthermore, the significant value obtained from one sample t-test indicates that all the variables are statistically significant as their p-value is less than the chosen 0.05 (5%) level of significance, and accordingly, the null hypothesis is rejected.

Table 5.2. The analysis result of variables emanating from Organizational Structure

Variables emanating from Organizational Structure	Combined Result			
	Mean	Rank	Std.	T-test
Organizational specialization and task diversification	3.15	8	.836	.016
Existence of comprehensive control systems	3.16	7	.755	.004
Company policies and procedures	3.24	3	.861	.000
Suitability of the organization structure (i.e. number of existing organizational units and their hierarchical levels)	3.22	4	.799	.000
Communication and coordination between organizational units	3.21	5	.802	.001
Company demographics (age of the firm, stage of maturity, number of employees, and geographic region)	3.27	2	.808	.000
Formalization and standardization of activities within the company	3.18	6	.796	.004
Employee's strategic and operational decision making power (i.e. decentralization)	3.31	1	.871	.000

Factor analysis (FA) was performed to extract the eight significant items indicated under this category. The analysis yielded two components with a cumulative variance of 65.33%, and the components are named Component 1, "*Organizational structure and corporate diversification,*" and Component 2, "*Company demographics and shared services."*

Table 5. 3. Factor analysis result of variables emanating from Organizational Structure

Variables emanating from Organizational Structure	Components	
	1	2
Organizational specialization and task diversification	.822	
Existence of comprehensive control systems	.813	
Company policies and procedures	.812	
Suitability of the organization structure (i.e. number of existing organizational units and their hierarchical levels)	.783	
Communication and coordination between organizational units		.822
Company demographics (age of the firm, stage of maturity, number of employees, and geographic region)		.810
Formalization and standardization of activities within the company		.798
Employee's strategic and operational decision making power (i.e. decentralization)		.742
Factor score	3.36	3.24
Initial Eigenvalue	3.22	2.01
% of Variance	40.26	25.07
Cumulative Variance %		65.33

Organizational Structure and Corporate Diversification: The organizational structure measures the complexity of an organization's hierarchical arrangements (Meijaard and Mosselman, 2002). This complexity can be expressed through factors like the number of administrative units, a chain of command, reporting relationships, division of authority, and decision-making processes, as identified by Martínez-León and Martínez-García, (2011). Thus, a suitable structure functions as support, giving the organization stability while driving it to adapt to its surroundings. Similarly, company policies and procedures also help create the firm's rules of conduct, defining the responsibilities of both employees and employers. A sound policy is essential in any organization and should be clear, determined, and free from conflicting views and confusion. Another essential variable in this component is comprehensive control systems established to maintain standard procedures throughout the company. These systems support key management aspects such as principles, policies, rules, roles and responsibilities, and core values that promote ethical business practices, which are vital for any organization's success. Proper management of these procedures and control systems is essential to maintain organizational stability. However, it is equally important for management to ensure that these systems are maintained with integrity and fully compliant to achieve organizational success.

Company Demographics and Shared Services: Involving employees in strategic and operational decision-making (decentralizing decision-making power) increases job satisfaction, cultivates a positive attitude, and encourages teamwork. This can enhance productivity as employees actively engage in various aspects of the organization. The findings from this research support Legge's (2020) claim that a decentralized decision-making process allows for more creativity and efficiency closer to the production process, resulting in less rigidity and flatter hierarchies within the organization. However, they contradict Phan's (2000) argument that centralized structures lead to better outcomes than decentralized ones. Phan contends that a centralized structure necessitates constant monitoring and evaluation of the organizational structure by top management, as well as setting goals and priorities for each management level, resulting in success.

5.2.2. Variables Emanating from Organizational Culture

According to (Feixin and Albertson, 2003; Needle, 2004), a firm's competency depends heavily on its organizational culture and values. Deng (2004) further suggests that organizational culture significantly shapes how employees perceive the company's shared vision, mission, and service orientation. This indicates that employees' shared values, beliefs, and attitudes substantially impact how they interpret the company's objectives and mission, as well as the level of service they provide. The variables in this category underwent evaluation to determine the most suitable ones for explaining the respondents' perspectives on the sustainable competency of SMCs. The summarized results of this evaluation can be found in Table 5.4.

The combined result indicates that organizational leadership style, attitude of top management, and availability of rewarding and incentive systems are the most recurring impact factors. Furthermore, Table 5.4 shows that all variables in this category significantly impact SMCs' sustainability, supported by the one-sample t-test result. Consequently, the null hypothesis is rejected as the p-value is lower than the chosen significance level.

Table 5. 4. The analysis result of variables emanating from Organizational Culture

Variables emanating from Organizational Culture	Combined Result			
	Mean	Rank	Std.	T-test
Presence of defined task assignment and measurement techniques	3.33	8	.816	.000
Presence of organizational adhocracy culture (i.e. creativity, innovation, and risk-taking)	3.37	5	.771	.000
Presence of organizational clan culture (i.e. participation, discretion teamwork, and integration)	3.35	7	.893	.000
Presence of organizational bureaucratic culture (i.e. common attitudes, values, convictions, and orientations)	3.36	6	.881	.000
Attitude of top management	3.41	2	.888	.000
Training and staff development	3.38	4	.946	.000
Availability of rewarding and incentive systems	3.40	3	.984	.000
Organizational leadership style	3.48	1	.995	.000

FA was performed to extract the eight items indicated under this category. The findings in Table 5.5 demonstrate that the analysis yielded two components, which explain 72.50% of the total variance. Upon analyzing the items included in each component, they are named Component 1, "*Organizational culture and work measurement*" and Component 2, "*Leadership, staff development, and rewarding system."*

Table 5. 5. Factor analysis result of variables emanating from Organizational Culture

Variables emanating from Organizational Culture	Factor Analysis	
	C1	C2
Presence of defined task assignment and measurement techniques	.868	
Presence of organizational adhocracy culture (i.e. creativity, innovation, and risk-taking)	.849	
Presence of organizational clan culture (i.e. participation, discretion teamwork, and integration)	.847	
Presence of organizational bureaucratic culture (i.e. common attitudes, values, convictions, and orientations)	.830	
Attitude of top management	.807	
Training and staff development		.893
Availability of rewarding and incentive systems		.884
Organizational leadership style		.811
Factor score	3.36	3.42
Initial Eigenvalue	3.65	2.15
% of Variance	45.58	26.92
Cumulative Variance %		72.50

Organizational Culture and Work Measurement: A robust culture is a hallmark of successful businesses. On the other hand, an ineffective culture might have a detrimental impact on the company's bottom line and leadership. As the situation in the CI is temporary and varies significantly, there is no one-size-fits-all cultural template that meets the needs of all organizations. Hence, blending and redefining the cultures (i.e., clan, adhocracy, and bureaucratic cultures) and reconciling the differences helps companies meet their business goals. These findings align with the "Competing Values Framework" theory introduced by Cameron and Quinn (1983). According to Cameron and Quinn, organizational effectiveness is determined by the dimensions of organizational focus (internal vs. external) and versatility (stability vs. flexibility). The model maps each dimension into quadrants, and based on their weight, the resulting graph indicates what is most valued in an organization, how it functions, how people cooperate, and what the corporate values are. Similarly, the other remaining variables, such as the attitude of top management (being optimistic, confident, trusting, and growth-oriented), with the presence of defined task assignments and measurement techniques, are believed to affect an organization's culture strongly.

Leadership, Staff Development, and Rewarding System: A leadership style is a joint outcome of behaviors, personality traits, and the underlying motives employed to achieve a common objective. It is a primary driver of increasing employee satisfaction,

commitment, and performance. Thus, the adopted leadership style influences the overall success of an organization. The study results also support the findings (Al Khajeh, 2018), which claim that their perception of the leadership style influences employees' commitment to the organization. Similarly, staff development and the reward system are critical to an organization's success as they promote employee job satisfaction, motivation, and commitment to work.

5.2.3. Variables Emanating from Characteristics of Entrepreneurs

The characteristics of the entrepreneurs were measured using 11 variables, and the results are summarized in Table 5.6. The existence of matured and developed entrepreneurial mindsets was regarded as the most crucial factor in promoting sustainable competency, demonstrating the importance of cultivating an entrepreneurial culture within organizations. This result aligns with the growing trend of taking calculated risks to gain a competitive advantage in today's competitive business environment. Further, the result also corroborated the position of (McGrath and MacMillan, 2000; Haynie et al., 2010; Naumann, 2017; Kuratko and Audretsch, 2021), who stated that the existence of matured and developed entrepreneurial mindsets reflect an individual's keen interest in entrepreneurial activities; becoming a key factor for high achievement and contributing to the successful operation of enterprises. Confidence in one's quality and capacity to accomplish objectives and the practice of setting a genuine objective and sense for achieving it were taken as the second and third most basic forms of the essential characteristics of an entrepreneur for doing well in business. In contrast, the study found that the least influential entrepreneur characteristics cited by respondents were traits such as looking for new opportunities and solutions to achieve goals, inspiring and motivating others, and making decisions based on one's judgment.

The one-sample t-test demonstrates that all the analyzed variables are statistically significant, with a p-value below 0.05 (5% significance level). This indicates that each of the variables in this category significantly impacts the sustainable competency of SMCs. As a result, the null hypothesis is rejected due to the p-value being lower than the chosen significance level.

Table 5. 6. The analysis result of variables emanating from Characteristics of Entrepreneur

Variables emanating from Characteristics of Entrepreneur	Combined Result			
	Mean	Rank	Std.	T-test
The practice of searching and discovering new solutions	3.37	5	.921	.000
The practice to forecast the future from once own instinct	3.34	8	.872	.000
The practice to make decision based on own judgment	3.38	4	.910	.000
Existence of matured and developed entrepreneurial mind-sets	3.47	1	1.012	.000
The practice of searching for additional opportunities for reaching the set objectives	3.32	9	.894	.000
The practice to lead individuals by inspiration and by motivation	3.31	10	.970	.000
The practice to set a genuine objective and sense for achieving it	3.39	3	.840	.000
Confidence in own quality and capacity to accomplish objectives	3.41	2	.855	.000
Entrepreneur's demography (i.e. age, education, gender, socio- economic origin, and ethnicity)	3.36	6	.914	.000
The practice of receiving and disseminating information	3.35	7	.828	.000
The practice of self-control and regulation of own behavior	3.29	11	.886	.000

Table 5.7 displays the results of FA conducted to identify the eleven items related to the category. The analysis yielded three components with a cumulative variance of 70.20%. Upon analyzing the items included in each component, they were labeled Component 1, *"Developed entrepreneurial characteristics and mindsets,"* Component 2, "*Entrepreneur's demography and self-efficiency,"* and Component 3, "*Self-regulation skills and the practice of information management."*

Table 5. 7. Factor analysis result of variables emanating from Characteristics of Entrepreneur

Variables emanating from Characteristics of Entrepreneur	Factor Analysis		
	C1	C2	C3
The practice of searching and discovering new solutions	.847		
The practice to forecast the future from once own instinct	.847		
The practice to make decision based on own judgment	.834		
Existence of matured and developed entrepreneurial mind-sets	.803		
The practice of searching for additional opportunities for reaching the set objectives	.794		
The practice to lead individuals by inspiration and by motivation	.758		
The practice to set a genuine objective and sense for achieving it		.907	
Confidence in own quality and capacity to accomplish objectives		.897	
Entrepreneur's demography (i.e. age, education, gender, socio- economic origin, and ethnicity)		.809	
The practice of receiving and disseminating information			.810
The practice of self-control and regulation of own behavior			.715
Factor score	3.37	3.39	3.32
Initial Eigenvalue	4.52	2.03	1.17
% of Variance	41.11	18.48	10.61
Cumulative Variance %			70.20

Developed Entrepreneurial Characteristics and Mindsets: The sustainable development of SMCs is linked to the presence of developed entrepreneurial characteristics and mindsets. While each entrepreneur is distinct, and their paths to success vary, they share certain standard features contributing to their achievements. Some of these features include the existence of matured and developed entrepreneurial mindsets; the ability to search and discover new solutions; the ability to forecast the future based on one's instincts and make decisions based on one's judgment, the ability to search for additional opportunities and solutions for reaching the set objectives; and the ability to lead individuals by inspiration and motivation. SMCs with entrepreneurial mindsets and a desire to develop should exhibit the essential skill sets to maximize their growth chances. The findings are also consistent with (Dziallas and Blind, 2019), who established a positive correlation between personal characteristics and the attitudes and mindsets of entrepreneurs.

Entrepreneur's Demography and Self- efficacy: The qualitative and quantitative variables of demographic characteristics of entrepreneurs, such as gender, age, education, experience, ethnicity, and socio-economic origin, positively and significantly impact entrepreneurs' success. Educated individuals are more likely to become successful entrepreneurs, while individuals between the ages of 25 and 44 are more inclined to start their businesses. Similarly, entrepreneurs with prior business experience are way better than those without prior business experience. Significant evidence was also observed of socio-economic background's core association with entrepreneurial traits. These findings are consistent with previous research by Soomro et al. (2019), who noted the significant impact of gender, age, education, and experience on entrepreneurial success. The other variables in this factor are "The practice of setting a genuine objective and a sense of achieving it" and "confidence in one's quality and capacity to accomplish objectives," collectively named "self-efficacy." Self-efficacy refers to an individual's belief, quality, and capacity to accomplish objectives. It also involves setting a genuine objective and making sense of it. A high level of self-efficacy enables entrepreneurs to develop creative insights and strategies for business operations (Schenkel et al., 2019). The findings of this research indicate the importance of self- efficacy and its positive relationship with a firm's performance.

Self-Regulation Skills and the Practice of Information Management: Self-regulation is a cognitive process necessary for regulating one's behavior, thoughts, and emotions to achieve specific goals. The entrepreneurs' capacity for self-control and regulation and the ability to make decisions under stress are essential for long-term sustainability. This finding confirms the assertions by Singh et al. (2013) that possessing such attributes as an entrepreneur enhances a company's performance. Another essential variable in this factor is the practice of information management. Information management involves gathering, storing, disseminating, archiving, and discarding data. Effective information management ensures that the right people have access to the right data at the right time, allowing them to make the right decisions. Information management allows one to manage time and resources to achieve desired goals properly. Effective information management is necessary to survive in the competitive market due to limited resources and low utilization by SMCs.

5.2.4. Variables Emanating from Competitive Strategy

The perceptions of the respondents on the impact of the competitive strategy on the sustainable competency of SMCs were measured using nine attributes so that their relative effectiveness in each attribute could be understood. The aggregate results shown in Table 5.8 indicate that the availability of institutional and business relationships (i.e., relationships and alliances with suppliers, owners, competitors, government entities, etc.) was ranked first. Such relationships are crucial for any business's success, enabling access to resources, knowledge, and potential growth opportunities. Hence, SMCs must prioritize building and maintaining these relationships to stay competitive and thrive in their industry. This finding is consistent with Lorenzoni and Lipparini's (1999) assertion that establishing sustainable and robust relationships with various institutions and corporations is critical to business success. The strength of these relationships depends on an organization's abilities, capabilities, position, and orientation in the competitive business environment. The result is also in line with Lechner and Dowling's (2003)'s position that suggested, at the organizational level, the ability to establish relationships increases the ability to penetrate the market; establish and exploit resources; increase access to information; and increase communication and coordination of business activities, thereby allowing them to grow and thrive within the shadow of their competitors.

The study found that market coverage and the image and reputation of the organization were ranked second and third, respectively, as important factors for SMCs' sustainable competency. However, external advice (such as accountants, lawyers, and business consultants) and the strategic selection of potential clients (known as focus strategy) were considered less important and had the most negligible impact on sustaining the competency of SMCs. The t-test showed that the p-values of all variables in the competitive strategy and sustainable competency category were below the 5% significance level, indicating that competitive strategy is a significant factor in determining sustainable competency for SMCs. Hence, the null hypothesis (HO) which, assumes that this category's variable had no impact on sustainable competency, is rejected.

Table 5. 8. The analysis result of variables emanating from Competitive Strategy

Variables emanating from competitive strategy	Combined Result			
	Mean	Rank	Std.	T-test
Market coverage	3.95	2	.834	.000
Bidding factors (i.e. experience and resources)	3.76	5	.905	.000
Availability of institutional and business relationships (i.e. relationship and alliances with suppliers, owners, competitors, government entities, and etc.)	4.03	1	.842	.000
Image and reputation of the organization	3.88	3	.854	.000
The practice of setting a defined corporate strategy (i.e. vision, mission, objectives, strategies and plans) and implement them accordingly	3.79	4	.910	.000
Ability to compete (number, kind of competitors and range of competitive pressure from the level of equilibrium in demand and supply)	3.72	6	.839	.000
The practice to utilize external advice (i.e. accountant; lawyer, and business consultant)	3.32	8	.955	.000
The practice of being less expensive than competitors (i.e. cost leadership strategy)	3.38	7	.946	.000
The practice to make a strategic selection of potential client (i.e. focus strategy)	3.19	9	.913	.007

FA was used to identify the eleven items indicated under this category, resulting in two components that together explain 72.37% of the total variation. The first component explains 48.60% of the variation, while the second explains 24.32%. After a repeated rotation of the variables included in each component, they are named Component 1, "*Marketing strategy"* and Component 2, "*Strategic management."*

Table 5. 9. Factor analysis result of variables emanating from Competitive Strategy

Variables emanating from competitive strategy	Factor Analysis	
	C1	C2
Market coverage	.867	
Bidding factors (i.e. experience and resources)	.838	
Availability of institutional and business relationships (i.e. relationship and alliances with suppliers, owners, competitors, government entities, and etc.)	.827	
Image and reputation of the organization	.826	
The practice of setting a defined corporate strategy (i.e. vision, mission, objectives, strategies and plans) and implement them accordingly	.820	
Ability to compete (number, kind of competitors and range of competitive pressure from the level of equilibrium in demand and supply)	.789	
The practice to utilize external advice (i.e. accountant; lawyer, and business consultant)		.901
The practice of being less expensive than competitors (i.e. cost leadership strategy)		.872
The practice to make a strategic selection of potential client (i.e. focus strategy)		.863
Factor score	3.86	3.30
Initial Eigenvalue	4.325	2.188
% of Variance	48.06	24.32
Cumulative Variance %		72.38

Marketing Strategy: Strategic alliances offer a way for businesses to combine their resources, knowledge, and expertise in a highly competitive and risky environment, allowing them to pursue common interests, enhance capabilities and core competencies, and gain competitive advantages while reducing uncertainties (Yi Wei, 2007). A firm's success is greatly influenced by the strategic alliances it forms, with key factors including the ability to expand market coverage and explore new opportunities that would not be available through solo efforts. Smiley et al. (2014) also suggest that strategic alliances allow SMCs to share their limited resources, including plants, equipment, and personnel, to minimize total value chain costs. Hence, parties involved in a strategic alliance must cultivate mutual trust, commitment, effective communication, and collaborative problem-solving skills.

Strategic Management: The ability to understand the strategic position of an organization and identify areas for improvement is crucial to ensure the firm's continued success and protect it from threats. As business managers, entrepreneurs must have the ability to comprehend their organization's strategic position, identify areas of weakness, devise potential solutions, and implement them effectively, as noted by Chinowsky (2000). As advised by Porter (1985), a few strategic management practices that entrepreneurs should

adopt in their business activities include the practice of being less expensive than competitors (i.e., cost leadership strategy), the practice of making a strategic selection of potential clients (i.e., focus strategy), and the practice of utilizing external advice (i.e., accountant, lawyer, and business consultant).

5.2.5. Variables Emanating from Organizational Resources

This section considered the influence of organizational resources on the sustainable competency of SMCs. As indicated in Table 5.10 below, the mean score analysis result shows the inability to access financial resources (i.e., strict credit terms, high-interest rate, strict requirements for obtaining bonds/guarantees/sureties), inappropriate financial policies adopted within the company, and inability to access plants and equipment the top impacting variables. Conversely, respondents ranked variables such as the inability to access information resources and high staff turnover as least likely to affect the sustainable competency of SMCs. The results of the one-sample T-test show that all variables listed in this category have a significant impact on the sustainability of SMCs. As the p-value is below the chosen significance level, the null hypothesis is rejected, affirming that these variables hold statistical significance in their impact on SMCs sustainability.

Table 5. 10. The analysis result of variables emanating from Organizational Resources

Variables emanating from organizational resources	Combined Result			
	Mean	Rank	Std.	T-test
Inappropriate financial policies adopted within the company	3.45	2	.738	.000
Inability to access plants and equipment	3.44	3	.713	.000
Inability to access financial resources (i.e. strict credit terms; high-interest rate; strict requirements for obtaining bonds/guarantees/sureties)	3.46	1	.839	.000
High cost of materials, labor force, innovation and technology	3.43	4	.796	.000
High staff turnover	3.19	8	.817	.002
Poor quality and competencies of human capital	3.34	5	.790	.000
Inability to access information resources	3.25	7	.782	.000
Ineffective and inconsistent resource management practice	3.32	6	.724	.000

FA was conducted on the eight organizational resource variables to explore their underlying relationships. The analysis resulted in two components that explain 72.33% of the total variance, with all variables in both components having positive values, indicating

interrelatedness and reflecting respondents' satisfaction levels. Table 5.11 shows that the first component accounted for 46.23% of the variation, while the second component explained 26.10%. After repeated rotation of the loaded variables, the organizational resources were operationalized using Component 1*, "Inability to access resources and high cost of construction inputs"* and Component 2, *"Poor resource management skills.*"

Table 5. 11. Factor analysis result of variables emanating from Organizational Resources

Variables emanating from organizational resources	Factor Analysis	
	C1	C2
Inappropriate financial policies adopted within the company	.883	
Inability to access plants and equipment	.869	
Inability to access financial resources (i.e. strict credit terms; high-interest rate; strict requirements for obtaining bonds/guarantees/sureties)	.853	
High cost of materials, labor force, innovation and technology	.781	
High staff turnover	.762	
Quality and competencies of human capital		880
Inability to access information resources		.855
Ineffective and inconsistent resource management practice		.849
Factor score	3.39	3.30
Initial Eigenvalue	3.70	2.09
% of Variance	46.23	26.10
Cumulative Variance %		72.33

Inability to Access Resources and High Cost of Construction Inputs: The ability of construction contractors to succeed largely relies on the availability of construction resources such as materials, human resources, machinery, and finance. These resources significantly impact the performance of construction projects, and the inability to access them can significantly impede the growth and development of a construction firm. Recent research has shown that SMCs encounter obstacles in accessing financial resources due to inappropriate financial policies in the company. Further, they may struggle to access plants and equipment and experience high materials, labor force, innovation, and technology costs. These findings align with previous research by Kulemeka et al., 2015; Offei et al., 2019, which also emphasizes the crucial relationship between resource access and the sustainable growth of SMCs.

Poor Resources Management Skill: Given the complex nature of construction projects, keeping track of all the necessary components can be challenging, as it requires carefully coordinating multiple moving parts. Inadequate resource management skills can compound the challenge, manifesting in various ways. This includes an inability to access important information and insights, ineffective resource allocation practices that can lead to the squandering of resources, and inadequate human resources, which can impact an organization's ability to meet its goals. These factors can contribute to poor management, reduced productivity, unused equipment, and waste materials, adversely affecting organizational profitability and delaying project completion.

The finding is also supported by Amoah et al.'s (2011) assertion that ineffective resource management is the leading cause of performance problems in construction organizations. In today's complex business environment, these issues can have profound implications for the success of a business. As such, organizations must ensure their management teams have the skills to manage operations effectively and efficiently.

5.2.6. Variables Emanating from Managerial Skill and Competency

The variables under this category presume lack of project management skills (i.e., planning, organizing, co-coordinating, controlling, motivating, communicating, and leading), lack of contractual negotiation skills, and the inability of entrepreneurs to understand the construction process to be the most impacting factors. Similarly, variables "lack of technical skills" and "lack of supply chain management skills" have a higher standard deviation, indicating the respondents' different perceptions about the variables. The one-sample T-test indicates that all variables are significant. Thus, the null hypothesis is not accepted as the p-value is less than the chosen significance level.

Table 5. 12. The analysis result of variables emanating from Managerial Skill and Competency

Variables emanating from managerial skill and competency	Combined Result			
	Mean	Rank	Std.	T-test
Inability to establish and implement strategy	3.87	4	1.055	.000
Inability of entrepreneurs in understanding the construction process	3.90	3	1.045	.000
Lack of contractual negotiation skill	4.02	2	1.042	.000
Lack of project management skills (i.e. planning, organizing, controlling, motivating, communicating, and leading)	4.03	1	1.189	.000
Lack of supply value chain management skills	3.65	5	1.193	.000
Lack of technical skills	3.50	6	1.207	.000
Lack of ICT and information management skills	3.42	7	.877	.000
Lack of human resources management skills	3.21	10	.879	.001
Lack of legal skills	2.89	11	.790	.050
Ineffective financial management ability (i.e. estimating, cash flow and cost control)	3.39	8	1.023	.000
Inability to handle multiple project at once (i.e. at organization level)	3.24	9	.919	.001

Table 5.13 shows the FA results identifying 11 items related to the category, yielding three components with a cumulative variance of 61.89%. Component 1, *"Poor corporate management skills,"* Component 2, *"Inability to understand and manage the construction process,"* and Component 3, *"Inability to manage multiple projects and ineffective financial management."*

Table 5. 13. Factor analysis result of variables emanating from Managerial Skill and Competency

Variables emanating from managerial skill and competency	Factor Analysis		
	C1	C2	C3
Inability to establish and implement strategy	.883		
Inability of entrepreneurs in understanding the construction process	.881		
Lack of contractual negotiation skill	.867		
Lack of project management skills (i.e. planning, organizing, co-coordinating, controlling, motivating, communicating, and leading)	.829		
Lack of supply value chain management skills	.695		
Lack of technical skills	.673		
Lack of ICT and information management skills		.747	
Lack of human resources management skills		.729	
Lack of legal skills		.487	
Ineffective financial management ability (i.e. estimating, cash flow and cost control)			.814
Inability to handle multiple project at once (i.e. at organization level)			.741
Factor score	3.83	3.38	3.32
Initial Eigenvalue	4.23	1.39	1.16
% of Variance	38.45	12.66	10.78
Cumulative Variance %			61.89

Poor Corporate Management Skill: Small businesses are often started by experts or specialists in certain fields who have limited knowledge and experience in management. These individuals tend to focus primarily on their area of expertise and may not delegate the management of the business or invest efforts in enhancing their own management skills. This approach can result in difficulties since several studies have identified poor management as a common cause of business failure. Some attributes include poor management metrics such as lack of project management skills, lack of technical skills, lack of supply chain management skills, lack of ICT and information management skills, and lack of contractual negotiation skills. Thus, management skills could be improved by acquiring basic skills and knowledge in managerial functions. Improved management skills will help develop the SMCs effectively in the competitive business environment.

Inability to Understand and Manage Construction Process: Construction management is a complex process that involves overseeing every aspect of a project's life cycle, from start to finish. It is a specialized professional service that employs specific project management techniques to coordinate various services during the project planning, design, execution, and commissioning phases, intending to achieve project objectives such as quality, cost, time, and scope. To be successful in this field, entrepreneurs who work as construction managers must have certain skills, including knowledge of the construction process, the ability to formulate and implement effective strategies, and the capability to navigate legal, contractual, regulatory, and transactional issues related to construction. Failure to possess these skills can adversely affect the firm's success.

Ineffective Financial Management and the Inability to Handle Multiple Projects: Having specific financial management skills is crucial for operating a successful construction business due to the inherent risks associated with the industry. Planning and managing financial resources is essential for running a successful construction business, as uncertainty is common in the industry. This involves various financial management tasks, such as cost and working capital planning, accounting for financial resources, profit management, cash flow management, and making sound financial decisions. It also involves identifying the most efficient sources of capital to finance projects. Studies have indicated that inadequate financial management is a significant contributor to project failures, and as a result, many

construction enterprises go bankrupt due to ineffective financial management. Hence, entrepreneurs must thoroughly understand and establish financial management abilities to succeed as SMCs in today's competitive business environment. The findings also support the positions of (Amoah et al., 2011). Another essential variable in this category is the difficulty of managing multiple projects simultaneously (i.e., at the organizational level). Lack of project management skills, poor communication skills, inability to assign tasks, and other factors contribute to failure to manage multiple projects. Hence, analyzing the scope of a project, planning the implementation, communicating with team members, and managing risks are all essential alternatives for successful SMCs.

5.2.7. Variables Emanating from Tendering and Contract Administration

This section examined the variables emanating from tendering and contract administration. Table 5.14 below presents the analysis result of the survey questionnaire. Accordingly, low profit margin due to competition was mentioned as the highest, followed by inability to cover tendering expenses, then failure to secure prequalification criteria and technical threshold. In contrast, the lowest mean was the inability to utilize preferential/affirmative procurement systems and reviling BOQ pricing in secret and unethical behavior within a firm staff. It is also reported that poor pricing and contract administration skills have the highest standard deviation value (1.202), indicating that respondents' perception is varied.

The one-sample T-test indicates that, except for the inability to utilize preferential/affirmative procurement systems, all the remaining variables significantly impact sustainable competency. Accordingly, the null hypothesis was rejected, except for "the inability to utilize preferential/affirmative procurement systems," which indicates that the sustainable competency of SMCs does not depend on the SMCs' inability to utilize preferential/affirmative procurement systems.

Table 5. 14. The analysis result of variables emanating from Tendering and Contract Administration

Variables emanating from tendering and contract administration	Combined Result			
	Mean	Rank	Std.	T-test
Inability to cover tendering expense	3.56	2	1.070	0.000
Failure to complete and submit the bid document within the allotted tender floating time	3.23	8	.964	0.002
Poorly designed contract document (i.e. inappropriate and incomplete contract documents; weak enforcement of contract conditions; and failure to resolve contract disputes)	3.44	5	1.027	0.000
Routine discontinuity of work	3.27	7	1.014	0.000
Inability to utilize preferential/affirmative procurement systems	3.06	9	.972	0.396
Reviling BOQ pricing in secret and unethical behavior within a firm staffs	2.82	10	.940	0.014
Low profit margin due to competition	3.68	1	1.078	0.000
Inability to understand, administer and interpret specifications and contract clauses	3.34	6	.994	0.000
Failure to secure prequalification criteria and technical threshold	3.56	3	1.102	0.000
Poor pricing and contract administration skill	3.51	4	1.202	0.000

FA analysis yielded three components, collectively explaining 64.67% of the total variance. The components were named as follows: Component 1,*"Poor contract management capacity and inadequate contract document;"* Component 2, *"Lack of competence in procurement management and inability to meet the technical requirement,"* and Component 3, *"Low-profit margin due to competition and unethical practice."*

Table 5. 15. Factor analysis result of variables emanating from Tendering and Contract Administration

Variables emanating from tendering and contract administration	Factor Analysis		
	C1	C2	C3
Failure to complete and submit the bid document within the allotted tender floating time	.864		
Poorly designed contract document (i.e. inappropriate and incomplete contract documents; weak enforcement of contract conditions; and failure to resolve contract disputes)	.835		
Inability to cover tendering expense	.832		
Routine discontinuity of work	.831		
Inability to understand, administer and interpret specifications and contract clauses		.886	
Failure to secure prequalification criteria and technical threshold		.844	
Reviling BOQ pricing in secret and unethical behavior within a firm staffs			.786
Low profit margin due to competition			.726
Factor score	3.38	3.45	3.25
Initial Eigenvalue	3.14	1.51	1.15
% of Variance	34.87	16.75	12.81
Cumulative Variance %			64.43

Poor Contract Management Capacity and Inadequate Contract Document: Successful contract administration is marked by efficiently managing a project's time, cost, quality, and safety objectives. Conversely, inadequate contract management can cause inefficient construction, delays, unnecessary changes, conflicts, and disputes, often leading to work interruptions and stoppages (Abotaleb and El-Adaway, 2018). Various factors can lead to poor contract administration, such as insufficient skills in contract administration (Kulemeka et al., 2015) and poorly designed contract documents (i.e., inappropriate and incomplete contract documents). Furthermore, inadequate supervision and monitoring (Fida, 2008), parties' unwillingness to cooperate and adhere to contract rules and regulations, weak enforcement of contract rules and regulations (Offei et al., 2019), and inadequate job estimating and costing (Amoah et al., 2011) can contribute to poor contract administration.

Failure to complete and submit the bid document within the allotted floating time is another critical variable in this category. Tender floating time reflects the time left until the tendering process ends, allowing contract participants to make decisions. Thus, tenderers must submit their quotations in the allotted floating time and submit their proposals to ensure a fair and transparent tendering process. It is also important to allocate sufficient tender floating time so that more firms can participate in the bidding process. Similarly, the fourth important variable under this dimension is the inability to cover tendering expenses. SMCs spend money on the bidding process during the bid submission phase. These incurred costs include money spent on purchasing tender documents, transportation, and phone bills to obtain quotations, time taken for the estimator to price the tender document, tender guarantees or letter of intent payments, and postage cost of tender documents for opening. These are all factors that disproportionately affect SMCs. The result of the finding also agrees with the position of (Shakantu, 2003).

Lack of Competence in Procurement Management and Inability to Meet Technical Requirements: SMCs fail to meet prequalification criteria and technical requirements due to a lack of annual turnover, the required machinery, human resources, office space, etc. Furthermore, a challenge may arise when the tender invitation does not consider the technical capacity of those submitting tenders. This can lead to SMCs being excluded from

participating in or winning contracts as they need to possess the necessary technical qualifications. SMCs can thus take advantage of chances to compete for and win contracts. In efforts to support the SMCs, it is necessary to address these challenges, develop affirmative technical criteria, and carefully consider how to ensure the technical qualifications of potential SMCs are considered. A focus should also be placed on fostering their technical capacity and increasing access to resources and training. Recent research conducted by Offei et al. (2019) suggests that most SMCs have insufficient knowledge and understanding of the contracts they have entered into. They struggle to understand the intricacies of construction clauses and conditions. They also face other challenges, including inadequate legal technicalities in the end stages of contract negotiations for construction projects, outdated specifications and design/construction documentation, and a lack of practical expertise in running a contracting firm.

Low-Profit Margin Due to Competition and Unethical Practice: Competitive bidding on construction projects involves decision-making under uncertainty due to the unpredictable nature of the competitive business environment. Each bid is determined by a number of factors, including the estimated direct job cost (labor costs, material costs, equipment costs, wages, and any subcontract attributable to direct work); the markup or return cost (overhead costs and profit); and the bid amount. However, the larger the markup, the less likely to get selected, and the lower the markup, the more likely to go bankrupt. As the competition among competing bidders for construction projects is high and the chance of winning the bid is low, SMCs prefer bidding with a minimal profit margin to get the work, putting them in danger of bankruptcy. In addition to the previously mentioned factors, it is crucial to address other essential variables within this factor. These include practices such as reviling Bill of Quantities (BOQ) pricing in secret and engaging in unethical practices. These actions have significantly undermined the industry's quality, trust, and overall confidence. Mitigating these unethical practices necessitates prioritizing measures aimed at discouraging and minimizing their occurrence. This can be achieved through strategies such as avoiding conflicts of interest, implementing rigorous monitoring mechanisms, and ensuring proper supervision among all stakeholders involved in the CI.

5.2.8. Relative Importance of the Factors

In order to determine which factors were most important, the factor score formula proposed by Fan and Fox (2009) was used to rank the component scores from highest to lowest. The factor analysis results revealed seventeen different components from seven sources, each with varying factor scores. The components with higher factor loadings were deemed more important, indicating their greater impact. The most significant factors, along with their top results and factor scores, were as follows: organizational structure and corporate diversification (3.36) from organizational structure; leadership, staff development, and rewarding system (3.42) from organizational culture; entrepreneur's demography and self-efficiency (3.39) from characteristics of entrepreneur. Similarly, marketing strategy (3.86); inability to access resources and high cost of construction inputs (3.39); poor corporate management skills (3.83); and lack of technical expertise and inability to meet technical requirements (3.45) were identified from competitive strategy; organizational resources; managerial skill and competency; and tendering and contract administration respectively.

5.3. Findings from Interviews and Discussion

Semi-structured interviews were adopted to collect the opinions of the interviewees on the factors affecting the sustainable competency of SMCs. The findings were mapped with subthemes of the research construct. The primary focus of these interviews in this section was to identify the endogenic factors (internal factors) deemed significant for the competency of SMCs. The discussions revolved around themes perceived from various sources, including organizational structure and culture; characteristics of entrepreneurs; competitive strategy; organizational resources; managerial skills and competency; and tendering and contract administration. The interviews were taken in parallel with the questionnaire survey to gather holistic results and a richer qualitative data set, facilitating a more in-depth analysis of the qualitative aspect of the research findings.

5.3.1. Organizational Structure

The interviews explored participants' perceptions and experiences regarding key factors influencing SMCs' organizational structure and their contribution to overall competency. The findings from the interviews highlighted that organizational structure plays a crucial

role in the sustainability and growth of SMCs in the CI. Interviewee R4 pointed out that the organizational structure represents the sum of total factors such as a firm's vision, mission, objectives, and strategic structure in which all parts of the system must work together towards their goal. The adopted structure significantly impacts the company's abilities, including its capacity to adapt and gain a competitive advantage. R4 has stressed the importance of having an effective organizational structure to maintain strategic flexibility, adaptability, and continuous improvement. Conversely, R4 noted that disorganized and poorly structured structures negatively impact organizational performance and may result in business failure. The majority of small and a few medium-sized firms carry out their business activities, by a simple system illustrated by a few specialty fields; a smaller number of departments; greater scope of management; increased centralization; a lower number of hierarchical levels; and little formalization. Irrespective of the business's size, whether small, medium, or large, it is crucial to establish and maintain an organizational structure. This practice cannot be downplayed, and it is vital to restructure this system to facilitate unhindered performance for business development.

Another interviewee, R12, expressed the belief that a sustainable business relies heavily on its organizational structure's effectiveness. This effectiveness is demonstrated by the company's ability to handle challenges and competitors in the business environment. R12 also emphasized the importance of SMCs having well-defined policies and procedures for decision-making, a clear chain of command with designated reporting levels for employees, and defined leadership styles and power dynamics within the organization. R12 further explained that, while the formal structure is an important element of an organization, management can influence its effectiveness through effective strategic planning, line staffing and training programs, supervision of employees, and continuous organizational redesign. Some essential components that make up an effective organizational structure include formalized (agreed upon) policies; institutionalized procedures; incentives to motivate the achievement of goals, and clear lines of accountability.

R2 argued that for an organization to be effective, it should have a flexible structure that allows employees to participate in the decision-making process while ensuring efficient and timely decisions. This collaborative approach helps ensure that decisions are made based

on factual analysis rather than an individual's illogical, irrational, or emotional reasoning, which could negatively impact the company's performance. R2 noted that small companies typically have a centralized decision-making process and few employees. However, in the CI, each operating site is responsible for making its own decisions, which must be funneled through a designated employee. Therefore, employees should have access to decision-making authority within the existing organizational structure. All interview participants shared that an effective and well-functioning organizational structure is crucial for the sustainability, competitiveness, and growth of businesses. As such, SMCS need to prioritize the establishment and maintenance of an effective organizational structure.

5.3.2. Organizational Culture

In response to the question of how organizational culture affects the sustainable competency of SMCs, the interviewees expressed a range of views. Accordingly, an interviewee revealed that organizational culture has a direct and significant positive effect on the sustainable growth of SMCs. According to R3, organizational culture is linked to people's attitudes, enthusiasm, and dedication to achieving organizational success. It also includes shared knowledge, social expectations for the company's image, social responsibility, coordination, cooperation among all organization members, and establishing rules. A company's culture plays a vital role in determining employee performance and engagement at work, ultimately affecting its success in achieving its objectives. Moreover, R3 stated that successful organizations have a culture centered on a firmly held and extensively disseminated set of principles that are reinforced by the organization's strategies and structure. This shared set of beliefs results in three key outcomes where employees are able to fulfill their obligations, actively participate in accomplishing the organization's objectives, and make valuable contributions to the organization's overall success.

In the interviews, R3, R4, and R7 discussed a range of factors that they thought could influence an organization's culture. Here are some of the results from the interviewees' responses concerning factors that may contribute to an organization's culture. Some of these were considered positive and desirable, e.g., trust, empathy, compassion, professionalism, curiosity, initiative, sense of duty, and pride in work. In contrast, other factors were seen as negative and undesirable, such as a culture of blame, favoritism, arrogance, dictatorship,

and stubbornness. The interviewees further observed that the entrepreneur or manager typically plays the primary role in shaping the organizational culture and driving the business forward. The leadership style employed by the organization's leaders is considered one of the most critical cultural elements that contribute to the overall atmosphere and environment of the organization. In addition, the interviewees found that business cultures seldom align with a single type of organizational culture. Many organizations exhibit traits of multiple cultures, suggesting that there is no one 'right' way of doing things for most organizations. For instance, clan culture emphasizes teamwork and collaboration, while adhocracy culture prioritizes innovation and taking risks. On the other hand, hierarchy culture prioritizes speed, and market culture prioritizes results. Therefore, incorporating characteristics from multiple cultures can result in a hybrid benefit, and individuals tend to feel more comfortable working in such a diverse environment.

5.3.3. Characteristics of Entrepreneur

The responses of the interviewees (R1, R2, R7, R10, and R11) showed that these manifestations of characteristics of an entrepreneur could be generally operationalized as the need for achievement; traits of tough decision-making; confidence and initiative; flexibility and adaptability; a readiness and capability to take risks and make decisions independently; commitment and determination; and also the ability to identify opportunities and implement them. Entrepreneurs also have the characteristics of competitiveness, focus, persistence, rational decision-making, creativity, resilience, personal integrity, and many more. All these make them highly successful and have high-achieving potential. Many of these characteristics align with the entrepreneur characteristics dimensions previously identified in the literature (Smith, 1976; Utsch et al., 1999; Hisrich and Drnovsek, 2002; Rwigerma and Venter, 2004; Mueller and Thomas, 2001; Soriano, 2010; Snyder and Shane, 2009; Neneh, 2011; Naumann, 2017; Kuratko and Audretsch, 2021). This consistency demonstrates the validity of the issues raised by the interviewees. The interview participants also agreed that the entrepreneur characteristics and business-related qualities are suitable for performance appraisal in developing an entrepreneurial company.

In addition to the previously mentioned entrepreneurial traits, the interviewee emphasized the significance of an entrepreneur's demographic factors, such as age, education, gender, lifestyle, socio-economic background, ethnicity, and geographic location, in understanding and predicting entrepreneurial qualities while controlling for other variables. R1 specifically highlighted age and geographic location as significant demographic considerations. According to the interviewee, entrepreneurs aged over 40 years often display hesitancy towards taking risks, a key characteristic of entrepreneurship. This hesitancy may initially hinder their entrepreneurial journey, but as they embark on a business venture, they tend to develop a deeper understanding of risk-taking and become more open to it. Similarly, the geographical location plays a crucial role in shaping the entrepreneurial attitudes of individuals. In regions with well-developed infrastructure and services, entrepreneurs are more inclined to take risks in starting businesses compared to areas lacking the support of robust infrastructure and services.

As part of the interview process, participants were provided with a list of personality traits that were previously mentioned in the questionnaire. They were asked to reflect on their thoughts regarding the importance of these traits in the development of competencies for SMCs. All interviewees acknowledged the significance of these traits and recommended their adoption to cultivate the desired competencies.

5.3.4. Competitive Strategy

The business environment is characterized by high levels of competition, dynamism, and sophistication. Within this highly competitive environment, SMCs must formulate their competitive strategies, considering their unique characteristics, vital resources, and the power dynamics between them and prominent players in other national markets. This strategic approach is crucial for their survival and sustainability in the market.

Interviewees discussed the distinct features of the business environment and the competitive strategies that SMCs need to adopt. The points raised by the interviewees corroborate the findings from the questionnaire survey, which aimed to explore the specific factors influencing SMCs in Ethiopia. According to R6, in order for SMCs to thrive and achieve long-term sustainability in such a highly competitive business environment, they

must develop a well-structured corporate strategy, establish effective communication channels, and cultivate enduring relationships with industry stakeholders as a foundation for success.

R1 was asked to share his perspective on the feasibility of applying Porter's strategic concepts, which encompass focus, cost leadership, and differentiation, within the context of Ethiopia. R1 replied that while Ethiopian SMCs share similarities with those in other developing economies, the implementation of such strategies in the Ethiopian business landscape necessitates a comprehensive analysis of the country's national and regional conditions. Additionally, it requires a deep understanding and assessment of Ethiopia's economic, social, and cultural factors, which exhibit unique characteristics when compared to industrialized nations. In alignment with this viewpoint, both R10 and R12 emphasized the importance of SMCs building their image, credibility, and reputation, areas that have yet to be fully realized by most of these enterprises. Once these aspects are successfully established, SMCs will enhance their competitiveness in the challenging business environment.

5.3.5. Organizational Resources

An organization's performance is primarily determined by its resources, which include human resources, financial, information, physical resources, and others, and which collectively contribute to the creation of construction projects. Properly accessing and managing the appropriate combination of these resources provides a catalyst through which organizations can achieve desired growth, making effective management of resources crucial to an organization's success. At this point, interviewees were asked to shed their ideas about the influence of organizational resources on the sustainable competency of SMCs. All the interviewees (R3, R4, R5, R7, R10, R11, and R12) agreed that organizational resources are essential to SMCs, and access to these resources is the essence of sustainable competency in the long run. SMCs usually lack access to the organizational resources required for their projects and to achieve their performance. Some of the human resources-related challenges faced by SMCs are related to their inability to hire qualified personnel; poor human resource training and performance appraisal; lack of motivation and inadequate reward systems; over and understaffing; weak human resources planning and management;

lack of access to better technology; lack of efficient human resource transfer; etc. systems are some of the challenges faced, among others, preventing SMCs from developing a sustainable competency.

In the interviews, the participants identified the challenges SMCs face regarding financial resources, with a lack of access to finance being the most significant issue. The inability to meet the requirements of financial institutions (e.g., insufficient assets for collateral), poor profit performance and creditworthiness, poor credit history, high default rates (especially in small businesses), and inability to pay high-interest rates are some of the reasons why SMCs find it difficult to access finance. Other financial challenges include ineffective financial management systems and high operating expenses.

Physical resources, encompassing machinery, plants, and equipment, are crucial tangible assets for business operations. These resources can be owned, leased, or rented, but SMCs often grapple with challenges in obtaining the physical resources required to run their businesses. Interviewees emphasized that the high cost of physical resources can lead to issues like obsolescence, decreased productivity, theft, and equipment breakdown. Additionally, inadequate management practices related to physical resources pose significant concerns for SMCs. The interviewees also underscored the significance of information resources as valuable assets in the current knowledge-based economy. Insufficient access to valuable information can result in poor decision-making, reduced efficiency, and high costs associated with acquiring necessary information. Consequently, their inability to acquire information resources puts them at a disadvantage, negatively impacting their competitiveness and survival in today's highly competitive business environment.

5.3.6. Managerial Skills and Competency

Managerial skills are significant assets that help determine and sustain a firm's business performance, profitability, organizational excellence, and, most importantly, its existence in the long run. The managers/entrepreneurs should possess the highest level of the required competencies. Managerial competencies are highly variable, skill-based, and context-dependent, so there can be few unifying performance measures. The findings of studies by

Olugboyega, 1997; Honig, 1998; Gartner et al., 1999; Marri et al., 2003; Nieuwenhuizen and Kroon, 2003; Moo and Eyiah, 2019; Allan and O'Dwyer, 2000; Baard and Van den Berg, 2004; Perks and Struwig, 2005; Botha, 2006; Chilipunde and Shakantu, 2010; Godfrey, 2012; Kulemeka et al., 2015; Mafimidiwo and Iyagba, 2016; Thwala and Phaladi, 2018; Offei et al., 2019 collectively contribute to understanding key organizational skills essential for effective operation within various contexts. The interviewees were asked to state the managerial skills and the competency-related factors and reflect on their relationship with the sustainable competency of SMEs. The findings from the interview revealed that there was a direct and clear relationship between managerial skills and the competency of SMCs.

Management is commonly defined as the art of achieving objectives through a combination of planning, organizing, leading, and controlling, as outlined by Stoner and Freeman (1989). The resources available for management encompass organizational structure, human resources, material resources, finance, plants and equipment, technology, and information. These resources are valuable in how they are effectively utilized to accomplish objectives, as stated by Stoner and Freeman. Given that construction resources are finite and subject to variability, it's imperative that they are used judiciously to yield optimal results while adhering to time and budget constraints. Therefore, employing the correct methodologies and possessing competent managerial skills play crucial roles in enhancing the utilization of these limited resources and maximizing their efficiency. However, the interviewees (R2, R5, R6, R9, and R10) expressed concerns that managers of SMCs, particularly small enterprises, appear to struggle with implementing the appropriate methodologies and managerial skills. Entrepreneurs or managers of small and medium-sized enterprises exhibit difficulties in making well-informed decisions and tend to heavily prioritize short-term profit objectives, resulting in suboptimal decision-making and the adoption of short-term measures.

This lack of planning has various detrimental effects, the most crucial being that companies cannot make optimal use of their resources (i.e., human, technology, financial, plant, and equipment). Poor control over organizational resources, poor managerial decision-making processes; lack of implementation of management practices; absence of the appropriate

policies, systems, and procedures; and ineffective accountability lead to unsatisfactory results. Furthermore, interviewees emphasized that entrepreneurs of small enterprises typically lack formal education in business or management, and they often have limited knowledge of project management processes. Consequently, they exhibit reduced effectiveness in communication, which, in turn, negatively impacts the company's operations and performance. Additionally, it was underscored that entrepreneurs' inability to comprehend the construction process and its functioning stands out as a significant factor in this context.

5.3.7. Tendering and Contract Administration

This interview section aims to establish the existence or otherwise of a relationship between SMCs' tendering and contract administration and their sustainable competency development. Tendering and contract administration are the two processes where the resources of the SMCs are set, and conditions for using them are selected. Therefore, having the necessary resources and conditions for correct utilization ensures the efficiency and sustainability of SMCs in the competitive business environment. Interviewees revealed that SMCs entering into tendering face difficulty being eligible for the tendering process due to several obscuring factors. Most of these difficulties appear before and during the tendering process, as revealed by the interviewees. Accordingly, R5 and R9 stated that the main challenges for SMCs in the pre-tendering phase stem from a lack of the necessary resources required as a prerequisite for entry into the tendering process. Additionally, an inability to cover tendering expenses, inadequate or poor management structure, lack of information, and lack of technical experience are common impediments that cause most SMCs to become frustrated and abandon the pre-tendering phase.

R5 and R9 also noted that challenges faced during the bidding process by the SMCs are associated with insufficient preparation, unrealistically low profit margin to win the contract, low quality of offered technical solutions, and lack of marketing resources. R5 and R9 further stated that, although some SMCs are successful in the tender, most tenderers suffer from one or more of the following challenges during contract administration. These difficulties are generally due to their lack of adequate managerial experience and structure in running a contract, poor contractual administration skills, and poor claim management

and dispute resolution capabilities. The findings from the interview support the results obtained through the questionnaire survey and thus help validate this thesis's work. Additionally, the findings of the study are also consistent with previous research conducted by Shakantu, 2003; Didibhuku and Mvubu, 2009; Amoah et al., 2011; Kulemeka et al., 2015; Ogunbiyi et al., 2016.

5.4. Chapter Summary

SMCs' competitiveness in a competitive market hinges on influencing factors. Identifying and understanding these factors and their relationship with the business will help create necessary development strategies. The findings of the chapter revealed the major endogenic factors as employee's strategic and operational decision-making power (i.e., decentralization); organizational leadership style; the existence of matured and developed entrepreneurial mind-sets; availability of institutional and business relationships (i.e., relationship and alliances with suppliers, owners, competitors, government entities, etc.); inability to access financial resources (i.e., strict credit terms; high-interest rate; strict requirements for obtaining bonds/guarantees/sureties); lack of project management skills (i.e., planning, organizing, co-coordinating, controlling, motivating, communicating, and leading); and low-profit margin due to competition from organizational structure; organizational culture; characteristics of the entrepreneur; competitive strategy; organizational resources; managerial skill and competency; and tendering and contract administration core sources respectively. In the following chapter of this thesis, a detailed discussion of the findings related to exogenic factors influencing the sustainable competency of SMCs in the Ethiopian CI will be presented.

CHAPTER SIX

EXOGENIC FACORS AFFECTING THE SUSTAINABLE COMPETENCY OF SMCs

6.1. Introduction

In this chapter, data gathered from questionnaires and interviews are presented, focusing on the exogenic factors that impact the sustainable competency of SMCs. The identified constructs include presumed sources of sustainable competency: government policies, regulatory framework, industry networks, the culture of competitive bidding, and technology and innovation. All the obtained datasets were subjected to reliability and validity tests, and the findings were employed to test the research hypotheses established in Chapter Three and validate the conceptual framework. The theoretical literature from Chapter Two also supports the findings of each question, and these findings were briefly discussed at the end of each presumed source of factors, leading to corresponding inferences. Descriptive statistics, one sample t-test, factor analysis, and correlation analyses were used to analyze the datasets. Table 6.1 below presents the Kaiser-Meyer-Olkin, Bartlett's test, and Cronbach's alpha results. The KMO value ranges from 0.740 to 0.833, indicating a good result. Bartlett's test was also conducted, and all the variables were found to be significant. Furthermore, the Cronbach's alpha value ranges from 0.722 to 0.820, indicating that all the factors are reliable and consistent.

Table 6. 1. Test for Appropriateness of Data

S/No.	Sources of Variables	Alpha (α) value	KMO	Bartlett's Test of Sphericity	No. of Items
1	Government policies	0.722	0.794	Significant	8
2	Regulatory framework	0.820	0.833	Significant	7
3	Industry networks	0.766	0.770	Significant	5
4	Culture of competitive bidding	0.783	0.740	Significant	9
5	Technology and innovation	0.759	0.778	Significant	13

6.2. Findings from Questionnaire Survey

6.2.1. Variables emanating from Government Policies

This section discusses the impact of government policies on the sustainable competency of SMCs. Table 6.2 presents the findings of the survey questionnaire analysis, including mean values, rankings, standard deviation, and one-sample T-test results. The aggregated results indicate that unfavorable financial policies received the highest ranking, followed by the weak institutional capacity to execute policy frameworks and high interest rates and inflation (magnitude and stability).

Given the capital-intensive nature of the CI, SMCs require considerable financing to undertake projects, which makes them vulnerable to the adverse impacts of unfavorable financial policies, which are prevalent in the Ethiopian CI. The government's unfavorable financial policies, including high taxes, a lack of government subsidies, import/export restrictions, inefficient regulatory procedures, inadequate access to credit, inflationary monetary policies, currency controls, and volatile exchange rates, along with the burdensome bureaucratic processes, have compounded the challenges faced by SMCs in this industry. Furthermore, the implementation of unfavorable financial policies can increase the vulnerability of SMCs to debt and funding risks. This, in turn, leads to reduced fiscal revenue, an increased fiscal deficit, liquidity problems, lower enterprise profitability, and other negative impacts. Consequently, many SMCs are compelled to operate with very limited budgets, leading to the lack of the necessary resources to invest in labor, machinery, and materials. This, in turn, restricts their ability to take on larger projects and often forces them to rely on subcontracting work from larger contractors, thereby limiting their sustainable growth. This finding is supported by the research of (Amonoo et al., 2003; Năstase and Kajanus, 2009).

In addition to unfavorable financial policies and weak institutional capacity to execute policy frameworks, they have negatively impacted the sustainable competitiveness of SMCs in the Ethiopian CI. While policies are formulated with the best intentions, their impact can be limited if institutions cannot implement them effectively. For instance, evidence has indicated that policy implementation has been inadequate due to the relevant

institutions' lack of capacity to enforce their implementation and weak monitoring and evaluation systems. Furthermore, the lack of institutional capacity significantly contributes to corruption and rent-seeking practices, creating an uneven playing field that favors larger firms with greater bargaining power.

The one-sample t-test results indicate that all variables are statistically significant (p-value < 0.05), leading to the rejection of the null hypothesis (H0). Therefore, all variables in this category impact the sustainable competency of SMCs.

Table 6. 2. The analysis result of variables emanating from Government Policies

Variables emanating from government policies	Mean	Rank	Std. Dev.	T-test Sign.	Factor Analysis C1	Factor Analysis C2
High interest rates and inflation (magnitude and stability)	3.47	3	.847	.000	.868	
Weak institutional capacity to execute policy frameworks	3.49	2	.886	.000	.850	
Poor infrastructure development policy	3.47	4	.892	.000	.837	
Highly fragmented and inconsistent construction industry policy	3.38	6	.811	.000	.795	
Inadequate policy vision and failure to understand local needs and demands	3.40	5	.861	.000	.630	
Unfavourable macroeconomic policies	3.33	7	.719	.000		.840
Inadequate supportive institutional arrangements	3.32	8	.771	.000		.872
Unfavourable financial policy	3.69	1	.909	.000		.697
				Factor Score	3.44	3.45
				Initial Eigenvalue	3.32	1.93
				Variance %	41.52	24.14
				Cumulative Variance %		65.66

Factor analysis identified and extracted eight items in this category, resulting in two components that together account for a cumulative variance of 65.66%. These components are named Component 1, "*Poor policy development and weak institutional capacity,"* and Component 2, "*Unfavorable policies and low institutional arrangement."*

Poor policy development and weak institutional capacity, which contribute to the underdeveloped growth of SMCs in the Ethiopian CI, have been identified as significant barriers. Policy development in Ethiopian CI often fails to recognize the unique needs and challenges of SMCs, thereby failing to provide adequate support for their growth.

Furthermore, the institutional capacity to support and implement these policies is limited due to inadequate resources, an inadequately skilled workforce, and weak government oversight. This lack of effective policy development and weak institutional capacity has created a cycle of stagnation in the CI, making it an inhospitable environment for the development of SMCs. Consequently, it is essential for the Ethiopian government to focus on designing and implementing favorable policies and support programs that foster the effective development of SMCs. An examination of existing policies, procedures, and systems, coupled with learning from past experiences, is crucial. This process provides valuable insights into weaknesses in policy implementation, identifies areas for improvement, and enables the development of more effective strategies. By analyzing past experiences and identifying weaknesses, policymakers can enhance policies, procedures, and systems to ensure greater effectiveness in achieving their intended outcomes. These insights also help identify and address knowledge or resource gaps that may hinder effective policy implementation. It is equally important to establish an independent organization dedicated to studying and evaluating policies. This organization can provide technical advice and guidance in designing, implementing, and reviewing policies for the competency development of SMCs.

Another significant variable in this category is "high-interest rates and inflation." An increase in interest rates can elevate project costs, disrupt project cash flow, and influence financial and investment decisions. Similarly, inflation exerts an impact on the CI, affecting material, machinery, and labor costs, often resulting in project cost overruns. As emphasized by Musarat et al. (2021), addressing these challenges necessitates government intervention through adjustments to the broader macroeconomic environment and the implementation of policies that promote investment in the CI.

6.2.2. Variables Emanating from Regulatory Framework

This section examines the influence of regulatory frameworks on the sustainable competency of SMCs, and it involves computing the aggregate mean score value. Unfavorable economic regulations (e.g., restrictions on pricing and competition, market entry/exit, pricing controls, restrictions on normal commercial practices), weak institutional capacity to execute regulatory frameworks, and unfavorable administrative regulations

(e.g., strict administrative formalities and regulatory rigidity) ranked highest. In contrast, stringent social regulations (e.g., environmental and social cohesion) were considered the least significant factors influencing the sustainability of SMCs.

SMCs in many economies face significant regulatory barriers, with unfavorable economic regulations identified as the most critical. These regulations are complex and take many forms, including bureaucratic red tape, cumbersome licensing requirements, controls on pricing and competition, restrictions on market entry/exit and price controls. These inappropriate or poorly enforced competition laws disproportionately affect and hinder the competency and development of SMCs. Such regulations can increase business costs, limit competition, and ultimately reduce efficiency and productivity. These findings are consistent with the positions of Kongolo (2010) and Ndiaye et al. (2018), who have also highlighted that the regulatory environment significantly impedes the growth and success of SMCs in many developing economies. On the other hand, favorable economic regulations are characterized by low barriers to market entry, less strict administrative formalities, facilitating access to market opportunities, and increasing the efficiency of SMCs' operations. Specifically, these regulations reduce the regulatory burden on SMCs.

In addition to unfavorable economic regulations, weak institutional capacity to execute regulatory frameworks was the second most critical barrier in several economies, affecting the sustainability of SMEs. Much of the literature in this area emphasizes that it's not just the quantity of regulations that matters, but also how well and to what extent they are implemented. This situation leaves SMCs vulnerable in many ways. As Cardoza et al. (2016) argue, the lack of transparency in regulation, poor compliance, complicated procedures, and requirements placed on SMCs are the most common problems arising due to the weak capacity of public institutions.

Table 6.3 below shows that the p-values for all variables are less than the chosen significance level (0.05), leading to the rejection of the null hypothesis (HO) that assumes the variable in question does not affect sustainable competency.

Table 6. 3. The analysis result of variables emanating from regulatory framework

Variables emanating from regulatory framework	Mean	Rank	Std. Dev.	T-test Sign.	Factor Analysis C1	Factor Analysis C2
Poor co-ordination and collaboration of institutions responsible for formulation and amendment of regulatory framework	3.30	4	.765	.000	.814	
Stringent social regulations (i.e. environmental and social cohesion)	3.23	7	.849	.001	.780	
Regulatory and legal restrictions	3.25	6	.890	.000	.699	
Weak institutional capacity to execute regulatory frameworks	3.38	2	.824	.000	.594	
Unfavorable economic regulations (i.e. restriction on pricing and competition, market entry/exit, pricing controls, restrictions on normal commercial practices)	3.42	1	.945	.000		.847
Regulatory and legislative inflation	3.28	5	.839	.000		.796
Unfavorable administrative regulations (i.e. strict administrative formalities and regulatory rigidity)	3.34	3	.805	.000		.789
				Factor Score	3.29	3.35
				Initial Eigenvalue	3.42	1.07
				Variance %	48.85	15.29
				Cumulative Variance %		64.14

FA identified two main components that explain 64.14% of the total variance among the seven essential variables associated with the regulatory framework. These components were labeled as Component 1, *"Inadequate institutional capacity of regulatory agencies,"* and Component 2, *"Unfavorable regulatory framework."*

Poor policy development and weak institutional capacity have been identified as major barriers to the growth of SMCs in the Ethiopian CI. The Ethiopian CI often fails to recognize the unique needs and challenges of SMCs, providing insufficient support for their growth. Contributing factors to this under development include a highly centralized regulatory framework, a lack of technical and managerial competence, bureaucracy, inadequate accountability, and corruption, among others (MoUDC, 2012). To address these challenges, more proactive measures are needed to strengthen the regulatory environment. The government should establish a platform for enhanced coordination and collaboration among federal government agencies and offices responsible for developing, revising, and enforcing regulations and standards. Additionally, economic and administrative regulatory structures should be re-engineered to promote flexibility and adaptability, fostering a change-adaptive mentality. Furthermore, efforts are required to improve financing facilities, create robust and inclusive procurement policies, and enhance the public sector's

delivery capabilities. However, the institutions' capacity to effectively implement these policies is hindered by insufficient resources, an inadequately skilled workforce, and inadequate government oversight. This lack of adequate policy support and weak institutional capacity has resulted in a cycle of stagnation in Ethiopia's CI, creating an environment that is not conducive to the development of SMCs.

6.2.3. Variables Emanating From Industry Networks

The analysis in Table 6.4 reveals that the top three factors affecting the industry are a lack of trust between parties in the industry (i.e., honesty, integrity, and openness); poor supply chain relationships; and poor construction R&D as the top three most affecting factors. Lack of trust, particularly in terms of honesty, integrity, and openness, was ranked as the most significant factor. This finding is consistent with the observations made by Akintoye and Main (2007), who noted that trust can serve as a barrier and impact business operations. The absence of honesty, integrity, and openness emerged as key issues hindering SMCs from pursuing various development opportunities.

The one-sample T-test results show that all variables have p-values below the selected significance level of 0.05. Therefore, we reject the null hypothesis, indicating that the variables do have an impact on SMCs' sustainable competency due to their p-values being lower than the chosen significance level.

Table 6. 4. The analysis result of variables emanating from Industry Networks

Variables emanating from Industry Networks	Mean	Rank	Std. Dev.	T-test	Factor Analysis
				Sign.	C1
Lack of trust between parties in the industry (i.e. honesty, integrity, and openness)	3.58	1	.830	.000	.869
Poor supply chain relationships	3.49	2	.893	.000	.758
Weak professional and industry associations	3.40	4	.960	.000	.739
Weak joint risk assessment and management practice	3.31	5	.911	.000	.688
Poor construction R and D	3.42	3	.921	.000	.546
				Factor Score	3.49
				Initial Eigenvalue	2.65
				Variance %	52.96
				Cumulative Variance %	52.96

Factor analysis in this category resulted in a single component with a cumulative variance of 52.96%, named "*Ineffective industry network*."

Ineffective Industry Network: In the CI, long-term relationships are built on open communication and trust. McAllister (1995) argues that reciprocal trust is formed through communication and interaction, providing a foundation for trust and business opportunities. However, when communication is lacking, fears of exploitation and betrayal can arise, leading to a reluctance to commit. To address this issue, trade associations and organizations such as the Ethiopian Construction Technology and Management Professional Association (ECoTMPA), Ethiopian Architects Association (EAA), and Ethiopian Civil Engineers Association (ECEA) should collaborate to bring industry stakeholders together and foster trust. Another important variable in this component is construction research and development. Research and development in construction cover various actions aimed at improving the quality, productivity, and efficiency of materials, equipment, labor, and construction management (Jekale, 2004). It can also introduce cost-effective and innovative technologies to the market rapidly, reducing issues related to quality, safety, and legal responsibility. Therefore, investing in research and development reduces associated risks by building trust in technology and individuals.

Another significant variable in this component is supply chain relationships. According to Baymout (2015), supply chain management can be a strategic tool to enhance performance in a competitive market. Integration with internal and external networks enables organizations to maximize their potential, reduce operating costs, improve service, and gain a significant competitive edge. Key elements for achieving supply chain management (SCM) integration and strong organizational relationships include partnerships, alliances, cooperation, collaboration, trust, information sharing, and technology sharing. Further, Thakkar et al. (2008) suggest that a firm's competitive supply chain management strategy is influenced by various critical success factors, such as effective corporate planning, environmental structural features, perception and experience, ability to manage value and risk, and the availability of performance measurement tools/matrices. Prioritizing these challenges can help SMCs in the industry achieve sustainable success and competitiveness.

6.2.4. Variables emanating from the Culture of Competitive Bidding

The culture of competitive bidding was assessed using nine variables, and the results are displayed in Table 6.5. These variables, well-documented in the literature, have consistently been associated with the development of organizational competency. The top three variables impacting the competency of SMCs in this category were identified as the inability to compete with larger construction companies, followed by uncertainties in the supply of materials and prices, and the presence of an informal construction system.

In the CI, it's a common observation that SMCs lack the capacity to compete with larger construction companies in a highly competitive business environment. This is mainly due to their limited resources, including experience, capital, and technology, which leaves them vulnerable to their larger counterparts in terms of market share and bargaining power. In Ethiopia's CI, where a few large competitors with more resources and economies of scale dominate, SMCs struggle to survive in this high-risk environment. On the other hand, the presence of substitute commodities in the CI doesn't seem to significantly impact the sustainability of SMCs, as the one-sample t-test value exceeds the chosen 0.05 (5%) significance level. All the other variables are statistically significant, with p-values below the chosen significance level, leading to the rejection of the null hypothesis, which assumes that the variable is unimportant and has no impact on SMCs' sustainable competency.

Table 6. 5. Analysis result of variables emanating from Culture of Competitive Bidding

Variables emanating from culture of competitive bidding	Mean	Rank	Std. Dev.	T-test Sign.
Fragmented competitive bidding process	3.42	5	1.047	.000
Presence of informal construction system	3.59	3	1.030	.000
Shrinkage in construction demand	3.50	4	.984	.000
Uncertainty in supplies of materials and prices	4.06	2	.854	.000
Threat from substitute commodities in the construction industry	3.01	9	.917	.870
Higher buyer’s and suppliers bargaining power	3.19	7	.851	.003
Construction industry dynamics	3.18	8	.820	.004
Undesirable effect of globalization	3.20	6	.907	.003
Inability of SMCs to compete with bigger construction companies	4.07	1	.846	.000

Furthermore, “fragmented competitive bidding process” and “presence of an informal construction system” had the highest standard deviations, indicating varied perceptions among different study respondents.

Table 6. 6. Factor analysis result of variables emanating from Culture of Competitive Bidding

Variables emanating from Culture of Competitive bidding	Factor Analysis		
	C_1	C_2	C_3
Shrinkage in construction demand	.874		
Fragmented competitive bidding process	.863		
Presence of informal construction system	.860		
Undesirable effect of globalization		.849	
Higher buyer’s and suppliers bargaining power		.845	
Construction industry dynamics		.818	
Inability of SMCs to compete with bigger construction companies			.931
Uncertainty in supplies of materials and prices			.914
Factor Score	3.50	3.19	4.07
Initial Eigenvalue	3.00	1.87	1.35
Variance %	37.53	23.37	16.94
Cumulative Variance %			77.84

FA identified three components among the eight items in this category, with a cumulative variance of 77.84%. These components are named Component 1, *“Unsuitable bidding environment,”* Component 2, *“Construction industry dynamics and globalization,”* and Component 3, *“Competition and uncertainties in the supply chain.”*

Unsuitable Bidding Environment: The Ethiopian CI primarily follows the traditional procurement method (design-bid-build), leading to challenges in coordinating various project stakeholders due to fragmented competitive bidding processes. This fragmentation results in unsynchronized efforts, adversarial relationships, and overall dissatisfaction within the industry. Furthermore, the emphasis on price-based selection criteria poses a significant challenge for small and medium-sized contractors (SMCs) when competing against larger contractors with more resources and experience. To address these issues, alternative procurement methods such as design-build and construction management could foster greater collaboration and knowledge sharing among stakeholders, potentially leading to a more inclusive and diverse industry.

Another significant variable under this component is the shrinkage of construction demand. In recent years, the Ethiopian CI has witnessed a substantial decrease in demand, primarily due to various factors, including economic downturns resulting from political unrest and pandemics. These economic challenges have resulted in reduced funding for infrastructure projects, significantly impacting small and medium-sized contractors (SMCs) operating within the industry. With fewer construction projects available, these contractors face considerable difficulties in securing contracts and generating revenue, potentially leading to financial instability and even bankruptcy. The decline in demand has intensified competition among SMCs, making it challenging for them to secure contracts and causing a decline in profit margins. Consequently, many SMCs have experienced financial hardships, downsizing, or even business closures. Furthermore, the reduced demand has hindered SMCs' ability to invest in essential areas such as employee training, new technologies, and equipment, ultimately diminishing their long-term competitiveness.

The presence of an informal construction system presents another significant challenge for SMCs operating in the Ethiopian CI. This system is marked by unlicensed contractors who lack the qualifications and expertise to meet quality standards, and they often operate outside formal regulations. These unlicensed contractors frequently offer lower prices, creating unfair competition for SMCs that are required to adhere to higher standards and regulations, thereby increasing their operational costs. Addressing the challenges posed by the informal construction system will necessitate a collaborative, long-term initiative involving various stakeholders from across the CI and government.

Construction Industry Dynamics and Globalization: The dynamics of the CI and globalization have hindered the development of Small and Medium-sized Contractors (SMCs) in the Ethiopian CI. Competition from foreign construction companies with more significant financial resources, advanced technology, and extensive experience has made it challenging for local contractors, including SMCs, to secure contracts and project financing. Globalization has further complicated matters, as Ethiopian contractors struggle to remain competitive due to limited access to technology and materials, skills and knowledge gaps, and other factors. Additionally, globalization has necessitated the adoption of new building standards and regulations, requiring costly investments in

technology and training to ensure compliance. These obstacles, coupled with other factors, have significantly eroded the competitiveness of local contractors, particularly SMCs. Furthermore, the lack of government support and protectionism has placed local contractors at a disadvantage in competing with foreign companies, resulting in a continuous decline in their share of the CI.

Competition and Uncertainties in the Supply Chain: The inability to compete with larger contractors has posed a significant challenge for SMCs in Ethiopia's CI, and the presence of foreign contractors has exacerbated this challenge. SMCs find themselves constantly seeking ways to survive and compete with large contractors, a risky endeavor due to the CI's unpredictability. Similarly, uncertainties in the supply of materials and prices stand out as the most significant challenges faced by SMCs in the Ethiopian CI. This is because the sector heavily relies on materials imported from abroad and is subject to volatile currency fluctuations. As a result, SMCs often experience unreliable and inconsistent access to materials and price fluctuations, adding complexity to their day-to-day operations. Furthermore, SMCs struggle to forecast material prices and availability, negatively impacting their ability to budget and plan effectively. These supply chain challenges, coupled with limited financial resources, compound the difficulties faced by SMCs in the Ethiopian CI. Addressing these supply chain issues is crucial to ensuring the survival and long-term success of SMCs in the industry.

6.2.5. Variables emanating from Technology and Innovation

Table 6.7 summarizes the findings for the variables related to technology and innovation. The three most important factors identified are poor linkages between CI and R&D institutions, a gap in linking modern technology with traditional practice, and the inability to afford innovative construction technologies. The results of the one-sample t-test demonstrate that, except for technological sophistication, all other variables have a significant impact.

Table 6. 7. Analysis result of variables emanating from Technology and Innovation

Variables emanating from Technology and Innovation	Mean	Rank	Std. Dev.	T-test Sign.
Reliance on foreign sources (i.e. materials, professional consultancy and contracting)	3.38	6	.884	.000
Inability to afford innovative construction technologies	3.41	3	.895	.000
Gap in linking modern technology with the traditional practice	3.42	2	.795	.000
Inability of development models to stimulate the development of local technologies	3.40	4	.849	.000
Insufficient investment in science and technology	3.29	11	.966	.000
Technological sophistications	3.10	13	.883	.150
Inability to select and manage suitable technologies	3.30	10	.863	.000
Inadequate or poor coordination of government agencies in promoting and/or supporting technology development initiatives	3.36	8	.876	.000
Poor linkages between CI and R&D institutions	3.54	1	.805	.000
Inadequate physical infrastructure and information necessary for investments in technology	3.21	12	.877	.002
Non supportive social structures and culture of implementing technology	3.37	7	.743	.000
Inefficient mechanisms to facilitate the transfer technologies and inability to know what is to be transferred	3.39	5	.930	.000
Poor access to technology	3.33	9	.883	.000

FA presented in Table 6.8 revealed four components that explained 64.81% of the total variance. Upon examining the items that were loaded onto each component, they were labeled as follows: Component 1, *"Technological underdevelopment;"* Component 2, *"Inadequate technology access and linkage system;"* Component 3, "*Poor innovative ecosystem;"* and Component 4, *"Inadequate technology governance framework."*

As the sole industry regulator, the Ethiopian government is expressly tasked with promoting and protecting the industry's interests in general. Above all, the most critical tasks are establishing easy access to information and communication technologies (ICT) and funding, and equipping higher education institutions with the required resources. Additionally, standards, codes, rules, regulatory frameworks, and directives should be open for revision. Further promotion of indigenous knowledge and skills, labor-intensive techniques and management, education, training, and R&D on local materials would help overcome the significant bottleneck in the Ethiopian CI.

Table 6. 8. Factor analysis result of variables emanating from Technology and Innovation

Variables emanating from Technology and Innovation	Component			
	C_1	C_2	C_3	C_4
Insufficient investment in science and technology	.845			
Inefficient mechanisms to facilitate the transfer technologies and inability to know what is to be transferred	.786			
Inability to select and manage suitable technologies	.783			
Inability to afford innovative construction technologies	.771			
Poor access to technology		.861		
Poor linkages between CI and R&D institutions		.855		
Gap in linking modern technology with the traditional practice		.810		
Non supportive social structures and culture of implementing technology			.761	
Inability of development models to stimulate the development of local technologies			.719	
Inadequate physical infrastructure and information necessary for investments in technology			.713	
Inadequate or poor coordination of government agencies in promoting and/or supporting technology development initiatives				.805
Reliance on foreign sources (i.e. materials, professional consultancy and contracting)				.708
Factor Score	3.35	3.43	3.33	3.37
Initial Eigenvalue	3.23	1.91	1.53	1.10
Variance %	26.90	15.92	12.78	9.20
Cumulative Variance %				64.81

6.2.6. Relative Importance of the Factors

The variable loading for each factor only reflects the correlation between variables and individual components, not their significance. Therefore, the factor score formula was once again used to determine the relative importance of the factors or major challenges. Factors with higher component loadings were considered more significant and impactful. Twelve components were identified from five sources with varying factor scores through factor analysis. The most important impacting factors and their top results, along with their factor scores, were identified as follows: weak institutional capacity and unfavorable policies and a low degree of institutional arrangement (3.45) from government policies; inadequate institutional capacity of regulatory agencies (3.42) from regulatory framework; ineffective industry networks (3.49) from industry networks. Similarly, unsuitable bidding environment (4.07) from the culture of competitive bidding; inadequate technology integration and transfer practice (3.55) from technology and innovation.

6.3. Findings from Interviews and Discussion

Semi-structured interviews were adopted as a research tool to better understand the subjective experiences of the respondents and to uncover the relationship between the exogenic factors affecting the sustainability and competency of SMCs. The participants' perceptions of the impact of government policies, regulatory frameworks, industry networks, and the culture of competitive bidding, as well as technology and innovation, were collected through interviews. The findings were discussed and mapped to the subthemes of the research construct to explain the aforementioned exogenic factors and the perceptions of their impact on sustainable SMCs competitiveness.

6.3.1. Government Policies

Infrastructure development is crucial for the growth of SMCs, and the government should invest in infrastructure and enact policies and legislation to support this growth. Communication infrastructure, transportation systems, information technology (IT) access, and utility supply can enhance SMCs productivity and competitive advantage, enabling rapid growth (Seddiqi, 2015). Government policies can encourage entrepreneurship and assist SMCs in ensuring their sustainable competency through policies, regulations, strategic plans, and support programs. However, some policies have been described as hostile and inhibiting the sustenance of SMEs, causing disadvantageous effects on them by impacting their development rather than stimulating them (Audretsch et al., 2007; Friedman, 2011). Failed policies can trigger a chain of reactions, leading to an output change in the CI. Factors contributing to policy failure include a lack of sound policy design, communication and coordination issues within bureaucracies, corruption, lack of resources, and unclear or unconvincing goals (McConnell, 2015). This interview section aims to identify the impacts of government policies on the sustainable competency of SMCs.

The government uses monetary and credit policies to regulate the money supply in an economy, aiming for stable prices and economic growth. These policies involve controlling interest rates, bankruptcy laws, exchange controls, inflation, credit limits, and lending policies (Zapalska and Brozik, 2006). Evidence has shown that disproportionate control of

these policies affects SMEs' entry and development, as stated by Abor and Biekpe (2006). According to Interviewee R1, unfavorable financial policies directly impact the sustainable competence of Ethiopian SMEs in the construction sector. R1 further explains that these policies manifest in various ways, such as strict government-imposed foreign exchange controls, which restrict entrepreneurs' access to sufficient foreign currency for importing materials or investing in machinery. The findings of Harrigan and Oduro's study in 2000 also support R1's claim, highlighting that high exchange rate control systems could pose a challenge for entrepreneurs in obtaining the necessary local currency to purchase foreign exchange required for importing capital goods.

In the Ethiopian CI, more than 70% of all construction materials, including steel, cement, glass, aluminum, and other construction inputs, are imported from trading partners at very high costs, including China, Turkey, and India. This restriction on foreign exchange significantly impacts the price of construction materials; it increases the unit costs of construction projects and leads investors to shift their attention to other business sectors, thereby reducing overall productivity in the industry in general and SMCs in particular. R1 also indicated that foreign exchange controls have also impacted the import of construction technology, machinery, and equipment into the industry, forcing enterprises to reduce their investment budget and subsequently affecting their capacity development.

Furthermore, interviewee R2 indicated that another significant constraint on their sustainable competency has come from taxation policies that have hampered their business activities. The interviewee argued that the increased cost of working capital due to taxation policies and import duties has made firms less competitive in the business environment and restricted their ability to grow. Another major challenge is the restriction on the amount of cash that an individual or enterprise can hold. This law makes it difficult for SMCs to manage their cash flow and budget effectively, as they are not able to access the necessary amount of cash to cover short-term liabilities, such as purchasing inputs such as construction materials, utility charges, and labor wages, which constitutes a hurdle for SMCs as most of their activities are conducted on a cash basis.

The Ethiopian government's policies have been largely ineffective in responding to opportunities for infrastructure development, as evidenced by the mismanagement of current and planned development projects. According to data from the 2020 Office of the Auditor General, more than 11% of mega projects have been delayed for over five years, while 18.62% have been put on hold for up to five years. Another 71.72% of projects have been delayed for up to three years, and 5.52% have been canceled despite significant public funding. Dissatisfied with these results, the government has reduced spending and decided not to pursue new construction projects, leading to a significant decline in construction investment. This has caused a series of negative consequences, including a reduction in job opportunities and an increase in the number of SMCs unable to survive.

The problems raised by the interviewees reaffirm the results of the survey. The issues include weak institutional capacity to execute policy frameworks, the absence of transparent policy formulation, low levels of stakeholder participation in policy formulation, a lack of human capital for policy implementation, weak governance structures, underdeveloped control and monitoring systems, and poor infrastructure development policies as significant reasons for poor policy performance. These findings align with the research conducted by Niu, 2008; Silva et al., 2008; Patanakul and Pinto, 2014, who explored the effects of government policies on the output of the CI, especially for small and medium-sized enterprises.

6.3.2. Regulatory Framework

The impact of regulation on the performance of SMCs can be both positive and negative, and while the positive effects are straightforward, there may also be negative consequences to consider. According to Islam and Wahab (2021), regulations play a crucial role in shaping a level and competitive playing field for SMCs by simplifying business processes, ensuring transparency, and promoting accountability in government procedures. Moreover, another critical aspect of regulation is the regulation of trading practices, which aims to prevent unfair practices like monopolies, bid rigging, harassment, and price gouging within an economy. While the benefits of regulations for SMCs should be commended, it is also clear that excessive regulatory constraints can inhibit the competitiveness of SMCs and must be understood and regulated comprehensively (Akinboade and Kinfack, 2012).

Excessive regulatory constraints are rules or requirements that burden SMCs with unnecessary restrictions, leading to distortion and inefficiencies (Eyiah, 2004; Akinboade and Kinfack, 2012; Edwards, C. (2021). Few examples of excessive regulatory constraints include: licensing and permitting requirements (complex and time-consuming processes for obtaining licenses, permits, and certifications for construction activities); taxation and financial regulations (complex tax codes, levies, and financial reporting requirements); labor laws and employment regulations (compliance with labor laws, such as minimum wage requirements, overtime regulations, and workplace safety standards, is essential for protecting workers' rights). Some of these impacts on SMCs could include: (1) an increased regulatory burden on SMCs to comply with the set of regulations; (2) raising the cost of doing business and inhibiting their flexibility in a competitive business environment; or (3) administrative fees imposed on SMCs may be unnecessary impositions, discouraging them from growing and surviving in a competitive business environment (Eyiah, 2004). Excessive regulatory constraints can indeed hinder the competitiveness of SMCs and, therefore, must be thoroughly understood and regulated. Unlike excessive constraints, appropriate measures are proportionate, transparent, and promote innovation and fair competition. Few examples of appropriate regulatory constraints include: transparent contracting and procurement policies (fair bidding processes, anti-corruption measures, etc.); tax incentives and tax codes (tax breaks for startups, simplified tax filing, etc.); supportive labor laws (flexible work arrangements, training and development incentives etc.).

The interviewees were asked about the difficulties related to the regulatory framework, and most SMCs indicated that they faced significant challenges. Interviewee R3, in particular, pointed out that challenges related to registration and licensing are significant issues for SMCs in the CI. The regulatory requirements for contractor registration and licensing are generally based on the number and type of pieces of equipment and human resources owned by a contractor rather than the technical performance achieved by the contractor. These criteria discourage SMCs and primarily serve as entry barriers, as SMCs have limited capacity to meet the minimum requirements for their businesses to register as per these requirements. R3 also mentioned that the absence of central databases to track human

resources and equipment owned by contractors has made the registration and licensing process susceptible to malpractices and corruption. This finding is consistent with the results of a study by Mengistu (2019), who researched ways to improve determinant factors to facilitate the development of the CI in Ethiopia.

Regulatory impact indicators are crucial for assessing the consequences of regulations. They provide essential information that helps regulatory authorities evaluate the effectiveness of the regulatory system, including its costs, benefits, social implications, and overall performance. However, according to R6, institutional and regulatory frameworks are yielding low-quality, ineffective results and are failing to adequately oversee or monitor crucial aspects of the regulated industry.

The unsatisfactory regulatory outcomes can be attributed to a combination of several factors. Firstly, there is insufficient training of regulatory personnel, as well as a lack of understanding among management regarding their responsibilities. Additionally, the sector lacks adequate regulation, and conflicts of interest exist among regulatory agencies, as they operate as profit-seeking organizations in Ethiopia. Foreign policy also influences the regulatory framework, driven by political and economic interests. Poor monitoring and enforcement mechanisms, lack of transparency, and a bureaucratic environment further impede the implementation of regulatory measures. Moreover, the structure and functions of regulatory agencies are based on outdated law enforcement concepts, resulting in the misallocation of resources. Poor infrastructure exacerbates the situation, leading to unreliable regulatory outcomes.

Regulatory impact indicators are vital for scrutinizing the outcomes of regulations. They provide indispensable information that helps regulatory enforcers evaluate the effectiveness of the regulatory system, including its costs, benefits, social implications, and overall performance. However, R6 believes that institutional and regulatory frameworks are producing low-quality, ineffective results and are not adequately regulating or monitoring important aspects of the regulated industry. The reason for the unsatisfactory regulatory outcomes is a combination of several factors. Firstly, there is inadequate training of regulatory personnel, as well as inadequate management comprehension of their

responsibilities. Additionally, the sector is not adequately regulated, and there are conflicts of interest among regulatory agencies since they operate as profit-seeking organizations in Ethiopia. The foreign policy also influences the regulatory framework, and this is driven by political and economic interests. Poor monitoring and enforcement mechanisms, lack of transparency, and a bureaucratic environment also hinder the implementation of regulatory measures. Moreover, the regulatory agency's structure and functions are based on outdated concepts of law enforcement, leading to the misallocation of resources. Poor infrastructure further exacerbates the situation, leading to unreliable regulatory outcomes.

R6 expressed that compared to other developing economies, the government's ability to create and implement sound SMCs policies and regulations is well below average, indicating poor regulatory quality. Therefore, regulatory systems and infrastructure must support SMCs' needs and sustainable development while upholding the public interest. He further stated that regular regulatory impact analyses should be established or implemented to evaluate the impact of government policies and regulations on SMCs. Other challenges stated by the interviewee (R1) also highlighted that bureaucracy in government administrative systems, including procurement and tenders, and the overall integrity of procurement procedures, posed significant regulatory obstacles to SMCs' growth. These issues excessively complicated administrative procedures and created a robust regulatory barrier for SMCs. This finding also agrees with the position of Hayford (2012); Nyarku and Oduro (2017), who stated that bureaucratic procedures act as "red tape," making the administration process more difficult and discouraging for SMCs growth. Appropriate solutions for “Red-tape” could be: simplify administrative processes and reduce bureaucratic complexities (Upite et al., 2011; Loosemore, 2015); Harmonize regulatory frameworks (Mengistu, 2019; Mengistu and Mahesh, 2020; Shooshtarian, et al., 2021); Simplify business registration and licensing procedures (Wirahadikusumah and Pribadi, 2011), etc.

6.3.3. Industry Networks

The themes of this interview discussion section were challenges identified from industry networks to understand the connection between industry networks and the sustainable competency of SMCs in the Ethiopian CI. In a highly competitive, dynamic, and ever-

evolving construction market, running a business without a network system is challenging, especially for SMCs with limited resource capabilities (financial, technical, and human), as we have witnessed in the past few years. The industry networks in the CI play a vital role in the competency development of SMCs, as they provide opportunities and assistance that are essential to their success. In this regard, the interviewee, R6, revealed that the network in the Ethiopian CI, within itself and with other sectors, is weak and hindered by a lack of interest and commitment among potential network members and effective communication between them. Thus, most SMCs rely on their personal links and trade contacts to access relevant information, essential R&D services, technical expertise, and financial and legal services to further develop their competencies. R2 expressed his dissatisfaction and held the government and professional associations responsible for not promoting networking and creating favorable conditions for SMCs. Further, R2 argued that the government should take the lead in establishing a supportive environment driven by SMCs and create dedicated entities to oversee and manage the process. He also suggested that professional and trade associations should be assigned a critical role in creating a conducive environment for SMCs, which would foster greater interaction between them and the industry.

6.3.4. Culture of Competitive Bidding

The interviewees were requested to provide their perspectives, experiences, and opinions to thoroughly comprehend the difficulties encountered by SMCs in the Ethiopian CI during the competitive bidding process. The interviewees (R2, R8, and R10) revealed that corruption and unethical practices are the longstanding obstacles in the competitive bidding process of the Ethiopian CI. The problem has become challenging to address because those engaged in these activities have strong political ties, intricate networks, and expertise in operating covertly, making it challenging to control and eliminate the issue effectively.

R8 emphasized that the individuals implicated in the corrupt and unjust practices during the bidding process come from both government and private spheres. Within the government, officials engage in actions such as accepting bribes in return for contract awards, exhibiting bias towards companies with political affiliations in public project assignments, and misusing their authority to grant public projects to companies without adhering to fair, competitive bidding procedures, which undermines the fundamental

principles of openness, responsibility, and effectiveness in public sector procurement. These corrupt practices affected fair competition within the industry and also broke SMCs' trust in their government.

The contractors who participate in bidding are also involved in corrupt and unfair practices to gain an advantage. According to R8, these practices include bid rigging, front loading, bribery, collusion, profiteering, and price fixing. These unethical practices also extend to suppliers of construction resources. As previously mentioned, many construction materials are imported from Ethiopian trade partners. In addition to global factors that increase prices, suppliers of construction materials inflate prices through dishonest practices, resulting in high construction costs that ultimately determine the overall cost of construction. R8 speculates that as the cost of resources increases, confidence in investing in construction will decline over the long term, leading to reduced construction demand and ultimately impacting the survival of SMCs.

6.3.5. Technology and Innovation

Technology and innovation are essential for the construction sector, as they play a vital role in maintaining the competitiveness, efficiency, and success of SMCs. Over time, technology has become increasingly complex and sophisticated, and it is now more widely used than ever before. However, developing economies such as Ethiopia are unable to fully utilize this technology as it is not readily available (Barlow, 2000; Mouchi et al., 2011). Findings from studies have revealed several contributing factors within the developing economies' CI (Ofori, 1994; Amoah et al., 2011). The problems highlighted by the interviewee confirm the findings from the cited authors and questionnaire survey, which call for a more inclusive interpretation. Accordingly, interviewees stated challenges emanating from the government side include but are not limited to: inadequate technology transfer and communications processes, a lack of sound technology implementation and management practices, an inadequate institutional support arrangement and legislative guidelines for appropriate technology selection, incubation, transfer, and domestication processes; and an underdeveloped infrastructure for technology development. All of these factors pose significant challenges for SMCs and impact their competitiveness.

Further interviews have also revealed inadequate information, communication, and collaboration practices between CI stakeholders and R&D institutes and limited university-industry collaboration as the main challenges impacting SMEs. Other adversely affecting problems from industry stakeholders include inadequate social awareness of technology, insufficient capital for technology investment, low entrepreneurial drive among SMCs, and underdeveloped markets for technology products. These are among the reasons SMCs' competency is directly or indirectly affected, as stated by R3, R7, and R8.

6.4. Chapter Summary

In the Ethiopian CI, the competency of SMCs has been relatively underdeveloped, and their competitiveness has stagnated accordingly. This unimpressive track record can be attributed to various factors (i.e., endogenic and/or exogenic factors). The study's main purpose was to examine the factors affecting the sustainable competency of SMCs in the Ethiopian CI emanating from the business environment (exogenic factors). The findings of the study revealed the significant challenges/factors emanating from their respective sources as unfavorable financial policies (3.69) from government policies; unfavorable economic regulations (3.42) from the regulatory framework; lack of trust between parties in the industry (i.e., honesty, integrity, and openness) (3.58) from industry networks; inability of SMCs to compete with bigger construction companies (4.07) from the culture of competitive bidding; and poor linkages between CI and R&D institutions (3.54) from technology and innovation. Furthermore, twelve factors were also extracted from five core sources through factor analysis.

Given the above context, it is recommended that more effort is required from the government in supporting and establishing financial facilities that are capable of efficiently and reliably supporting the SMCs' development; developing comprehensive and affirmative regulatory policies and reforms; and increasing the capacity of the public sector to deliver services, particularly in the areas of policy implementation and administration. Investing in R&D may help bring innovations to market more swiftly that are both economical and innovative. It can also help lower the risk of quality, safety, and legal liability issues. In addition, the CI stakeholders need to cooperate to establish and maintain

trust, as the growth of these industries depends on the partnerships, alliances, and collaborations they make with one another. The following chapter of this thesis will provide a detailed discussion of the findings related to the effectiveness of contractor development programs on the sustainable competency of SMCs in the Ethiopian CI.

CHAPTER SEVEN

EFFECTIVENESS OF CONTRACTOR DEVELOPMENT PROGRAMS ON THE SUSTAINABLE COMPETENCY OF SMCs

7.1. Introduction

This chapter addresses the third objective of the research, which is to assess the effectiveness of CDPs in sustaining the competency of SMCs in the Ethiopian CI. The study measured participants' overall satisfaction, overall knowledge gained, skills developed from the development program, and institutional challenges faced during and after the development program.

7.2. Findings from Questionnaire Survey

A mixed-method approach (questionnaire surveys and semi-structured interviews) was employed to gather participants' perspectives. Purposive sampling was used to randomly select participants from various groups, and the sample size was calculated using a formula adapted from (Czaja and Blair, 1996), which determined a minimum required sample size of 96. A total of 147 questionnaires were distributed, of which 104 responses were duly completed, resulting in an effective response rate of 70.75%. Table 7.1 provides background information.

Table 7. 1. Respondent's Background

		Frequency	(%)
Area of establishment	Building Contractor	45	43.27
	Road Contractor	19	18.27
	General Contractor (All infrastructure Contractor)	40	38.46
Educational Background	BSc.	70	67.31
	MSc.	19	18.27
	Other	15	14.42
Work Experience	Less than 5	9	8.66
	6 – 10	43	41.35
	11 – 15	35	33.65
	16 – 20	14	13.46
	21 – 25	3	2.88
Grade of the Company	G3 – G5 (Medium Contractors)	24	23.08
	G6 – G10 (Small Contractors)	80	76.92

The study population consisted of building contractors (43.27%), road contractors (18.27%), and general contractors (38.46%) who had all participated in contractor development initiatives. Thirteen qualitative interviews were conducted and analyzed using thematic analysis to identify patterns and themes in the data. Qualitative themes were compared with quantitative findings to better understand the impact of variables on SMCs' competency sustainability. This approach provided a comprehensive understanding of the variables' impact and can be applied to similar contexts with CDPs. Participants rated the significance of the identified variables on an ordinal measurement scale, where [1] = Strongly Disagree, [2] = Disagree, [3] = Moderate, [4] = Agree, and [5] = Strongly Agree. Descriptive statistics, such as means, were employed to assess the relative importance of the variables, while a one-sample t-test with a hypothesized mean of 3.00 was used to determine their significance level, indicating an impact on SMCs' competency sustainability. The study identified 59 variables to address the research questions and led to the development of hypotheses concerning the relationships among the research constructs.

Hypothesis: The study hypothesizes that variables related to "overall participant satisfaction," "knowledge and skill development from the program," and "institutional challenges during and after the program" significantly correlate with the effectiveness of CDPs in the Ethiopian CI. For each variable, the null hypothesis (H0) posits that the variable has no significant impact on the measured aspect, while the alternative hypothesis (H1) suggests that the variable does have a meaningful impact.

7.2.1. Measure of the Development Program Participant's Overall Satisfaction

In this section, the results concerning the evaluation of overall satisfaction among participants in the development program are presented, offering insights into how the program's impact and quality are perceived by its intended beneficiaries. Thirteen different variables were employed to assess satisfaction, and their mean scores were calculated to determine overall satisfaction. A one-sample t-test was conducted, revealing that all of the variables were statistically significant, regardless of their rank differences. Additionally, Spearman's rank order correlation test indicated agreement on satisfaction levels between participants in the URRAP and IHDP programs, with a correlation coefficient of $\rho = 0.643$

and a significance level (p-value) less than 0.05, indicating similar satisfaction levels for both programs. The results of the mean values, rankings, and one-sample t-test are presented in Table 7.2 for reference.

Table 7. 2. The overall satisfaction of the development program's participant

Measure of the development program participant's overall satisfaction	Mean	Rank	S.D.	T-test Sign.
The program has enhanced my understanding of the construction environment	3.57	10	.693	.000
The program has afforded me sustainable contracting opportunity to get more contracts and enhanced my chances of tendering	3.61	8	.716	.000
The program has given financial institutions the confidence and certainty to assist	3.31	13	.956	.001
The program has improved my performance and enabled me to complete projects within the required quality, cost and time	3.67	7	.769	.000
The program has improved my relationship with the industry stakeholders	3.75	5	.721	.000
The program has improved my grading status	3.54	11	.847	.000
The program approach and mode of delivery was simple and easy to understand	3.84	3	.765	.000
The program was relevant and responsive to industrial needs	3.90	1	.757	.000
The program has recognized the psychology of participants	3.81	4	.764	.000
The program has increased my access to resources (i.e. information, technology, equipment, material, and etc.)	3.67	6	.703	.000
The program has created an opportunity and support for developing my technical knowledge and skill	3.61	9	.886	.000
The program has increased my entrepreneurial traits	3.86	2	.660	.000
The program has helped me to utilize indigenous technologies and local resources	3.50	12	.763	.000

Based on the aggregate responses (i.e., mean score results and standard deviation), the top four variables in this category, namely, "the program was relevant and responsive to industrial needs," "the program has increased my entrepreneurial traits," "the program's approach and mode of delivery were simple and easy to understand," and "the program has recognized the psychology of participants," have been identified as highly impactful variables on sustainable competency for firms. In contrast, variables such as 'the program has given financial institutions the confidence and certainty to assist me' and 'the program has helped me utilize indigenous technologies and local resources' had lower agreement among respondents.

The variable “The program was relevant and responsive to industrial needs” received the highest level of agreement based on the aggregate results. The CI is characterized by unique features and is subject to various constraints and external influences throughout project lifetimes. Therefore, effective contractor development must address and overcome these obstacles to enhance contractors' sustainability and contracting capabilities (Ofori, 2018). In this regard, respondents believed that the development program was closely aligned with a crucial need identified by the industry. However, respondents emphasized the importance of bridging the gap between the industry's requirements and the real-world context of participating SMCs. They suggested that the development program should adopt a more contextualized approach that considers factors such as SMCs' size, culture, structure, resources, infrastructure, and business models. Additionally, a robust performance monitoring and evaluation framework is deemed imperative, as the program's success relies on ongoing monitoring and evaluation of the implementation process and outcomes. Similarly, government-provided mentorship and support should address practical matters rather than pursuing a political agenda.

The second most strongly agreed variable, as ranked by the aggregate result, was “the program has increased my entrepreneurial traits.” While there is no magic formula for business success, there are certain traits that all aspiring entrepreneurs should cultivate to significantly improve their chances of success. Individuals with an entrepreneurial mindset see challenges and problems as opportunities and develop creative solutions to address them, combining and exploiting these opportunities (Neneh, 2011). Therefore, respondents believed that the program had enhanced their ability to identify business opportunities, their propensity for risk-taking, and their self-efficacy.

The program approach and mode of delivery were simple and easy to understand and were ranked third by overall respondents. The training approach and logistics employed in the program play a crucial role in determining overall outcomes. It was observed that the approach and mode of delivery were systematically designed to align with the program's learning objectives. Respondents also noted that participants with higher levels of education and experience in the CI tended to grasp the concepts more effectively than those with less background. Therefore, it is crucial to establish prequalification criteria, considering factors

such as industry experience, educational background, technical, managerial, and construction-related skills, to ensure that the program's objectives can be delivered effectively, regardless of the participants' level of understanding. Overall, the results suggest that effective contractor development requires a comprehensive approach that addresses the CI's unique features, constraints, external influences, and the specific circumstances of participating SMCs.

7.2.2. Evaluation of Overall Knowledge Gained and Skill Developed from the CDPs

Participants were asked to evaluate the overall knowledge gained and skills developed from the contractor development program and to indicate their agreement level. Of the 28 variables stated under overall knowledge gained and skills developed, respondents expressed high satisfaction levels in four (14.29%) areas of knowledge. These areas of knowledge are (1) daily recording and report preparation, (2) leadership quality, (3) construction materials handling, storage, and inventory management, and (4) construction contract document management."

"Daily recording and report preparation" was ranked first, as perceived by overall respondents. The survey participants emphasized the importance of record-keeping and reporting practices when running a construction company. They highlighted the value of maintaining a construction report, which documents the work performed, tasks accomplished, problems solved, and unresolved issues daily, enabling a review and analysis of project progress. It's uncommon to find a construction company that adequately records and documents its past work, so contractors must have a daily record-keeping and reporting system in place. The respondents reported improved abilities in performing these tasks, which have helped them avoid ongoing disputes and claims.

The need for improvement in leadership quality is the second most crucial valuable lesson obtained from the CDP. Construction businesses require strong leadership qualities in their leaders for successful management (Ofori and Toor, 2012). The development program helped participants cultivate their leadership skills, including communication, strategic planning, decision-making, and problem-solving. This improvement empowered them to effectively mobilize, persuade, direct, coordinate, and align people toward common industry goals.

The third-ranked overall knowledge gained and skill developed from the CDP, obtained from the aggregate result, was 'construction materials supply management.' Materials constitute a significant portion of project costs, sometimes up to 60% of the total project cost (Koriom et al., 2019). Efficient materials management can enhance project cost-effectiveness. In the IHDP projects, where 80–90% of construction materials were supplied by the government, significant challenges arose related to inconsistent and delayed delivery of construction materials, insufficient capacity, poor communication among supply chain stakeholders, sub-standard/poor quality construction material supply, inadequate logistic support, inefficiencies in procurement and distribution of materials, and transportation shortages. As a key client and industry regulator, the government should address these challenges by regulating the CI and providing adequate support to enhance the capacity of the construction material supply chain.

On the other hand, respondents reported moderate levels of satisfaction in fourteen (50.00%) knowledge areas, which include (1) construction materials supply management; (2) construction price analysis; (3) material estimation, budgeting, planning, and programming; (4) scheduling, purchasing, and procurement of construction materials; (5) project planning, coordinating and controlling (i.e., cost, schedule, quality; project scope, etc.); (6) construction project team development and employees motivation; (7) cash flow analysis and monitoring; (8) price forecasting, cost norms, and price indices preparations; (9) cost and schedule performance analysis; (10) tender and pre-tender cost estimating; (11) human resource development strategies; (12) construction equipment and plant scheduling and deployment; (13) labor disputes and complain handling systems; and (14) project and site organization.

Furthermore, participants expressed lower levels of satisfaction in ten (35.71%) knowledge areas, such as (1) construction equipment and plant access, handling and management; (2) financing decision-making, source of finance, financial statement and analysis; (3) variation orders management; (4) working capital management, capital budgeting, a system of monitoring and control; (5) construction equipment and plant productivity and cost analysis; (6) employment contract and manpower recruitment; (7) employees health and safety at the construction project site; (8) cost-benefit analysis and risk-return

assessment; (9) cost-effective construction materials, methods and technologies used; and (10) construction project risk management.

The majority of participants (85.71%) expressed only moderate to low levels of satisfaction in most covered knowledge areas. These findings indicate room for improvement in the program, particularly in areas where participants expressed lower satisfaction levels. Recommendations include revising the program to address these areas, potentially through additional training materials or innovative teaching methods to enhance participants' knowledge and skills. This may involve incorporating additional training materials or adopting new teaching methods to enhance participants' knowledge and skills in these specific areas.

Furthermore, the program should offer personalized learning options, allowing participants to select areas for improvement based on their job roles and career goals. This personalization can be achieved through assessments, career guidance, and individualized development plans. Additionally, the program should incorporate emerging technologies and industry trends to keep participants informed about the latest practices and standards, ensuring their competitiveness and adaptability to industry changes. Regular program evaluation and monitoring are also crucial to maintaining relevance and effectiveness in meeting participants' needs.

Table 7. 3. Overall knowledge gained and skill developed from development program

Overall knowledge gained and skill developed from development program	Mean	Rank	S.D.	Index	T-test Sign.
Construction Materials Management					
Construction materials supply management	3.42	5	.832	.685	.000
Construction materials handling, storage and inventory management	3.50	3	.763	.700	.000
Material estimation, budgeting, planning and programming	3.35	7	.707	.669	.000
Scheduling, purchasing and procurement of construction materials	3.30	8	.749	.660	.000
Construction Site Supervision					
Project planning, coordinating and controlling (i.e. cost, schedule, quality; project scope and etc.)	3.29	9	.649	.658	.000
Construction contract documents management	3.43	4	.773	.687	.000
Daily recording and report preparation	3.60	1	.770	.719	.000
Variation orders management	2.99	21	.782	.598	.900
Construction equipment and plant management					
Construction equipment and plant access, handing and management	3.08	19	.618	.615	.207
Construction equipment and plant scheduling and deployment	3.17	16	.756	.635	.022
Construction equipment and plant productivity and cos analysis	2.94	23	.708	.588	.408
Construction Costing (Cost Engineering)					
Price forecasting, cost norms and price indices preparations	3.24	12	.782	.644	.002
Tender and pre-tender cost estimating	3.22	14	.668	.648	.001
Construction price analysis	3.36	6	.787	.671	.000
Cost benefit analysis and risk-return assessment	2.80	26	.840	.560	.016
Construction Performance Management					
Project and site organization	3.12	18	.701	.623	.096
Cost and schedule performance analysis	3.24	12	.794	.648	.003
Cash flow analysis and monitoring	3.25	11	.721	.650	.001
Construction project risk management	2.75	28	.785	.550	.002
Human Resource Management					
Employment contract and manpower recruitment	2.94	23	.651	.588	.368
Human resource development strategies	3.21	15	.962	.642	.027
Construction project team development and employees motivation	3.26	10	.848	.652	.002
Leadership quality	3.52	2	.776	.704	.000
Labor disputes and complain handling systems	3.16	17	.765	.633	.032
Employees Health and safety at the construction project site	2.87	25	.698	.573	.052
Financial Management					
Financing decisions making, source of finance , financial statement and analysis	3.00	20	.709	.600	.582
Working capital management, capital budgeting, system of monitoring and control	2.96	22	.787	.592	.619
Cost Effective Construction					
Cost effective construction materials, methods and technologies used	2.78	27	.836	.556	.008

A Spearman's rank-order correlation test was conducted to assess agreement between URRAP and IHDP participants regarding the knowledge and skills acquired from the program. The results indicate a lack of agreement between the two groups, suggesting differences in their perceptions of program outcomes.

7.2.3. Evaluation of Institutional Challenges Faced During and Post CDPs

Ethiopia has embarked on several critical strategies to support SMCs' development, and it is undertaking an endeavor to boost the country's CI development. However, how those strategies have been implemented in practice has proven ineffective in addressing the issues faced by SMCs, as most SMCs have failed to survive in a competitive business environment. This portion of the study examined the challenges development institutions face during and after post-development programs. To evaluate these challenges, 16 variables (i.e., eight variables from during the implementation phase of development programs and eight from the phase post the implementation of development programs) were shortlisted and summarized in Table 7.4 below. One-sample T-test indicates that all variables are statistically significant as their p-values are less than the 0.05 (5%) significance level. Accordingly, the null hypothesis, which assumed that the variable did not impact sustainable competency, is rejected.

The top institutional challenges faced during the implementation phase of the development program include training budget limitation, outrageous work overburden due to a large number of project participants, and poorly designed training and technical support schemes. On the other hand, the top institutional challenges faced post the development program implementation include the absence of an appropriate recording, monitoring, and evaluation system for the contractors involved; unsatisfactory supply chain management; and delays and poor quality of locally assembled construction equipment.

Both groups of respondents ranked training budget limitations highly, indicating a similar perception of the issue. Theoretical and practical training equips them with the necessary skills and experience to increase their competencies by developing technical, administrative, and business management skills. Furthermore, previous studies have found a link between training and organizational effectiveness (Blundell et al., 1999). Learning

new skills, acquiring knowledge, and staying up-to-date with industry development are essential for business sustainability, competency, and success within today's CI. According to previous studies, investment in training and development programs may be justified by their impact on the growth of individual and organizational effectiveness (Bartel, 2000). Thus, the amount of allocated budget for training governs the overall training objectives of the program: logistics to conduct training; the training approach; the number of people to be trained; the process of identifying and mobilizing human resources required for training; and even the outcomes (Delery and Roumpi, 2017). The study participants believed the allocated budget did not sufficiently account for the training needed. This has restricted the transfer of information, technology, and innovation and the acquisition of technical and management abilities. The success of the CI relies on the joint efforts of various stakeholders, such as international aid agencies, non-profit organizations, major construction firms, and local financial institutions. Hence, the study highlights the significance of these stakeholders taking concrete steps to finance training and development programs.

Outrageous work overburden due to a large number of project participants was ranked second by the IHDP participants, indicating the severity of the problem. In contrast, the URRAP participants ranked the same variable in the sixth position, reflecting differences in participants' perceptions. According to the IHDP survey participants, the IHDP bureau experienced a significant workload due to a high number of participants. This led to a fragmented and disrupted work environment, resulting in inefficient outputs and hindering the program's goals. The lack of adequate staffing and human resources further contributed to the participants' dissatisfaction. The respondents emphasized the need for relevant government offices and bureaus to prioritize the provision of sufficient and well-equipped personnel to ensure the program's success.

Poorly designed training and technical support schemes were ranked third. The respondents believed that, although the training and development program's objectives were relevant and responsive to industrial needs, its design and technical support schemes were inadequate. The effectiveness of training in influencing skills, knowledge, performance, and competency depends mainly on its design, delivery, and technical support schemes.

Respondents felt that training programs should be designed to clearly communicate their purpose, objectives, and outcomes in an understandable manner. Effective training programs should provide multiple opportunities for participants to practice the knowledge and skills they have gained and offer feedback to assess the trainees' performance. Therefore, additional attention and care should be devoted to designing and organizing programs to effectively meet the trainees' needs.

Table 7. 4. Institutional challenges faced during and post development program

Institutional challenges faced during and post development program	Mean	Rank	S.D.	Index	T-test
During the development program Outrageous work overburden due to a large number of project participants	4.03	2	.769	.806	.000
Training budget limitation	4.15	1	.665	.831	.000
Poorly designed training and technical support schemes	4.01	3	.818	.802	.000
Inadequate and incompetent human capital in delivering the program	3.86	5	.756	.771	.000
Limited intake capacity	3.54	8	.858	.708	.000
Shortage of appropriate training materials	3.91	4	.904	.783	.000
Absence of emphasis on practical training	3.77	7	1.09	.754	.000
The program lacks minimum pre-qualification criteria as pre-requisite	3.79	6	.972	.758	.000
Post the development program Poor capacity of financial institutions and inadequate support system	3.64	6	.847	.729	.000
Unsatisfactory supply chain management	4.02	2	.985	.804	.000
Absence of appropriate recording, monitoring and evaluation system of the contractors involved within the program	4.07	1	.948	.813	.000
Limited capacity of the government structure and development partners	3.92	4	.821	.785	.000
Poor information and communication services	3.76	5	.853	.752	.000
Delay and poor quality of locally assembled construction equipment	3.94	3	.974	.788	.000
Corruption	3.62	8	1.01	.723	.000
Political interference in contract award	3.64	6	.880	.729	.000

The absence of an appropriate recording, monitoring, and evaluation system for the contractors involved in the program was ranked as the top challenge. Such a system is crucial as it helps assess whether the training was implemented according to the action plan or if there were significant deviations from the intended outcomes of the program. This system aids in evaluating whether training programs have been executed in line with the action plan and have achieved their intended results. It also plays a vital role in identifying implementation bottlenecks, detecting unintended effects, pinpointing remaining gaps, and

evaluating program outcomes (Mayne, 2007; UNDP, 2009). Additionally, it enables the generation of feedback from the field, which can be incorporated into subsequent training programs to continuously improve their design. However, it became evident that insufficient attention was given to recording, monitoring, and evaluating the progress of program participants against pre-defined indicators. As a result, it was impossible to determine whether contractor performance had improved due to the lack of performance metrics.

Furthermore, it is worth highlighting that consistent follow-up meetings and monitoring were not conducted across all the programs in which the participants took part. This absence of regular feedback made it challenging to evaluate the effectiveness of the programs. To enhance the performance of future initiatives, there is a need to establish and implement a more systematic approach for post-program assessment and follow-up. This can be achieved through the following steps: (1) creating a system or framework to track better and measure participants' progress over time; (2) developing monitoring instruments, communication channels, performance reports, and indicators to measure the program's effectiveness and efficiency; (3) establishing favorable policies and strategies with precise implementation directives and improving accessibility to adequate resources and funding; and (4) encouraging stakeholders, such as academic and research establishments, professional organizations, civil society groups, international organizations, etc., to be flexible and expand their involvement in the monitoring and evaluation process to fulfill their obligations effectively.

Unsatisfactory supply chain management received the second-highest ranking. As part of the development program, the government offered an 80–90% supply of all primary construction materials and financial support through advance payment. Despite these efforts, respondents identified inadequate supply chain management as a significant obstacle to their success. The issues contributing to this problem include fragmented industry structures, delays in material delivery, inadequate construction material supply, poor planning and logistics management, and inefficient strategic alliances within the supply chain system. Respondents also pointed out that the lack of unified management techniques, ineffective communication systems, and a lack of clarity regarding the roles

and responsibilities of different parties involved in the supply chain were significant factors contributing to poor supply chain management. The successful completion of projects relies heavily on effective supply chain management. To improve the supply chain management system, the government should prioritize the selection and coordination of competent and suitable suppliers while ensuring a seamless flow of materials and information throughout the supply chain.

The third most significant challenge identified in the development program is the delay and poor quality of locally assembled construction equipment. According to the respondents, small and medium-capacity equipment, such as tractors, trailers, towed rollers, graders, water tankers, fuel tankers, and pickups, were manufactured and/or assembled and distributed to SMCs by Metals and Engineering Corporation (METEC). While locally assembled construction equipment played a vital role in combining labor and machinery, its quality was severely lacking. The equipment, constructed from cheap materials, quickly deteriorated under the rigorous demands of construction sites, rendering it unable to withstand the heavy workloads.

Another significant issue highlighted is the absence of affirmative procurement measures for public works and services. This lack of support makes it more difficult for SMCs to secure contracts and compete effectively with larger firms, as most project procurement follows the conventional bidding process. These challenges have severely impacted the sustainability of businesses within the CI. To address these issues, it is crucial for governments and development programs to provide continuous support to businesses even after the program's completion. This support should include facilitating access to credit and implementing affirmative procurement measures for public works and services. By doing so, businesses can thrive in a competitive environment, ultimately contributing to the overall development of the economy.

Furthermore, Spearman's rank-order correlation, calculated with a 95% confidence interval ($P = 0.05$), indicates no significant agreement in rankings between URRAP and IHDP participants.

7.3. Findings from Interviews

The previously discussed survey results were used to investigate the development program's effectiveness in enhancing the sustainable competence of SMCs by equipping them with the necessary knowledge and skills to capitalize on the developmental opportunities provided. This interview section complements and enriches the quantitative findings from the survey by presenting qualitative data gathered from the experiences and perspectives of participants in the CDP, government agencies responsible for creating the program, and experts from the CI.

7.3.1. Findings from SMCs Who Participated in the CDPs

Upon analysis of the responses provided by the SMCs who participated in the CDP, several key findings were identified, shedding light on the effectiveness of the program and the impact it had on the contractors' businesses.

The interviewees were asked about their views on the accessibility and openness of the SMCs development program. All the participants concurred that the program was widely advertised to all SMCs, including a detailed description of its goals and eligibility requirements. This allowed them to apply for consideration. In terms of accessibility, all SMCs were able to easily apply and provide their information to the appropriate development authorities in the hope of receiving job opportunities and financial assistance that would help them after graduating from the program.

The participants were inquired about their level of satisfaction with the program. They were requested to provide their overall perception of the program, including whether they regarded it as a positive experience aligned with their initial expectations. Interviewee R13 believes that the program's objectives are aligned with the industry's needs and that it is keenly concerned with addressing the challenges that SMCs encounter, at least in theory. Furthermore, R13 felt that the program's effectiveness could be improved by incorporating more practical and hands-on approaches to address SMCs' challenges. R18 also shared the belief that the contractor development program was designed after identifying the specific demands of SMCs, such as the need to unlock entrepreneurial potential, elevate sustainable

competency, and foster the enterprise development of SMCs as a part of the general needs of the Ethiopian government's vision for economic development. However, despite having significant potential and being well-conceived, the program faced criticism from interviewees for its lack of practicality in implementation.

R13 and R18 also believed that during its implementation, several problems had been observed, such as inadequate funding for the program, program officials' lack of adequate training on how to effectively implement the program, resulting in poor communication and coordination with the participating SMCs, poor coordination among different agencies involved in the program, inadequate management of the supply chain, and the absence of a dedicated support unit to assist the SMCs. R17, on the other hand, believed that the CDP did not achieve its intended goal as most SMCs could not survive in a competitive business environment. The observation by R17 states that the CDP was more politically driven than strategic, suggesting that the program's design may have been flawed from the outset. A lack of strategic planning and alignment with the needs of SMCs may have contributed to the program's failure to achieve its intended objectives. This R17's perspective contradicts the views of other observers, who stated that the program's objectives were aligned with the industry's needs.

R17 further expressed dissatisfaction due to the fact that some important areas of expertise and knowledge that are crucial for SMCs development, including entrepreneurship and business development, construction resource management, construction project management, procurement and contract management, and information management, were not adequately addressed. The interviewee highlighted that these crucial areas of expertise could be targeted in future programs to provide effective interventions. He suggested that future programs should develop training modules covering these areas comprehensively.

Concerning the benefit obtained from the program in the areas of entrepreneurship development, human resource development, material development, technology development and innovation, and improving the operating environment, interviewee R15 stated that the program has been able to foster his entrepreneurial traits such as his leadership skills, communication skills, and negotiation skills. These skills have allowed him better to understand entrepreneurship's benefits, risks, and uncertainties and make

informed decisions. He also noted that the program helped him expand his business and allowed them to connect with potential clients and suppliers, and consequently, his business opportunities have increased significantly.

However, this does not hold true for some program participants, particularly those entrepreneurs who took part in IHDP. According to IHDP interviewee R21, the program did not meet his entrepreneurial needs and did not provide him with a comprehensive understanding of entrepreneurship. Similarly, another IHDP interviewee (R13) indicated that the program fell short in imparting an adequate understanding of entrepreneurial development. R13 pointed out that the program failed to account for the diverse knowledge, experience, and academic backgrounds of entrepreneurs in the CI.

R13 entered the construction business with aspirations of becoming a successful contractor, and like many others, he lacked prior construction engineering-related experience. These individuals joined the program to gain a solid grasp of entrepreneurship. Unfortunately, many of them could not achieve their aspirations due to their limited academic expertise. R13 suggests categorizing participants based on their educational backgrounds and experiences to enable better monitoring of their progress before and during the program. For instance, those with engineering or architecture backgrounds may have a stronger technical foundation but might require more support in developing business acumen. Conversely, individuals with a business background may need additional training in technical skills. Close monitoring of progress can also aid in identifying knowledge gaps that need addressing. This allows the program to offer additional resources and training, ensuring that all participants acquire the essential skills for success.

Regarding human resource development, interviewee R19 highlights the persistent and critical issue of the skilled human resources shortage in Ethiopian CI. This problem has become more pronounced due to the CI's rapid growth, which has outpaced the availability of skilled labor. R19 acknowledges the Ethiopian government's efforts to support the CI and promote sustainable human resource development solutions. In particular, the government has been actively encouraging SMCs in this sector. However, concerning the development program in which he participated to enhance his human resources capacity, R19 notes that some essential topics in basic human resources were lacking in certain areas.

These gaps include project planning and management, financial management, accounting, and cost estimation—areas he considers crucial challenges in the CI. Therefore, he suggests that the government should take proactive measures to ensure that future development programs for the CI encompass relevant training in these areas, which were not adequately covered in previous programs.

All the interviewees expressed similar views regarding the benefits of managing the construction material supply chain. Participants from both URRAP and IHDP agreed on the importance of locally available materials, which can reduce construction project costs and provide easy accessibility for SMCs. However, they also recognized the need for further efforts to improve the management of sustainable construction materials within the supply chain. To address this, the interviewees suggested conducting additional research and development to enhance locally available construction materials and their production methods. They emphasized the importance of standardizing the properties of these materials and creating policies and programs to encourage their use in construction projects. The government's role was highlighted in supporting and promoting indigenous knowledge and skills related to local material production, enhancing capabilities, integrating them into mainstream market products, and ensuring the sustainability of these materials. By adopting these measures, the CI can significantly benefit from the utilization of locally available materials.

Most interviewees expressed dissatisfaction with the capacity-building assistance they received during and after the development program, citing its insufficiency. This lack of support has made it challenging for them to maintain competitiveness in their respective fields. According to Interviewees R14, R15, and R16, financial assistance was the most helpful type of support for their construction projects. They also mentioned the significance of technical training and workshops to enhance their skills. Additionally, assistance with equipment, such as tractors, trailers, dump trucks, graders, water tankers, fuel tankers, and pickups for URRAP participants, and supplies like steel reinforcement, cement, roofing materials, and sanitary fixtures for IHDP participants, was crucial. However, interviewees reported that the assistance received through these capacity-building packages was

inadequate or limited in scope, which, in turn, resulted in constraints in their construction projects and the potential for significant losses.

The interviewees also raised various issues they had encountered, including delayed payment for completed work, delays in the supply of construction materials, insufficient financial assistance from the government, ineffective resolution of claims and disputes, delays in site handover, instances of corruption, and the absence of a clear monitoring and inspection framework to track progress. Furthermore, R17 and R20 reported facing post-program challenges. These difficulties included a lack of government support for post-program assistance, which was crucial as they heavily relied on government funding and job opportunities. They also mentioned their struggles in securing adequate credit from the financial sector, coping with high inflation, and dealing with inefficient supply chains for construction materials. Additionally, they noted that recent conflict events in northern Ethiopia had led to a decline in construction demand, exacerbating their challenges.

Furthermore, the interviewees emphasized the significant issue of the lack of affirmative procurement measures for public works and services. This challenge made it more difficult for them to secure contracts and compete effectively with larger firms, as most projects followed conventional bidding procedures. The cumulative impact of these challenges has severely affected businesses' ability to sustain themselves in the CI. To address these issues, governments and development programs need to provide continued support to businesses even after the completion of the program, including access to credit and affirmative procurement measures for public works and services. This will help ensure that businesses can thrive in a competitive environment and contribute to the development of the economy.

7.3.2. Findings from the Government Agencies Who Participated in the CDPs

This interview sub-section was designed to gather the perceptions of government agencies regarding the design of the CDP, its primary achievements, and the prevailing opportunities for creating sustainable SMCs. Regarding the strategy and goals of the CDPs, interviewees were asked to provide their views on the following questions: "How is the program's strategy and goal developed?" and "Do you believe that all the strategies devised adequately address the challenges faced by SMCs in the Ethiopian CI?" According to Interviewee R22,

the program's strategy is developed based on the government's national policies and priorities, with a focus on economic growth and development. The Ethiopian government underscores poverty reduction and sustainable development as essential policy areas, including a range of initiatives aimed at diminishing poverty and fostering sustainable development. These initiatives involve enhancing infrastructure, developing human resources, generating employment opportunities, and elevating the income levels of citizens. Furthermore, as per R22, the goal of the CDPs for the CI was to empower contractors and enhance their capabilities through comprehensive training and assistance, covering technical, financial, logistic, regulatory, and administrative aspects. This approach aimed to improve the overall quality of their business performance, thereby enhancing their sustainable competitiveness. R24 also shared similar perspectives, stating that the CDPs were designed to enhance competitiveness and overall performance to meet the national demand for large-scale projects, aligning with other development policies.

Regarding whether strategies are devised to thoroughly address the challenges faced by SMCs in the Ethiopian CI, interviewees expressed their deep appreciation for commendable initiatives aimed at addressing issues that could enhance competitiveness and sustainability. According to R23, Ethiopia has indeed embarked on several critical strategies to support the development of SMCs and is making efforts to boost the country's CI development. However, the practical implementation of these strategies has proven to be ineffective in addressing the challenges faced by SMCs, as most of them have struggled to survive in a competitive business environment. Contributing factors include weak institutional capacity, inadequate support structures for implementing the strategies, and deficiencies in progress tracking and monitoring at both the national and regional levels. The interviewees also noted that these strategic plans were hindered by factors such as insufficient financial resources and an underdeveloped multi-stakeholder partnership system.

R22, R23, and R24 suggested that the Ethiopian government needs to take several steps to improve the current situation and successfully implement SMCs development strategies in the future. These steps include (1) strengthening its institutional capacity and improving the support structures for implementing strategies; (2) establishing an effective monitoring and evaluation system and progress tracking; (3) strengthening multi-stakeholder involvement

in policy planning and implementation; (4) allocating sufficient financial resources for SMCs development initiatives; and (5) establish an independent organ to study the performance of SMCs and the impact of development strategies. Furthermore, the government should provide an enabling environment that encourages SMCs to participate in policy planning and implementation processes to ensure greater ownership and sustainability of initiatives.

Regarding the main achievements of the development strategies in improving the competitiveness of participating contractors, interviewees were asked to provide measurable outcomes resulting from the CDPs. In general, interviewees acknowledged that the CDPs had a positive impact on the competencies of participants, although there is still room for improvement to enhance the sustainable competencies of participating contractors and the overall Ethiopian CI. The achievements reported by interviewees included the creation of job opportunities, increased inter-sectoral linkages with other sectors of the economy, and infrastructure development, such as rural road construction and expansion, among other positive outcomes. The success of the CDPs was also evident in fostering entrepreneurship, with some participants successfully elevating their businesses from small to medium-sized or from medium-sized to large construction enterprises. However, interviewees noted a significant gap between expected and realized achievements, indicating the need for continued and better-focused development strategies.

Regarding how the programs addressed the issue of technology development, interviewees expressed that the programs aimed to tackle multiple aspects. They sought to identify and select suitable technology for SMCs operating in labor-intensive and low-skill domains. Furthermore, efforts were made to enhance entrepreneurs' technical and managerial capabilities and build SMCs' competencies, strengthen institutional mechanisms for appropriate technology development (including specialized search, assessment, transfer, absorption, adaptation, and replication), and promote an enabling environment for technology development. Concerted efforts have been directed toward areas like prefabrication and modular construction, as evidenced in condominium housing development projects utilizing precast beam and agro-stone wall systems. Similarly, labor-based technology has been applied in road construction projects. Despite these efforts,

interviewees acknowledged that there is still room for improvement in technology development and its application in certain areas.

The interviewees (R22, R23, and R24) put forward several potential measures to enhance the current situation. These measures encompass increasing investment in R&D and innovation management, with a specific emphasis on establishing technology incubation and diffusion centers for SMCs; offering incentives for industry-university collaborations in research and innovation, along with related infrastructure; promoting public-private partnerships for technology transfer; and reinforcing institutional mechanisms for technology development. This reinforcement aims to enhance the relevance and effectiveness of existing R&D institutions and centers to support MSEs. Another crucial intervention proposed by the interviewees is establishing a technology database and network. This database would store, share, and disseminate information on technological advancements. It should include comprehensive details on various technology products and services, along with their characteristics and potential applications. To further support SMCs, the government should develop a comprehensive legal and policy framework and establish an effective monitoring mechanism to oversee the implementation of related projects.

Regarding how the devised programs addressed human resource development, interviewees emphasized that human resource development was a top priority within the overall development strategy for SMCs. It aimed to enhance capacity and skills to improve operational efficiency, productivity, and competitiveness for SMCs. According to R24, the capacity-building program was comprehensive, addressing the diverse needs of SMCs, including both soft skills and technical competencies. Objectives of the program included training in entrepreneurship, basic business and financial management, equipment management, and technology transfer and diffusion, which were considered highly relevant. The program also encompassed the development of key actors critical to SMCs success, such as TVET teachers, industry facilitators, construction management consultants, architects, and other engineering firms. R22 added that the ECBP led to the development of new engineering courses, occupational standards, TVET curricula, an e-learning strategy, and models for promoting small enterprises in collaboration with GIZ.

Additionally, the capacity development program aimed to provide coaching and mentoring support to SMCs by involving university faculty in their projects.

According to R22, the programs have faced criticism for their theoretical nature and narrow focus, often falling short in adequately addressing the specific needs of SMCs. They lack necessary contextualization, a holistic approach, and comprehensive coverage, which limits their effectiveness. R23 and R24 also highlighted that the programs have not reached their full potential due to various factors, including insufficient institutional support, deficiencies in regulatory and administrative systems, high turnover of experts, absence of integrated and continuous skills and technology support, underdeveloped entrepreneurial mindsets, poor communication among stakeholders, and inadequate funding. Furthermore, the capacity development program encountered challenges related to weak coordination of activities and a lack of clear sustainability focus.

Interviewees emphasized that collecting feedback and conducting post-program evaluations are essential for identifying remaining gaps and determining whether the capacity development program achieved its desired outcomes. However, they (R20, R21, R23, and R24) pointed out that not all programs they participated in conducted regular follow-up meetings and monitoring. This lack of feedback made it difficult to assess program effectiveness. According to the interviewees, there is a need to develop and implement a more systematic approach for post-program assessment and follow-up to enhance the performance of future programs. They suggested creating a system or framework to better track, control, and measure participants' progress over time. Furthermore, they proposed establishing practical monitoring strategies to ensure that participants maintain the knowledge and skills gained through the program and to evaluate their progress over time. Another challenge highlighted by the interviewees (R22 and R23) was the inconsistency in follow-up activities. The absence of dedicated personnel to regularly follow up with program participants and measure their performance posed a significant barrier to assessing the program's impact. They argued that an effective monitoring system should be in place to ensure proper tracking and measurement of program participant performance and growth.

Regarding the assistance given, help the participant contractors gain access to work opportunities, financial assistance, construction material supply, and other resources once they exit the program. While the program helps the participants develop their business acumen and technical capabilities, it fails to provide enough guarantee to sustain these achievements once they graduate. According to the interviewees (R22 and R23), post-development assistance is generally absent or, at best, inadequate. Consequently, some program participants have struggled to maintain their businesses once they leave the program. In many cases, businesses have been unable to survive, eventually leading to bankruptcy and business closures. R23 pointed out that once the program concludes, participants are left to fend for themselves without support from program administrators. Furthermore, the lack of financial and technical guidance from program administrators, coupled with issues such as poor supply chain management and limited knowledge of the business environment, were identified as key factors contributing to the difficulties faced by many participants.

Overall, the findings underscore significant challenges and barriers encountered during the development program, which have a direct impact on its overall performance and outcomes. These challenges include inadequate capacity within government agencies, encompassing limited resources, expertise shortages, and insufficient infrastructure for program administration and support. These issues have led to resource mismanagement, delays, reduced accountability, and underutilization of industry expertise. Furthermore, a lack of coordination and collaboration among various stakeholders emerges as another major factor contributing to the challenges faced during the development program. Inadequate communication and cooperation between SMCs, government agencies, and industry stakeholders have resulted in fragmented efforts, duplicated work, and a lack of synergy. These factors have hindered the effective implementation of the program and impeded overall progress.

In addition to institutional and coordination challenges, financial constraints emerged as a significant barrier to the program's success. Limited financial support and budgetary constraints curtailed the program's capacity to provide sufficient resources and support to the participants. These constraints strained the financial stability of SMCs and their ability

to sustain and expand their businesses beyond the program's duration. Figure 7.1 summarizes the study's findings, emphasizing the key areas of concern and their impact on the program's effectiveness. Moreover, the absence of post-development assistance and ongoing support represented a critical gap in the program's implementation. Upon the program's conclusion, many participants found themselves without the necessary guidance and support to continue operating their businesses successfully. This lack of assistance led to a high rate of business closures and bankruptcies among the program participants, undermining the long-term sustainability of the program's objectives.

To tackle these challenges and enhance the effectiveness of forthcoming development programs, it is paramount to prioritize capacity building within government agencies. This involves enhancing the skills and expertise of staff, allocating sufficient resources, and establishing robust monitoring and evaluation mechanisms. Strengthening coordination and collaboration among stakeholders is also vital to ensure a unified and cohesive approach to program implementation. Moreover, addressing financial constraints can be achieved by securing adequate funding and exploring innovative financing mechanisms to provide the necessary resources for program success. Additionally, the incorporation of post-development support and mentorship programs can assist participants in sustaining their businesses and navigating challenges beyond the program's duration.

Furthermore, the lessons and experiences gained from past development programs are invaluable for policymakers and program administrators. They serve as a guide to identifying potential challenges, indicating priority areas for improvement, and mitigating future risks in similar programs. Interviewees also emphasized that these past development programs enable governments to discern what works and what doesn't, facilitating better planning and the design of future development efforts.

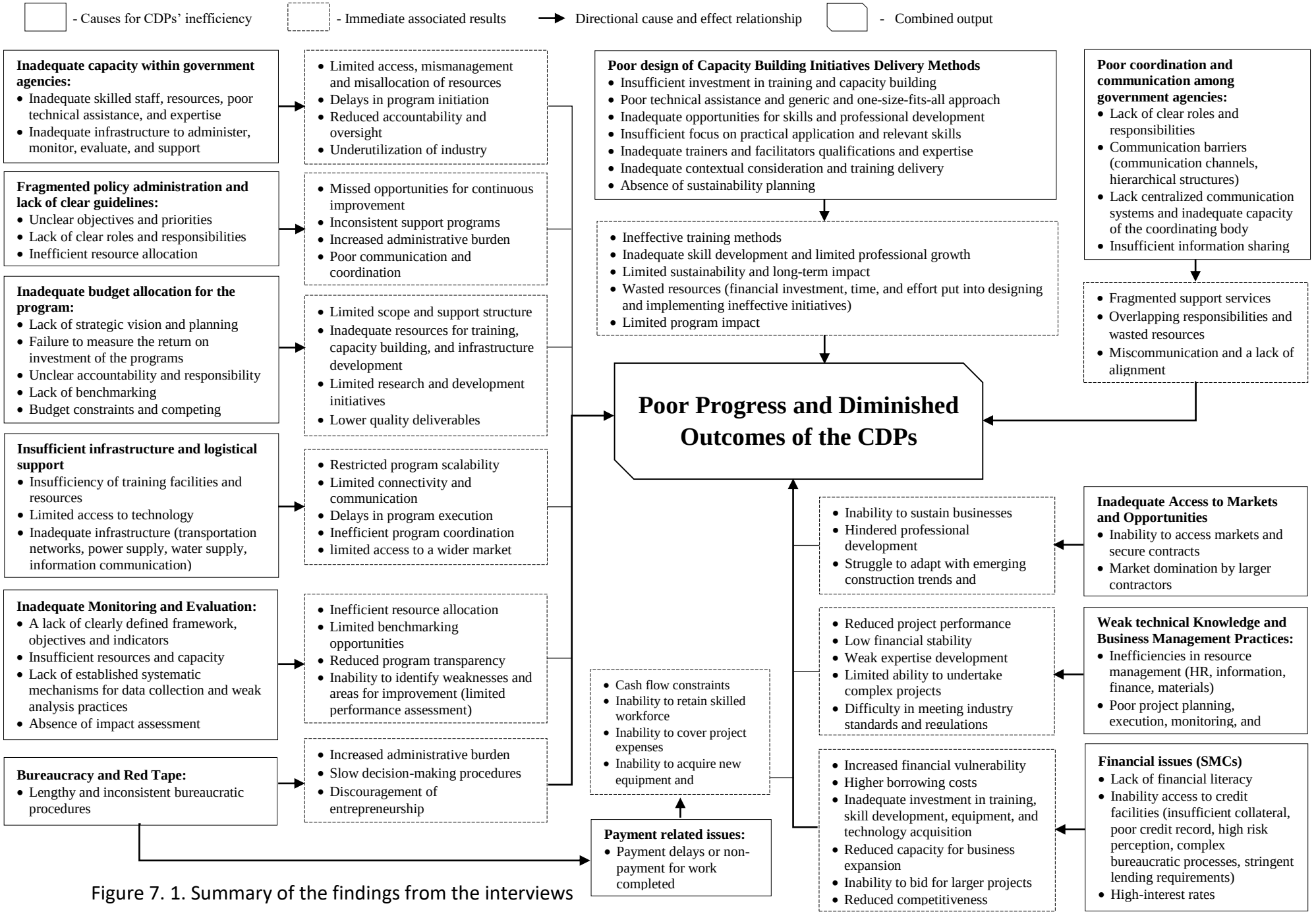

Figure 7. 1. Summary of the findings from the interviews

7.4. Chapter Summary

In many developing economies, including Ethiopia, recent research on CI development has revealed a wide range of challenges that hinder the sustainable competency of SMCs. In response to these challenges, policies and support systems have been devised to eliminate development barriers and create a conducive operating environment. The Ethiopian government, both at the federal and regional levels, has been at the forefront of designing and implementing various programs through designated agencies and organizations. The research findings indicate that the program was highly relevant and responsive to the needs of the CI. It successfully improved the entrepreneurial traits of the program participants. Furthermore, the program's approach and mode of delivery were straightforward and easy to understand, reflecting its positive outcomes. However, despite the program's distinguished success in areas such as construction materials management and site supervision, it fell short in equipping participants with knowledge in crucial areas like construction equipment and plant management, performance management, human resource management, financial management, and construction costing. Additionally, the research findings highlight significant challenges encountered during the implementation of the development program. These challenges encompassed training budget limitations, an excessive workload due to a large number of project participants, and inadequately designed training and technical support schemes.

On the other hand, post-development assistance was generally found to be absent or, at best, inadequate. Many program participants encountered significant challenges in sustaining their businesses after program completion. Some faced bankruptcy and were forced to close their businesses due to the lack of support from program administrators once the program concluded. Furthermore, the absence of financial and technical guidance from program administrators, coupled with issues such as poor supply chain management and delays, and the subpar quality of locally assembled construction equipment, were among the key factors contributing to the participants' failures. Therefore, it is imperative for the federal government, in collaboration with its regional agencies or designated regional entities, to take the following measures: strengthen its institutional capacity and improve the support structures for implementing strategies; establish an effective

monitoring and evaluation system and progress tracking and measurement of program participant performance; provide an enabling environment that encourages SMCs and other stakeholder to participate in policy planning and implementation processes to ensure greater ownership and sustainability of initiatives; allocate sufficient financial resources for SMCs development initiatives; establish an independent organ to study the performance of SMCs and the impact of development strategies; encourage collaboration between SMCs, and R&D institutions, trade and industry associations, as well as to establish inter-sectoral connections in the field of supply chain services. Furthermore, the government should facilitate access for participant contractors to work opportunities, financial assistance, sustainable supply chain management, and other resources upon their exit from the program. The following chapter of this thesis will provide a detailed evaluation of the prevailing opportunities to create sustainable SMCs and develop appropriate improvement mechanisms to exploit these opportunities in the Ethiopian CI.

CHAPTER EIGHT

PREVAILING OPPORTUNITIES AND COMPETENCY IMPROVEMENT MECHANISMS

This chapter presents the prevailing opportunities for SMCs' development in the Ethiopian CI and outlines the management mechanisms related to factors influencing the sustainable competency of SMCs.

8.1. Prevailing Opportunities for SMCs

The following sub-section evaluates the prevailing opportunities within the regulatory environment and infrastructure development. It explores how these aspects create potential areas for growth and competitiveness development for SMCs.

8.1.1. Opportunities in Regulatory Environment

The Ethiopian CI has been experiencing consistent growth in recent years due to the increasing demand for infrastructure and housing. However, this growth has been impeded by significant challenges such as poor construction quality, insufficient safety standards, and a shortage of skilled contractors and professionals. Addressing these challenges requires reinforcing the CI by enacting regulations, standards, and protocols that govern the sector. It also involves improving construction professionals, contractors, and consultants' registration, certification, and accreditation processes. Neglecting to motivate professionals, prioritizing equipment and office space over expertise, and having an outdated legal framework with inadequate law enforcement could impede the progress of the CI. Hence, through the Ministry of Urban Development and Construction (MoUDC), the Ethiopian government has proposed a comprehensive amendment to the Construction Professionals and Contractors Registration and Certification Directive to address these issues.

The MoUDC has introduced a new Construction Certification and Registration Directive, No. 648/2021, which amends the Construction Contractors and Professionals Registration Directive No. 19/2013 and the Construction Consultants Registration Guide No. 22/2019

(as per Article 5(6) of Regulation No. 439/2019), in accordance with Proclamation No. 1097/2019, Article 22. The primary objective of the new Directive is to simplify entry into the industry, reduce registration and certification costs for construction professionals, regulate the registration and licensing of construction professionals, and create a favorable environment for employers in the industry. The new Directive also seeks to promote competition, enhance regulations to encourage expertise and professionalism and ensure the participation of competent professionals, contractors, and consultants. Moreover, it eliminates administrative burdens and red tape, streamlining the process for employers to register and certify professionals. The new Directive will also recognize competent construction professionals, contractors, and consultants through registration, certification, and accreditation processes. The registration and certification process for construction contractors and professionals has been made less strict through various measures introduced by the Directive. These measures simplify the process for contractors and professionals to enter the industry. For instance, the construction contractor registration process has been altered by reducing the registration grades from 10 to 7, simplifying human resources requirements, and lowering the minimum equipment requirement for contractors. The amendments also include a new criterion of maximum annual turnover within the last five years.

Facilitating the entry of SMCs into the industry is a significant step towards increasing competition and improving the quality of construction projects delivered. The recent amendment simplifying the minimum machinery/equipment requirement is a positive development. This simplification enables more SMCs to meet the necessary registration criteria without investing in costly machinery purchases. However, it is essential to note that SMCs must still meet other necessary registration criteria, such as a maximum annual turnover within the last five years, to ensure that only financially stable and experienced contractors are involved in construction projects. This helps level the playing field within the industry and weed out inexperienced or financially unstable contractors who may compromise the quality of projects delivered. Tables 8.1 and 8.2 provide a comparison between the revised registration requirements for General Contractors (GC) and the previous requirements. The new requirements stipulate that contractors seeking registration under grades 6 and 7 can no longer provide extensive documentation to prove their

machinery ownership during registration. Under the previous regulations, contractors seeking registration under the above grades must possess essential equipment such as a dump truck, a pick-up truck, and a concrete mixer. In addition, the new requirements for medium contractor registration (grades 3 to 5) no longer necessitate the ownership of large-scale equipment, such as dozers, crushers, and concrete mixers, thereby enabling SMCs with limited resources to compete in the industry with reduced overhead costs.

Table 8. 1. Equipment requirement for GC registration (former construction certification and registration guidelines)

Item	Equipment requirement	Grades									
		1	2	3	4	5	6	7	8	9	10
1	Dozer 280 - 33 HP	4	3	1							
2	Dozer 210 - 250 HP	1	1	1	1						
3	Crane 25 T	1									
4	Chain Loader 1.25 – 1.75m3	1									
5	Wheel Loader 2- 2.5 m3	2	1	1	1						
6	Crusher 30T/hr	2	1								
7	Crusher 5-15T/hr	-	-	1	1	1					
8	Grader 100 - 120HP	2	2	1	1						
9	Excavator	1	1								
10	Sheep Foot Roller 14 - 17 T	1	1								
11	Roller 10T	4	3	1	1						
12	Dump Truck 7m3	15	10	5	3	2	1				
13	4W Drive	4	3	2	1						
14	Pick Up	3	3	2	2	1	1	1			
15	Concrete Mixer 500-750 lit.	3	2	2	1						
16	Concrete Mixer 250-500 lit.					1	1	1			
17	Dumper 1m3	2	1								

Table 8. 2. Equipment requirement for GC registration (amended construction certification and registration directive)

Item	Equipment requirement	Unit	Grades						
			1	2	3	4	5	6	7
1	Tower crane with minimum height 50m, lifting capacity min 2 ton or Telescope *mobile crane with boom extendable min up to 30 m and* lifting capacity min 5 ton	No	1						
2	Tower crane with minimum height 30m, lifting capacity min 1 ton or Telescope mobile crane with boom extendable up to 20m and lifting capacity min 5 ton	No		1					
3	Asphalt Paver paving width min 4m paving thickness min 15 cm	No	1	1					
4	Pneumatic Roller min 10 Ton	No	1	1					
5	Crusher min 60 Ton	No	1						
6	Grader min 120 HP	No	1	1	1				
7	Grader min 100 HP	No				1			
8	Excavator mini. 20 ton	No	1	1					

9	Loader min 3 m3	No	1						
10	Loader min 2m3	No			1				
11	Roller min 10 Ton (Static or vibratory)	No	1	1	1				
12	Roller min 8 ton (Static or vibratory)	No				1	1		
13	Dump truck min 10 m3	No			2	1			
14	Dump truck min 7 m3	No					1		

Regarding the human resources requirement, contractors who wish to register under GC grades 5 to 7 must now have at least one professional engineer on their staff with the necessary qualifications and experience, which is a departure from the previous registration requirements. Furthermore, medium-sized contractors (grades 3 to 5) must employ at least two graduate engineers to comply with the latest regulations. This new directive has made HR requirements more stringent, as contractors are obligated to hire professional engineers. Furthermore, the increased qualifications for professional engineers will ensure that all projects are completed to the highest standards, as these experts possess comprehensive knowledge in their respective fields and are more likely to recognize potential issues and develop timely solutions.

Table 8. 3. Human resource requirement for GC registration (former construction certification and registration guidelines)

Item	Human resource requirement	Unit	Grades									
			1	2	3	4	5	6	7	8	9	10
1	Professional Engineer IV	No	1									
2	Professional Engineer III	No		1								
3	Professional Engineer II	No			1							
4	Associate Engineer IV	No	1			1						
5	Associate Engineer III	No		1								
6	Associate Engineer II	No			1							
7	Associate Engineer I	No				1						
8	Engineering Aide III	No	1				1	1				
9	Engineering Aide II	No		1					1	1		
10	Engineering Aide I	No			1						1	
11	Graduate Engineering Aide II	No										1

Table 8. 4. Human resource requirement for GC registration (amended construction certification and registration directive)

Item	Turnover and human resource requirement	Unit	Grades						
			1	2	3	4	5	6	7
1	Yearly maximum turnover within the last five year greater than or equal to	Mill. birr	350	300	140	70	50	20	
2	Practicing professional Engineer (1 in building and 1 in road field)	No	2	2	2				
3	Professional Engineer (1 in building and 1 in road field)	No	2	2	1	1	1	1	1
4	Professional surveyor (location Engineer)	No	1	1					
5	Graduate Engineer	No	3	2	2	2	2	2	1
6	Graduate surveyor or Engineer	No			1				
7	Associate Engineer IV	No	3	2	1	1			1
8	Engineer Aid II	No	3	1	1	2	2		
9	Junior Assistant Engineer III	No					1	1	

In terms of human resource requirements, the new directive introduces higher standards for both building and road construction contractors. Under this directive, these contractors are now mandated to employ a professional engineer (specialized in civil engineering or construction technology and management) and two graduate engineers to ensure the delivery of services at the industry's highest standards. Additionally, the directive has revised the human resource requirements for grade 3 contractors, who are now required to have one engineer assistant II and one junior assistant engineer III on staff. Detailed qualifications for each role are provided in Tables 8.5, 8.6, and 8.7 below.

Table 8. 5. Human resource requirement for Building Contractors (BC) and Road Contractors (RC) registration (former construction certification and registration guidelines)

Item	Human resource requirement	Unit	Grades									
			1	2	3	4	5	6	7	8	9	10
1	Professional Engineer III	No	1	1								
2	Associate Engineer IV	No			1							
3	Associate Engineer III	No	1	1								
4	Associate Engineer II	No			1	1						
5	Engineering Aide II	No	1				1	1	1	1		
6	Engineering Aide I	No		1	1	1	1				1	
7	Graduate Engineering Aide II	No										1

Table 8. 6. Human resource and maximum turnover requirement for BC registration (amended construction certification and registration directive)

Item	Manpower and max. turnover (over a period of five years) requirement for BC registration	Unit	Grades						
			1	2	3	4	5	6	7
1	Yearly maximum turnover within the last five year greater than or equal to	Mill birr	200	150	70	40	25	10	
2	Practicing professional (Civil Engineer or CoTM fields)	No	1	1	1				
3	Professional (Civil Engineer or CoTM fields)	No	1	1	1	1	1	1	1
4	Graduate Engineer	No	3	2	2	2	2	2	1
5	Associate Engineer IV	No	1	1	1	1			
6	Junior Assistant Engineer III	No	1	1	1		1		
7	Engineer Aid II	No	2	2	1			1	1

Table 8. 7. Human resource and maximum turnover requirement for Road Contractors (RC) registration (amended construction certification and registration directive)

Item	Requirement (Turnover or Manpower or Machinery)	unit	Grades						
			1	2	3	4	5	6	7
1	Yearly maximum turnover within the last five year greater than or equal to	Mill birr	300	260	120	60	40	15	
2	Practicing professional in Road field	No	1	1	1				
3	Professional in road field	No	2	1	1	1	1	1	1
4	Material Engineer	No	1	1	1				
5	Professional surveyor (location Eng'r)	No	1	1	1				
6	Graduate Engineer	No	3	2	1	2	2	2	1
7	Associate Engineer IV	No	3	2	1				
8	Junior Assistant Engineer III	No		1	1	1	1	1	
9	Engineer Aid II	No				1	1		1
10	Graduate surveyor or Engineer	No				1			

The new directive regarding equipment requirements for BC category contractors brings significant changes. In grades 6 and 7, contractors are no longer obligated to possess specific construction equipment, simplifying the registration process. For grade 5 contractors, ownership of a dump truck with a minimum capacity of 7 m3 is now the only requirement. This change is particularly beneficial for SMCs, reducing entry barriers. Grade 3 and 4 BC contractors must have a minimum of two dump trucks with a capacity of at least 10 m3. Refer to Tables 8.8 and 8.9 for a detailed breakdown of requirements for each BC contractor grade

Table 8. 8. Equipment requirement for BC registration (former construction certification and registration guidelines)

Item	Equipment	Grades									
		1	2	3	4	5	6	7	8	9	10
1	Loader 2 – 2.5 m3	2	1	1							
2	Excavator 0.6m3	1	1								
3	Roller 10 Ton	1	1								
4	Dump truck 7m3 min	10	10	5	3	2	1				
5	Crane 25T	1									
6	Courier Truck	2									
7	Dumper	4	2	2							
8	Concrete Mixer 500-750 lit	3	2	2	1						
9	Concrete Mixer 250-500 lits.					1	1				
10	Pick-Up	4	2	2	2	1	1	1			
11	Crusher 20Ton/hr	1									
12	Crusher 10 Ton/hr	1									
13	Crusher 5-10 Ton/hr		1	1							
14	Hand Compactor	6	3	2	1	1					

Table 8. 9. Equipment requirement for BC registration (amended construction certification and registration guidelines)

Item	Requirement (Turnover or Manpower or Machinery)	Unit	Grades						
			1	2	3	4	5	6	7
1	Tower crane with minimum height 30m, lifting capacity min 1 ton or Telescope mobile crane with boom extendable up to 20m and lifting capacity min 5 ton	No	1						
2	Excavator mini. 20 ton	No	2	1					
3	Excavator mini. 15 ton	No			1				
4	Dump truck min 10 m3	No		2	2	2			
5	Dump truck min 7 m3	No					1		

Table 8. 10. Equipment requirement for RC registration (former construction certification and registration guidelines)

Item	Equipment	Grades									
		1	2	3	4	5	6	7	8	9	10
1	Dozer 280 - 330HP	3	2	1							
2	Dozer 210 - 250HP	1	1								
3	Wheel Loader 2 – 2.5m3	1									
4	Chain Loader 1.25 – 2.5m3	1	1								
5	Crusher 30T/hr	2	1	1	1						
6	Grader 100 - 130HP and above	2	1	1	1						
7	Excavator 0.6m3	1	1								
8	Sheep Foot Roller 14 – 17 T	1	1								
9	Roller 10 T	3	2	1	1						
10	Dump Truck	15	10	5	3	1					
11	4W Drive	3	2	1							
12	Pick Up	3	3	2	2						

A significant amendment in the equipment requirements for RC category contractors is that grades 3 and 4 RC contractors are no longer required to own equipment like an aggregate crusher, dump truck, four wheel drive (4WD), or pickup truck. This change significantly reduces their initial capital expenditure, making entry into this category more feasible. By lowering equipment requirements for registering contractors, SMCs gain access to previously inaccessible markets due to the high costs of equipment. This change also allows SMCs to focus more resources on their core business, giving them a competitive edge in pursuing larger contracts and more opportunities.

Table 8. 11. Equipment requirement for RC registration (amended construction certification and registration guidelines)

Item	Requirement (Turnover or Manpower or Machinery)	unit	Grades						
			1	2	3	4	5	6	7
1	Asphalt Paver paving width min 3.5m paving thickness min 15 cm	No	1	1					
2	Crusher min 60 Ton	No	1						
3	Grader min 100 HP	No	1	1	1	1			
4	Excavator min 20 ton	No	1	1					
5	Loader min 2m3	No			1				
6	Pneumatic Roller min 10 Ton	No	1						
7	Roller min 10 Ton (Static or vibratory)	No	1	1	1	1			
8	Roller min 8 ton (Static or vibratory)	No					1		
9	Dump truck min 10 m3	No					1		
10	Dump truck min7 m3	No						1	

Table 8. 12. Grades for contractor registration with their respective amount of venture they can delicate (source MoUDC, 2013 and Construction certification and Registration Directive No. 648/2021)

Grade	**Bid Ceiling Price for contractors in Mill. Birr (As per old directive)**			**Bid Ceiling Price for contractors in Mill. Birr (As per new directive)**		
	BC	**RC**	**GC**	**BC**	**RC**	**GC**
1	Above 210	Above 300	Above 350	Unlimited	Unlimited	Unlimited
2	Up to 210	Up to 300	Up to 350	Up to 750	Up to 1, 300	Up to 1, 500
3	Up to 160	Up to 225	Up to 270	Up to 350	Up to 600	Up to 700
4	Up to 110	Up to 154	Up to 185	Up to 200	Up to 300	Up to 350
5	Up to 54	Up to 76	Up to 100	Up to 100	Up to 150	Up to 180
6	Up to 27	Up to 38	Up to 45	Up to 40	Up to 60	Up to 70
7	Up to 11	Up to 15	Up to 18	Up to 20	Up to 30	Up to 40
8	Up to 5.4	Up to 7.50	Up to 9.0			
9	Up to 3.0	Up to 4.20	Up to 5.0			
10	Up to 1.0	Up to 1.50	Up to 1.8			

The registration and certification process for construction contractors and professionals has been simplified through various measures introduced by the directive to facilitate the entry of SMCs into the industry. The amendment eases the minimum machinery and equipment requirements, enabling more SMCs to meet the necessary registration criteria. This opens up new business opportunities for equipment rental service providers, allowing them to offer a wider range of equipment and machinery to meet the expanding needs of SMCs. Increased partnerships between SMCs and rental service providers will ultimately benefit the construction industry as a whole. Furthermore, the rise in collaborations between SMCs and equipment rental service providers could also result in increased tax revenue for the government. As rental service providers earn more business, they would be required to pay income tax on their profits, ultimately benefiting the government. On the other hand, the stricter human resource requirements ensure that all contractors, regardless of size, adhere to the same high standards, further benefiting the construction industry.

Other significant amendments include increasing maximum bid ceilings, granting contractors access to larger and more complex projects, thereby enabling SMCs to expand their influence in their industries. With higher bid ceilings, they can pursue larger and more challenging projects, demonstrating their capabilities on a broader scale. Additionally, SMCs can diversify their workforce by hiring professionals in diverse fields such as civil engineering, construction technology, and management. This change also allows them to compete for extensive projects by engaging various equipment and machinery rental services, as machinery and equipment are no longer limiting factors.

8.1.2. Opportunities in Infrastructure Development

Over the years, the Ethiopian government has achieved significant strides in developing its infrastructure, which has positively impacted the country's socio-economic growth. Despite these achievements, there remains a necessity for further advancement in infrastructure development to ensure sustainable growth. In pursuit of this goal, the government has made extensive investments in infrastructure development and has ambitious plans to elevate the country to a middle-income economy. These developments offer promising opportunities for SMCs to engage in infrastructure projects and contribute to the country's economic growth. The next section explores these opportunities in detail.

8.1.2.1. Investment in Transportation Sector

The Ethiopian government has formed a National Transport Council to lead the reform program in the sector. It has formulated a national logistics strategy, policy, and the transport sector's 10-year perspective plan (2020–2030). The plan includes 44 projects open for private sector investment and aims to invest $58 billion over the next decade. To this end, the government's ten-year plan aims to significantly expand the country's road network by increasing total road coverage by 101,915 km (from 144,027 km to 245,942 km), upgrading and fortifying existing federal and regional roads, expanding regular and alternating road maintenance coverage by 677,066 km (from 131,596 km to 808,662 km), and constructing new long-distance public bus stations from 690 in 2020 to 732 in 2030, increasing the number of cargo vehicle terminals from one to 23 and one-stop border posts from two to six; increasing the number of dry ports from eight to eleven; increasing urban transport infrastructure (depots, terminals, vehicle stops, and parking) from 1008 to 2106, installing a 25- km cable transport route, constructing a 925-km refined fuel pipeline, expanding train infrastructure coverage by 3,309 km (690 km to 3,999 km), and increasing the number of standardized airports from 22 to 28 are among the 44 projects to be developed and implemented over the next decade.

The plan to transform Ethiopia's transportation sector presents various opportunities for SMCs to establish themselves in the market and expand their businesses within the industry. SMCs have a crucial role in the expansion and modernization of Ethiopia's transportation sector, allowing them to capitalize on increasing market access. This can be achieved by bidding on transportation construction projects, partnering with larger companies through subcontracting or joint ventures, providing specialized services for maintaining and repairing existing infrastructure, and engaging in public-private partnerships. These opportunities will enable SMCs to actively contribute to the growth of the transportation sector and reap the benefits of this rapidly developing industry.

As a part of the government's ambitious 10-year plan, the Ministry of Transport has developed a comprehensive approach to managing the country's rural road network by implementing a rural road asset management master plan. The master plan is built on the lessons learned from the previous implementation of the URRAP and incorporates

international best practices. This plan aims to improve the condition of rural roads and increase the participation of SMCs. One of its key objectives in terms of its contribution to developing SMCs in the Ethiopian CI is to promote SMCs' participation in the maintenance and rehabilitation of rural roads. The master plan outlines several procurement strategies to promote the participation of SMCs in rural road maintenance. One such strategy is the Project Packaging Strategy, which involves breaking down large projects into smaller, more manageable packages, making it easier for SMCs to bid on and win contracts. Another strategy is the Design-Bid-Build (DBB) method, which separates the design and construction phases, allowing SMCs to bid solely on the construction aspect after the project design is completed. The Design-Build (DB) method integrates design and construction into a single contract, streamlining the process and potentially reducing costs and timelines, which can be advantageous for SMCs. Additionally, the Design-Build-Maintain (DBM) approach extends the DB method by including maintenance responsibilities, ensuring long-term project quality and providing continuous work opportunities for SMCs. Finally, the Output and Performance-Based Road Contract (OPRC) focuses on outcomes and performance standards rather than specific work activities, with contractors being paid based on achieving specific results.

The implementation of these procurement strategies aims to enhance the capacity and capabilities of SMCs, offering them valuable experience and exposure in a sector often considered a major obstacle to their success. Furthermore, to ensure that SMCs are adequately prepared to work on rural roads, the plan also includes capacity-building components such as training and mentoring programs, which can help them improve their skills and competitiveness.

8.1.2.2. Investment in Power and Energy Sector

The World Bank's (2022) development indicators report revealed that as of 2020, only 51.09% of Ethiopia's population had access to electricity, which is expected to increase by 10-14% per year until 2037. The report further indicated a substantial gap between urban and rural access to electricity, with 93.20% of urban areas having coverage compared to only 39.40% in rural areas. To address this disparity, the Ethiopian government has invested heavily in electric power generation in various parts of the country recently,

resulting in a current installed capacity of 4,965 MW. This capacity is anticipated to double with the construction of the Grand Ethiopian Renaissance Dam (GERD), which has a capacity of 6,450 MW. However, despite these efforts, the annual demand for electrical power is increasing by 30%, presenting a significant challenge to Ethiopia's goal of universal access to electricity (Schwab and Sala-i-Martin, 2014) and (Guta, 2018).

Ethiopia is one of the countries in sub-Saharan Africa. It has numerous rivers, lakes, and ample water resources, constituting 20% of Africa's total technically feasible potential. However, despite this significant potential, Ethiopia has utilized less than 10% of its available resources, as reported by Hailu and Kumsa, 2021. Eight of Ethiopia's eleven major river basins have been identified as having great potential for hydroelectric power production. Approximately 300 sites for hydropower plants have been identified in these eight river basins, with a technical power potential of 159,300 GWh per year. Of these potential sites, 34% can produce more than 60 MW, while the remaining 66% can produce less than 40 MW, as Desalegn and Tangl (2022) reported.

While Ethiopia is located near the equator, its wind resource potential is limited. Nevertheless, a few promising windy areas in Ethiopia are situated alongside the main East African rift valley, in the northeastern and eastern parts of the country (EREDPC and SNV, 2008). Despite this energy system's tremendous potential, wind farm development is in its early stages in Ethiopia. Similarly, Ethiopia has an estimated theoretical potential of solar PV of 5.2 kWh/m2/day (vary seasonally, from 4.55-5.55 kWh/m2/day) (GTZ, (2007) and (Mondal et al., 2018). Even though abundant solar energy resources are available in the country, less than 1% of solar PV has been used (Asres, 2021). According to Khan and Singh (2017) and Kruger et al. (2019), Ethiopia has an estimated geothermal resource potential of 5 GW, with 700 MW suitable for electric power generation in the Rift Valley area. To date, only one 7.5 MW geothermal power plant has been utilized.

The Ministry of Water and Energy in Ethiopia has reported that the country has economically viable potential to generate 45 gig watts (GW) of hydropower, 1,350 GW of wind power, 5.2 GW of photovoltaic energy, and 7 GW of geothermal energy (Derbew, 2013; Hailu and Kumsa, 2021). The Ethiopian government plans to invest $40 billion over

the next decade in the development of 71 new renewable energy projects, including 16 hydroelectric projects, 24 wind projects, 14 solar projects, and 17 geothermal projects (according to REGlobal's Views 2021 report). The development of the energy sector is expected to create job opportunities and contribute to the economic growth of Ethiopia. One of the main opportunities in the power supply sector is the increasing demand for new and improved power supply infrastructure. The Ethiopian government has emphasized investing in energy projects to develop the country's power supply infrastructure, including hydroelectric dams, wind farms, and solar power plants. SMCs can seize this opportunity by bidding on contracts for power supply construction projects.

There is an opportunity for SMCs to participate in developing specialized power supply infrastructure, including micro-grids and energy storage systems. These systems require specialized construction techniques and equipment and are typically more complex and expensive to build than traditional infrastructure. However, SMCs can still participate in these projects by partnering with larger companies or bidding on contracts for specialized construction services, such as electrical substations and transmission lines. Additionally, SMCs could focus on constructing power supply and energy infrastructure for rural areas, which is critical for connecting remote areas to urban centers and aligns with Ethiopia's development strategy.

8.1.2.3. Investment in Housing Development Sector

Ethiopia is the second most populous country in Africa, after Nigeria. It is home to 1.51% of the world's population, ranking it 12th globally. According to the United Nations population estimates and projections, as of 2022, Ethiopia's population is estimated to be 123.38 million, an increase of 2.57% compared to 120.28 million in 2021. If the country continues to grow at this rate, its population is expected to double in the next 30 years, reaching 210 million by 2060.

According to the World Bank development indicator, Ethiopia's urban population, as a percentage of the total population, was reported at 22.17% (25.59 million) in 2021. The number of people living in urban areas has doubled over the last decade, growing from 7.89 million in 1995 to 15.18 million in 2010, representing 17% of the total population.

This figure is expected to increase to 21.5 million by 2021, and the urban population is growing at an average rate of 4.3%, almost twice as fast as the overall population growth in urban areas. The rapid increase in population has led to the expansion of urban centers, resulting in a chronic housing shortage. Specifically, the capital city of Addis Ababa faces a housing backlog of about 1.2 million units, with a projected demand for 655,800 housing units from 2015 to 2025. Unfortunately, the estimated annual housing supply of approximately 165,000 unit nationwide falls far short of this demand. To address the ever-increasing demand for housing, the Ethiopian government has undertaken an ambitious project to construct affordable condominiums using public investment through its IHDP (Integrated Housing Development Program).

The IHDP condominium scheme is currently the dominant government-initiated housing program in urban Ethiopia. As of 2020, the government, through the IHDP, has built 400,000 condominium units, indicating a significant supply gap. In an effort to increase homeownership opportunities, the government of Ethiopia, through its Ministry of Urban Development and Construction (MoUDC), has set a plan to complete the construction of 4.4 million houses across the country over the next 10-year development master plan. Private sector engagement is also being sought to help achieve this target, with the expectation that the private sector will contribute to 80% of the housing supply. The overall economic growth, demographics, the long history of unmet housing demand, and the expansion of infrastructure development in Ethiopia represent important opportunities for SMCs to become more involved in the construction sector.

Another opportunity in the housing sector is the growing demand for high-end residential properties. As the economy continues to grow and the middle class expands, there is an increasing demand for luxury housing in urban areas. SMCs can tap into this market by specializing in high-end residential construction and offering unique and upscale designs and amenities. Additionally, the growth of the tourism industry in Ethiopia presents an opportunity for SMCs to construct and develop tourist-related housing projects. This can include the construction of hotels, resorts, and vacation rentals. Such projects provide them with a consistent source of income as well as an opportunity to gain experience working on large-scale construction projects. To make the most of these opportunities, SMCs must

ensure they have the resources and expertise to complete such projects. Furthermore, the government must implement necessary reforms to address any deficits in the capacity and capability of SMCs, simplify the ease of doing business, and create a more favorable environment for SMCs to operate in.

The Construction Certification and Registration Directive No. 648/2021 has been reviewed and found to offer several benefits to the CI in Ethiopia. These benefits include simplifying entry into the industry, reducing registration and certification costs, promoting competition, expertise, and professionalism, and ultimately leading to a more dynamic and competitive industry. Furthermore, the government's infrastructure development plan presents a significant opportunity for Small and Medium-sized Construction Companies (SMCs) in the CI to thrive and develop their competencies. Hence, it is crucial to recognize the pivotal role of SMCs in this process and prioritize supporting and enabling them to contribute efficiently.

The previous chapters addressed factors influencing SMCs' competence and evaluated the effectiveness of development programs. These analysis were closely examined to identify areas requiring improvement within the Ethiopian CI. Furthermore, there are significant growth prospects in this sector for establishing sustainable SMCs. In light of this, the following sub-section outlines mechanisms aimed at enhancing the sustainable competitiveness of SMCs. These mechanisms include revaluing entrepreneurial features, improving institutional capacity and the operating environment, advancing construction technology and innovation, establishing sustainable construction material supply chains, and enhancing human resource development. Under the revaluing of the entrepreneurial features of the firm, all endogenic factors were assessed, highlighting their significance as key areas for improvement. Similarly, exogenic factors such as government policies, regulatory frameworks, industry networks, and industry culture were assessed within the context of enhancing institutional capability and the operating environment. Dimensions such as construction technology development and innovation, sustainable construction material supply chains, and human resource development were identified as vital components for enhancing the performance of SMCs.

8.2. Competency Improvement Mechanisms

Data were collected through questionnaires and interviews, employing both quantitative and qualitative approaches. Subsequently, the gathered data underwent analysis to examine the presumed core factors affecting sustainable competency. These factors include the reassessment of entrepreneurial characteristics within the firm, the enhancement of institutional capabilities and the operating environment, developments in construction technology and innovation, sustainable material supply chain management, and human resource development. The quantitative datasets underwent reliability and validity testing. Their results were utilized to test the research hypotheses established in Chapter Three and validate the conceptual framework. The theoretical literature from Chapter Two provided support for the findings of each question. Results from the analysis of each presumed factor were briefly discussed, and inferences were drawn accordingly. Various statistical methods, such as descriptive statistics, one-sample t-tests, factor analyses, and correlation analyses, were employed to analyze the datasets. Table 8.13 presents the results of the Kaiser-Meyer-Olkin test for sampling adequacy, Bartlett's test for data suitability, and Cronbach's alpha for data reliability.

Table 8. 13. Test for appropriateness of data

Sources of Variables	*Alpha (α) value*	*KMO*	*Bartlett's Test of Sphericity*	*No. of Items*
Revaluing entrepreneurial features of the firm	0.819	0.821	Significant	13
Enhancing institutional capability and operating environment	0.889	0.876	Significant	24
Construction technology development and innovation	0.871	0.863	Significant	10
Sustainable construction material supply chain management	0.811	0.809	Significant	10
Human resource development	0.787	0.775	Significant	7

8.2.1. Findings from Questionnaire Survey

8.2.1.1. Revaluing Entrepreneurial Features of the Firm

This sub-section outlines a comprehensive approach to enhance the entrepreneurial characteristics of firms. Table 8.14 presents the findings, revealing the top three management mechanisms for enhancing sustainable competency: the practice of project

planning, scheduling, and performance tracking; improving organizational structure and culture; and improving contract management practices. The one-sample T-test confirmed the significance of all variables in this category, supporting the sustainable competency of SMCs in the Ethiopian CI. Consequently, the null hypothesis is rejected, as the p-value is less than the chosen significance level. Additionally, effective risk management and proper financial management practices, along with improvements in communication management practices, exhibited the highest standard deviation. This suggests variations in respondents' perceptions.

Table 8. 14. Analysis result of variables emanating from Revaluing Entrepreneurial Features of the Firm

Revaluing entrepreneurial features of the firm	Mean	Rank	S.D.	T-test Sign.
Improving organizational structure and culture	3.70	2	.980	.000
Adoption of decision support system, avoiding intuition and personal judgment for decision-making	3.29	11	.913	.000
Effective risk management and proper financial management practices	3.51	4	1.018	.000
Effective working interactions, goal alignment and reliance	3.42	7	.986	.000
Practice of project planning, scheduling and performance tracking	4.02	1	.953	.000
Improving contract management practice	3.58	3	.986	.000
Improving documentation and information management	3.34	10	.934	.000
Strategic workforce planning, smart hiring, and enhanced retention	3.25	12	.909	.000
Improving communication management practice	3.37	8	1.015	.000
Enhance corporate leadership, commitment and decision making capacity	3.36	9	.943	.000
Well defined appropriate structures and operating models	3.44	6	.993	.000
Defined appropriate structures and operating models within the firm	3.22	13	.931	.002
Align the organizational design with individual capabilities, roles, accountabilities and collaboration	3.50	5	.999	.000

FA was conducted to extract the thirteen significant items within this category. As summarized in Table 8.15 below, the analysis resulted in four components, explaining 63.37% of cumulative variance. Upon analyzing the items within each component, they were labeled as follows: Component 1, *"Enhanced entrepreneurial traits;"* Component 2, *"Contract management and workforce planning;"* Component 3, *"Enhanced leadership and defined operating models;"* and Component 4, *"Organizational design."*

Table 8.15. Factor analysis result of variables emanating from Revaluing Entrepreneurial Features of the Firm

Revaluing entrepreneurial features of the firm	Factor Analysis			
	C1	C2	C3	C4
Improving organizational structure and culture	.834			
Adoption of decision support system, avoiding intuition and personal judgment for decision-making;	.812			
Effective risk management and proper financial management practices	.755			
Effective working interactions, goal alignment and reliance	.730			
Practice of project planning, scheduling and performance tracking	.624			
Improving contract management practice		.773		
Improving documentation and information management		.749		
Strategic workforce planning, smart hiring, and enhanced retention		.742		
Improving communication management practice		.697		
Enhance corporate leadership, commitment and decision making capacity			.825	
Well defined appropriate structures and operating models			.786	
Defined appropriate structures and operating models within the firm			.738	
Align the organizational design with individual capabilities, roles, accountabilities and collaboration				.946
Factor Score	3.59	3.39	3.34	3.50
Initial Eigenvalues	4.26	1.76	1.47	1.10
Variance %	32.76	13.50	11.28	7.84
Cumulative Variance %				63.37

Entrepreneurial traits are often considered the most significant factors influencing the growth, performance, and competitiveness of most SMCs. Being an entrepreneur requires a crucial set of abilities. Some of these abilities are innate, while others can be learned or enhanced through consistent practice. Westhead et al. (2004) have proposed that enterprise managers should possess a broad skill set, including essential management skills in finance, human resources, law, and communication. Additionally, personal qualities such as persistence, leadership, commitment, and decision-making capacity are vital for running a successful firm. Effective project management skills, encompassing planning, scheduling, and performance tracking (Mengistu and Mahesh, 2020), are also crucial for a firm's success. Another key variable in this category is organizational structure. An improved structure not only enhances the decision-making process but also boosts employee performance and provides a solid foundation for effective planning (Meijaard et al., 2005). Therefore, understanding the qualities essential for entrepreneurs and enhancing these qualities can significantly improve the competency of SMCs.

Contract management involves multiple contracts and parties, making it a complex process. Therefore, improving contract management practices, such as communication management, documentation, and information management, directly impacts the competitiveness of SMCs. This finding aligns with previous studies by Chilipunde and Shakantu (2010) and Kulemeka et al. (2015). Similarly, strategic workforce planning, intelligent hiring, and enhanced retention strategies assist in aligning workforce capabilities with the requirements of the work. These practices involve identifying competencies, assessing current staffing levels, and forecasting future hiring needs, which is crucial for SMCs with limited resources. Conversely, the chosen organizational structure significantly influences an organization's ability to execute its strategy and achieve its objectives. It affects various aspects of decision-making processes and communication channels. Aligning the organizational structure with individual capabilities, roles, accountabilities, and collaboration is essential for achieving optimal performance.

Enhanced leadership and well-defined operating models, along with effective organizational design, are pivotal components for competency development in SMCs. Entrepreneurs and managers within SMCs must possess the skills and competencies necessary to drive growth and innovation. This requires a profound understanding of the organization's values, vision, and objectives. Moreover, a clearly defined operating model assists them in streamlining processes, identifying areas for improvement, and optimizing performance, thereby enhancing their competitive edge in the marketplace. On the other hand, effective organizational design, characterized by aligning individual capabilities, roles, accountabilities, and fostering collaboration, is equally critical for SMCs. This alignment enables SMCs to synchronize their resources, systems, and processes with their strategic goals, enhancing agility and adaptability. These attributes allow SMCs to respond swiftly to market changes and capitalize on emerging opportunities.

8.2.1.2. Enhancing Institutional Capability and Operating Environment

Table 8.16 below summarizes the data output for twenty-four questionnaire variables. The top four most effectively used management mechanisms are: introduction of sector-specific financing programs; develop financial institutions' capacity and establish new financial institutions; introduce affirmative procurement and incentive mechanisms; and promote

traditional financing mechanisms, innovative financial systems, and alternative sources of funding. The results of the one-sample t-test indicate that all variables, except for "economic liberalization" and "development of appropriate training and mentorship services," are significant, regardless of their rank.

Table 8. 156. Variables emanating from Enhancing Institutional Capability and Operating Environment

Enhancing institutional capability and operating environment	Mean	Rank	Std. Dev.	T-test Sign.
Promote traditional financing mechanisms; innovative financial systems and alternative sources of funding	3.67	3	0.920	0.000
Establishment of a government agency accountable for studying and promoting the industry	3.33	19	0.890	0.001
Develop financial institutions' capacity and establish new financial institutions	3.59	5	0.925	0.000
Introduction of sector specific financing programs	4.07	1	0.933	0.000
Simplify business registration and licensing procedures	3.28	22	0.898	0.008
Conducive contractor development programs and institutional support	3.37	17	0.921	0.000
Development of appropriate training and mentorship services	3.16	23	0.916	0.399
Improved and simplified procedures for assessing finance	3.54	7	0.965	0.000
Promote outsourcing of works for subcontractors	3.50	10	0.995	0.000
Promote alternative project delivery system	3.46	13	0.853	0.000
Strengthen professional institutions and trade associations	3.39	15	0.905	0.000
Developed construction ethics and professionalism	3.38	16	0.958	0.000
Harmonized regulatory frameworks	3.57	6	1.004	0.000
Develop appropriate construction regulations, standards and codes	3.48	11	0.791	0.000
Continuous contractor registration, grading and performance assessment	3.35	18	0.886	0.000
Introduce affirmative procurement and incentive mechanisms	3.51	9	0.820	0.000
Flexibility of govt. attitudes in modifying regulations, procurement system and contract conditions with less bureaucracy and administration process	3.53	8	1.028	0.000
Employ innovative and corruption-resilient procurement environment	3.47	12	0.954	0.000
Attention to best practice and use of industry benchmarking	3.30	21	1.031	0.011
Effective claim management and dispute resolution methods	3.39	14	0.846	0.000
Develop integrated market system and value chain as a focus	3.31	20	0.911	0.002
Strengthen government capacity to coordinate, track, monitor and evaluate the effective implementation of policies and development frameworks	3.84	2	0.912	0.000
Economic liberalization	3.05	24	0.970	0.453
Promote contract splitting	3.60	4	1.183	0.000

As shown in Table 8.17 for this category, FA results revealed four components explaining a cumulative variance of 74.38%. These components are named: Component 1, *"Enhanced operating environment and sustainable financial supply,"* Component 2, *"Sustainable procurement system, enhanced regulatory tools and professionalism,"* Component 3,

"Adaptive governance and appropriate regulatory resources," and Component 4, *"Regulatory capacity development, value chain integration, and efficient claim resolution."*

Table 8. 167. Factor analysis result of variables emanating from Enhancing Institutional Capability and Operating Environment

FA on Enhancing institutional capability and operating environment	Factor Analysis			
	C1	C2	C3	C4
Promote traditional financing mechanisms; innovative financial systems & alternative sources of funding	.886			
Introduction of sector specific financing programs	.878			
Develop financial institutions' capacity and establish new financial institutions	.875			
Establishment of a government agency accountable for studying and promoting the industry	.864			
Simplify business registration and licensing procedures	.851			
Conducive contractor development programs and institutional support	.848			
Improved and simplified procedures for assessing finance		.848		
Promote alternative project delivery system		.838		
Promote outsourcing of works for subcontractors		.838		
Strengthen professional institutions and trade associations		.834		
Developed construction ethics and professionalism		.823		
Harmonized regulatory frameworks		.803		
Develop appropriate construction regulations, standards and codes			.857	
Continuous contractor registration, grading and performance assessment			.850	
Introduce affirmative procurement & incentive mechanisms			.833	
Flexibility of government attitudes in modifying regulations, procurement system and contract conditions with less bureaucracy and administration process			.818	
Employ innovative and corruption-resilient procurement environment			.816	
Attention to best practice and use of industry benchmarking			.799	
Develop integrated market system and value chain as a focus				.892
Effective claim management and dispute resolution methods				.887
Strengthen government capacity to coordinate, track, monitor and evaluate the effective implementation of policies and development frameworks				.878
Promote contract splitting				.867
Factor Score	3.59	3.47	3.49	3.38
Initial Eigenvalues	6.55	3.73	3.21	2.87
Variance %	29.79	16.95	14.60	13.04
Cumulative Variance %				74.38

Enhancing the regulatory environment is key to creating a more conducive business environment for SMCs. Simplifying business registration and licensing procedures and

removing unnecessary regulations can reduce administrative costs for SMCs. Furthermore, improving the quality of development programs is essential for providing more effective services and technical assistance to SMCs. This can be achieved by establishing an independent institution to study, coordinate, promote, and provide guidance to CDPs, ensuring that the design and implementation of development programs align properly with the needs of SMCs. Such an institution can also promote professionalism and accountability among CI stakeholders and provide effective contractor development programs and institutional support. Another critical area for improvement is access to financing for SMCs. These businesses often struggle to access finance, hindering their sustainability. Implementing sector-specific financing programs, simplifying procedures for assessing finance, and promoting traditional financing mechanisms, innovative financial systems, and alternative funding sources can help address this issue. The government should also consider implementing policies that reduce the financial burden for SMCs, such as tax exemptions, reduced interest rates on loans, and lower deposit and collateral requirements.

Sustainable procurement systems are a crucial aspect of the CI, as they help ensure the effective utilization and management of resources. Governments should explore ways to enhance procurement systems to encourage the participation of SMCs in the procurement process. This can be achieved by introducing more flexible systems, affirmative procurement measures, and incentive mechanisms. Moreover, considering alternative project delivery systems and implementing transparent, corruption-free procurement practices can further facilitate the involvement of SMCs in procurement.

Enhancing regulatory tools is crucial for creating a more business-friendly environment for SMCs. This can be achieved by harmonizing regulatory frameworks and reducing bureaucratic and administrative processes. Governments should ensure that regulations are transparent, predictable, consistent, and enforced fairly and impartially. Professionalism is another critical aspect of the CI that must be improved to promote the success of SMCs. It involves adhering to high standards, codes of ethics, and safety regulations. Through enhanced professionalism, SMCs can demonstrate their competency in the CI and better understand contractual agreements, employment laws, ethical business practices, and other

regulations, providing a solid foundation for their success. The government should provide resources and training to SMCs to ensure they have the knowledge and skills necessary for professionalism in the CI.

Adaptive governance and appropriate regulatory resources are crucial components in developing and implementing effective regulations for the CI. Adaptive governance refers to the ability of the governance system to respond to the changing needs of the CI and its surrounding environment. The CI is in a constant state of evolution, with new technologies, materials, and methods emerging regularly. Therefore, the governance system must be flexible and adaptable to accommodate these changes, ensuring that regulations remain updated and relevant to the current situation. To achieve this, governing bodies need to have the appropriate regulatory resources at their disposal, enabling them to: develop appropriate construction regulations, standards, and codes; maintain continuous contractor registration, grading, and performance assessment; introduce affirmative procurement and incentive mechanisms; demonstrate flexibility in modifying regulations, systems, and contract conditions with less bureaucracy and administration process; and employ an innovative and corruption-resilient procurement environment. It is also crucial for the government to ensure that its governance system is adaptive, has the capacity to respond to the changing needs of the CI, and possesses an appropriate regulatory resource base.

Regulatory capacity development, value chain integration, and efficient claim resolution are critical components for the development of SMCs. A well-functioning regulatory system that effectively coordinates, monitors, and evaluates policy implementation creates a favorable environment for SMCs to operate and grow. Value chain integration enables SMCs to maximize efficiency, reduce costs, and improve satisfaction, thereby increasing competitiveness and profitability. Additionally, efficient claim resolution helps resolve disputes in a timely and cost-effective manner, maintains stability and predictability in the business environment, and contributes to growth and sustainability.

8.2.1.3. Construction Technology Development and Innovation

The analysis findings regarding construction technology development and innovation are presented in Table 8.18. The top three most effective management mechanisms identified are technology domestication and incubation services; R&D on locally suitable

technologies; and building absorptive capacity for existing technologies. The one-sample t-test further confirms the significance of the variables mentioned in this category in contributing to the sustainable competency development of Ethiopian SMCs.

Table 8. 18. Analysis result of variables emanating from Construction Technology Development and Innovation

Construction technology development and innovation	Mean	Rank	S.D	T-test
				Sign.
Promote the purchase of technical and advisory services on technologies	3.22	9	.874	.001
Appropriate labour-intensive techniques and management approaches	3.30	8	.933	.000
Promote indigenous knowledge and skills	3.40	6	.954	.000
Strategic use of construction information technology	3.34	7	.898	.000
Smart and life-cycle-optimizing equipment	3.21	10	.945	.004
R&D on locally suitable technologies	3.88	2	.902	.000
Foster innovation and diffusion of affordable technology	3.59	5	.842	.000
Technology domestication and incubation services	3.92	1	.910	.000
Build absorptive capacity for already existing technologies	3.73	3	.882	.000
Formulation and updating of regulations and standards for technologies and best practices	3.69	4	.923	.000

FA has resulted in two components with a cumulative variance of 69.12%. After analyzing the variables included in each component, they are named Component 1, *"Enhanced technology management"* and Component 2, *"Conducive technology transfer environment and capacity development."*

Table 8. 179. Factor analysis result of variables emanating from Construction Technology Development and Innovation

Construction technology development and innovation	Factor Analysis	
	C_1	C_2
Promote the purchase of technical and advisory services on technologies	.866	
Appropriate labour-intensive techniques and management approaches	.847	
Promote indigenous knowledge and skills	.845	
Strategic use of construction information technology	.835	
Smart and life-cycle-optimizing equipment	.739	
R&D on locally suitable technologies		.846
Foster innovation and diffusion of affordable technology		.839
Technology domestication and incubation services		.807
Build absorptive capacity for already existing technologies		.787
Formulation and updating of regulations and standards for technologies and best practices		.761
Factor Score	3.29	3.76
Initial Eigenvalues	4.63	2.28
Variance %	46.34	22.78
Cumulative Variance%		69.12

Construction technology development generally involves applying various types of technologies related to capital-saving technology, labor-intensive technology, alternate technology, indigenous technology, and adaptive technology (Sianipar et al., 2013). It also encompasses medium-level construction techniques and the upgrading of conventional technologies. The selection and adoption of such technologies should be based on their easy availability and cost-effectiveness. The application of appropriate labor-intensive techniques and management approaches, strategic use of construction information technology for scanning and selecting effective technologies, and the promotion of indigenous knowledge and skills all play a role in determining SMCs' growth and sustainability.

The Ethiopian MoCUD, including its regulatory bodies, should foster innovation and the diffusion of affordable technology. They should strongly facilitate technology domestication and incubation services, build absorptive capacity for existing technologies, and conduct research and development on locally suitable technologies. The government should also work continuously to improve and update regulations and standards.

8.2.1.4. Sustainable Construction Material Supply Chain

This section examined the effects of a sustainable construction material supply chain on the competency of SMCs in the Ethiopian CI. As Table 8.20 indicates, the top three most effective management mechanisms are encouraging local construction material producers and developing their capacity, promoting local material manufacturers and suppliers, and developing, adapting, or exploring hybrid techniques and tools (i.e., modern with the traditional). One-sample T-test results also show that the variables in this category are significant, suggesting that the aforementioned factors substantially impact the competence of SMCs.

Table 8. 20. Analysis result of variables emanating from Sustainable Construction Material Supply Chain

Sustainable construction material supply chain	Combined Mean	Rank	Std. Dev.	T-test Sign.
Development, adaptation or exploration of hybrid techniques and tools (i.e. modern with the traditional)	3.55	4	1.000	.000
Promotion of local material suppliers	3.63	2	.993	.000
Infrastructure development for quality assessment	3.55	4	.941	.000
Research and development on local materials	3.56	3	1.032	.000
Revision of codes, procedures and documents on construction materials	3.38	6	.916	.000
Protection- discouraging imports of construction materials	3.07	10	.983	.022
Standardization of local construction materials and quality guidelines	3.19	9	1.063	.021
Adoption of appropriate technologies	3.29	7	.718	.000
Education and training on local materials	3.27	8	.868	.000
Encourage local construction material producers and develop their capacity	4.14	1	.871	.000

The FA extracted the ten items indicated under this category. As shown in Table 8.21, the extraction resulted in three components with a cumulative variance of 71.29%. After analyzing the components included in each dimension, they are named Component 1, *"Sustainable construction material supply chain and promotion of material suppliers,"* Component 2, *"Standardized operating procedures and discouraging imports,"* and Component 3, *"Adoption of appropriate technologies and capacity development."*

Table 8. 218. Factor analysis result of variables emanating from Sustainable Construction Material Supply Chain

Sustainable construction material supply chain	Factor Analysis		
	C_1	C_2	C_3
Development, adaptation or exploration of hybrid techniques and tools (i.e. modern with the traditional)	.880		
Promotion of local material suppliers	.864		
Infrastructure development for quality assessment	.860		
Research and development on local materials	.853		
Revision of codes, procedures and documents on construction materials		.846	
Protection- discouraging imports of construction materials		.831	
Standardization of local construction materials and quality guidelines		.804	
Adoption of appropriate technologies			.821
Education and training on local materials			.811
Encourage local construction material producers and develop their capacity			.517
Factor Score	3.21	3.57	3.21
Initial Eigenvalues	3.89	1.82	1.41
Variance %	38.94	18.23	14.11
Cumulative Variance %			71.29

Sustainable construction material supply chain is a comprehensive study of durable and cost-effective materials and technologies. It involves enhancing the properties of materials, standardizing local construction materials and quality guidelines, and developing and adapting hybrid techniques and tools for valued applications in the industry. Additionally, it includes promoting and improving the capacity of local material manufacturers and suppliers. Sustainable construction material supply chain can enhance the competencies of SMCs and their competitiveness in the industry. While there has been significant interest in developing mechanisms for the growth and capacity development of SMCs in Ethiopian CI, less attention has been given to sustainable material development. Therefore, collaboration between MoCUD and its implementing organs is essential.

Similarly, adopting appropriate technologies could achieve sustainable competency improvements for SMCs in the CI. SMCs should be assisted with advisory services on 'strategic' technologies, improved access to information technology, and investment capital to acquire those technologies. Loans and tax incentives could also be offered to acquire such technologies, increasing productivity and efficiency.

8.2.1.5. Human Resource Development

This section considered the influence of HR development on the sustainable competency of SMCs. The aggregate mean score value revealed that encourage industry-based education systems; structured training and enhanced institutional support; and reviewing and revising registration and licensing systems of industry professionals were ranked as the top three most effective management mechanisms. Furthermore, the one-sample T-test result indicates that the sustainability of the SMCs in Ethiopian CI significantly depends on the variables stated under HR development. Details of the results are indicated in Table 8.22 below.

Table 8. 192. Analysis result of variables emanating from HR development

Human resource development	Combined Mean	Rank	Std. Dev.	T-test Sign.	Factor Analysis C1	C2
Promotion of and grants for R&D	3.36	6	0.835	0.000	.721	
Reviewing and revising registration and licensing system of industry professionals	3.46	3	0.953	0.000	.706	
Encourage industry based education system	4.10	1	0.911	0.000	.704	
Procure basic skills of management and continuous profession development	3.45	4	0.929	0.000	.689	
Create, encourage and promote self-development opportunities	3.30	7	0.836	0.002	.623	
Structured training and enhanced institutional support	3.56	2	0.803	0.000		.842
Promote mentor system (main contractor/subcontractor)	3.40	5	0.762	0.000		.817
				Factor Score	3.53	3.48
				Initial Eigenvalues	3.142	1.065
				Variance %	44.89	15.22
				Cumulative Variance %		60.11

FA was also performed to extract seven items indicated under this category. As shown in Table 8.22, it has resulted in two components with a cumulative variance of 60.11%. After analyzing the components included in each component, they are named Component 1, *"HR development and performance appraisal,"* and Component 2, "*Structured training and mentor system."*

One of the key components of the CI's development is HR, and its effective development requires the aggregate effort of all industry stakeholders (Mengistu and Mahesh, 2022). Accessing the needed HR and performance appraisals ensures sustainable development. Thus, as a significant shareholder, the government (i.e., the Ethiopian Project Management Institute and the Ethiopian Construction Works Regulatory Authority) should appropriately train, sustainably fund, and enhance its regulatory and developmental agencies; periodically review and revise the registration and licensing system; and encourage R&D. The other primary variable is encourage an industry-based education system under this factor. The higher education sectors (i.e., universities and TVET centers) have a vital role in delivering a well-rounded qualification that provides graduates with a clear grasp of what is required for a job in construction. However, evidence suggests that this is not the case in every instance. According to a study (Mengistu and Mahesh, 2018), higher education

systems fail to provide the essential knowledge that the industry requires. Many graduates are unprepared for the workplace and have little understanding of how the business operates in practice, making it difficult to find a balance between academics and skill development. As a result, higher education should create a market-demanding and industry-based education system to remain a crucial link in the CI's education supply chain.

8.2.1.6. Relative importance of the factors

The range of the component score, from highest to lowest, serves as a measure of the component's importance to overall preference. The higher the component loading, the more important it is considered, indicating the most crucial priority area. Through factor analysis, fifteen components were identified from five sources. The top results from their respective core sources, with respect to each factor score, were identified as follows: enhanced entrepreneurial traits and improved organizational structures (3.59); improved operating environment and sustainable financial supply (3.59); conducive technology transfer environment and capacity development (3.76); standardized operating procedures and discouraging imports (3.57) and human resource development and performance appraisal (3.53).

8.2.1.7. Correlations Analysis

The conducted correlation analysis showed a positive correlation among the management mechanisms. The correlation between "construction technology development and innovation" and "sustainable construction material supply chain" yielded a correlation coefficient of 0.704, indicating a strong positive correlation between the categories of mechanisms. Similarly, as institutional capability and operating environment enhancement improve, the sustainable construction material supply chain; human resource development and construction technology development and innovation in the industry also improves. Further enhancing institutional capability and operating environment has significant correlation with revaluing entrepreneurial features of the firm and hence, it can be concluded that there is a positive and significant relationship among the variables of management mechanisms.

Table 8. 23. Correlation matrix among the management mechanisms

	Revaluing entrepreneurial features of the firm	Enhancing institutional capability and operating environment	Construction technology development and innovation	Sustainable construction material supply chain	Human resource development
Revaluing entrepreneurial features of the firm	1				
Enhancing institutional capability and operating environment	.616**	1			
Construction technology development and innovation	.515**	.632**	1		
Sustainable construction material supply chain	.519**	.653**	.704**	1	
Human resource development	.590**	.611**	.576**	.591**	1

** Correlation is significant at the 0.01 Level (2-Tailed)

* Correlation is significant at the 0.05 Level (2-Tailed)

8.2.2. Findings from Interviews

Previous discussions in chapters 5 and 6 reveal a need for improvement in the factors that impact the sustainable competency of SMCs. This chapter seeks to address this need by presenting improvement mechanisms that can facilitate the sustainable competency of SMCs. This chapter suggests methods for improving these factors that can help SMCs develop sustainable competencies. This interview section will discuss and expand upon the improvement mechanisms mentioned earlier in the chapter.

8.2.2.1. Revaluing Entrepreneurial Features of the Firm

It is crucial to focus on the entrepreneurial features of firms, as the value of organizational development is contingent on its ability to survive, adapt, create value, transform, and overcome its competitors in its competitive environment to make sustainable development. Thus, revaluing the entrepreneurial features of firms is a key determinant of the firm's competitiveness in the long run and crucial to their sustainability and competitiveness. Interviewees outlined the aspects that needed to be revalued as potential entrepreneurial features of a firm, including organizational design, strategic management, resource management, and project management.

Concerning revaluating the organizational structure, interviewee R7 emphasized the significance of having a well-defined and persuasive organizational design. The clarity of the structure, where roles and responsibilities are explicitly defined and allocated throughout the company; flexibility, enabling easy modifications to roles and responsibilities; and effectiveness, ensuring the structure aligns with the firm's overall mission, are crucial factors in enabling companies to tackle obstacles that may impact their performance. According to R7, as the organizational size of small enterprises has limited resources, including human resources, it is crucial to have a well-defined and compelling organizational design that clearly allocates employees and job responsibilities.

On the other hand, medium-sized enterprises possess more resources than small-sized enterprises, and they need to create a practical, flexible, and sustainable structure to handle dynamic competitive pressures and meet future challenges. Furthermore, as suggested by R7, entrepreneurs and managers should implement performance development systems like training programs, motivational strategies, coaching sessions, and on-the-job training to optimize the knowledge and skills of their employees, which will ultimately contribute significantly to securing the future success of small businesses.

Ramachandran et al. (2006) assert that "strategic management" pertains to how organizations can achieve sustainable competitive advantages, resulting in maximum long-term benefits. Its importance lies in providing an overall direction to the enterprise, including defining its objectives, devising long-term policies and plans to attain those objectives, and assigning resources to execute those strategies. Hence, the interviewees R4, R6, and R10 agreed with Ramachandran et al.'s notion of strategic management and highlighted it as an area that requires attention and reevaluation since it has the potential to enhance the competitiveness of SMCs. According to R10, strategic management is often overlooked, particularly by small-sized enterprises, and even when it is practiced, it tends to be informal, unorganized, and irregular, with insufficient and ineffective information, often obtained through informal sources, and reactive instead of proactive. Furthermore, even though SMCs' owners/managers may engage in strategic thinking, it is seldom formalized due to time, money, knowledge, information, training, education, and skills constraints. As a result, they struggle to position themselves strategically and adhere to

traditional business practices or risk falling behind their competitors. This lack of strategic positioning is a significant factor in SMEs' failure to take advantage of opportunities offered by the business environment.

R4 emphasized the significance of having clear and appropriate structures and operating systems, as well as innovative and well-planned organizational policies that facilitate and promote the growth of SMCs. This view also corroborates with the literature, where an understanding of the importance of strategic management systems for SMEs' development is stressed by authors like (Bacon and Hine, 2001; Stonehouse and Pemberton, 2002; Wang et al., 2007; Mansingh, 2008; Baporikar, 2015; Abosede et al., 2016; Haleem et al., 2019; Gavurova et al., 2020). Other important attributes identified in the interview include resource management. The challenges associated with resource management were stated in chapters 2 and 6 of the research, and it was anticipated that these challenges could affect the sustainability of SMEs' competencies. However, the interviewees' experiences revealed that revaluing the resource management practices could effectively address these challenges and improve SMCs' overall performance. R7 considers resource management as a crucial factor that can drive the sustainable growth of a business. In the interview, R7 provided several potential approaches to enhance the capability of resource management, including developing the ability to plan and execute resource management policies, identifying appropriate means to manage limited resources for a variety of types of activities in all stages of the project life cycle; review, evaluate, monitor, and measure actual results against an existing plan to identify areas needing improvement; address threats, identify opportunities, and manage resources to accomplish the mission and meet competency requirements; benchmark best resources optimization practices; and perceive resource management as a key driver in the achievement of sustainable business growth.

The importance of project management is also stressed as a key driver for sustainable competence in SMCs. R9 emphasizes the crucial functions of project management, which involve evaluating, handling, and optimizing resources, reducing risks and obstacles to ensure timely project completion, attaining organizational goals, clarifying priorities, advancing projects toward strategic objectives, and enhancing team efficiency, effectiveness, and accountability. Confirming R9's observation, another interviewee, R7,

highlighted the critical roles of project management. It ensures that organizational values and priorities are integrated into all project activities, and organizational capabilities are utilized to benefit the project and its stakeholders' best interest. R7 emphasized that success in project management cannot be achieved through shortcuts. Instead, it requires strict adherence to a project management strategy, prioritizing tasks to ensure timely project completion, and planning resource allocation based on availability.

In general, the interviewees emphasized the importance of revaluing the entrepreneurial features of firms to ensure sustainable competitiveness. This includes reevaluating aspects such as organizational design, strategic management, resource management, and project management. These factors play critical roles in driving sustainable business growth and ensuring SMEs' competencies.

8.2.2.2. Enhancing Institutional Capability and Operating Environment

The central theme of this interview section focused on ways to enhance institutional capacity and create a favorable operating environment for businesses that facilitates the sustainable competency of SMCs.

8.2.2.2.1. Enhancing Institutional Capability

Enhancing the capacity of financial institutions: Respondents mentioned that one of the most crucial challenges SMCs face is access to financial resources. R10 stated the inability of financial institutions to reach out to SMCs and make available a sufficient amount of the credit and funding they needed, stringent prequalification requirements and procedures for accessing credit, and a lack of lending interest in SMCs by financial institutions due to their low credit ratings and eligibility criteria, among other obstacles that are hindering access to credit from financial institutions. R10 recommended the establishment of specialized and exclusively devoted financial institutions for the CI that will provide credit and loan facilities with flexible lending terms and more significant credit eligibility criteria to facilitate SMCs financing needs. Other developing countries, like Nigeria and South Africa, have created successful financial institutions in the CI, and there are valuable experiences and lessons to be gained from them.

Interviewee R10 suggested measures to boost lending to SMEs. These measures include the development of specialized regulations for SMCs in the financial sector, providing incentives for banks to lend to SMCs, enhancing the recognition of SMCs as creditworthy customers by financial institutions, and implementing a more flexible credit system for entrepreneurs. He also recommended that banks and other financial institutions increase their ability to offer financial services, explore new funding options like debt financing, and customize lending services.

Enhancing procurement systems: Improving procurement systems involves a continuous and collaborative effort by a group of individuals to implement procedures that reduce uncertainty and thereby improve their achievement of desired ends. R3 stated that the government is expected to establish a favorable procurement environment as a major client and regulator in Ethiopia's CI. The government must change the procurement system and contract terms to reduce bureaucracy and administrative burden. Excessive red tape and bureaucracy can create challenges for SMCs to operate efficiently and survive in the CI. Public institutions must proactively innovate in improving procurement systems to enhance efficiency and effectiveness. Further, R3 highlighted conducting a procurement policy impact assessment is also crucial to identify any negative effects and restructure the procurement system accordingly.

Another suggestion provided by interviewee R4 is the introduction of affirmative procurement systems, which are particularly designed to encourage SMCs to participate in the system. This would encourage SMCs to participate in bid preparation, tender submission, tender evaluation, and project awarding, ultimately increasing their overall participation in the procurement system. There is an opportunity to learn from South Africa's successful procurement practices, specifically in their use of affirmative procurement systems such as targeted procurement, Growth, Empowerment, and Redistribution (GEAR), and Broad-Based Black Economic Empowerment (BBBEE), which have yielded significant results. Studies have shown that affirmative procurement systems effectively promote the participation and inclusion of SMCs in various business practices. To successfully implement affirmative procurement systems with SMEs,

procurement planning policies must prioritize inclusive growth, increased participation, and inclusive development, providing SMCs access to opportunities.

Regarding the promotion of alternative project delivery systems, respondent R2 emphasized their importance in strengthening SMCs' participation. According to him, these systems are necessary as they improve project management, reduce operating costs, and offer flexibility with fewer rigid contractual requirements. R2 highlighted that these systems are less risky than traditional project delivery methods, making SMCs more efficient and competitive when they adapt.

Most interviewees agreed that the supply chain management in the Ethiopian CI is inefficient, leading to the impairment of crucial supply chain activities despite the high demand for construction infrastructure. According to R2, this is because the CI in Ethiopia is still in its early stages of development and lacks the necessary tools and framework for effective supply chain management.

The interviewees (R2, R4, and R7) recommend implementing a comprehensive solution for the Ethiopian CI. They propose enhancing the current marketing system, value chains, supply structures, and interfaces between supply chain nodes. R2 also suggests developing a flexible and well-designed system with appropriate functionality, performance metrics, monitoring, and integration support for the Ethiopian CI's current and future industry channels. Another area for improvement is regulatory management and facilitation. Minimum requirements for the registration and licensing of firms have been substantially reduced to facilitate easier entry and upgrading of firms in the construction register (details will be discussed in the opportunities section). According to R4, this amendment demonstrates the regulatory authority's commitment to promoting proper market entry, licensing, and upgrading of firms in the Ethiopian CI. R4 also emphasizes the importance of clear and specific registration and licensing rules and regulations to ensure a smooth and efficient process for firms. Without clear guidelines, confusion and ambiguity may arise, leading to delays or corruption. Therefore, a transparent and well-defined regulatory framework is crucial to facilitate the registration and licensing process for construction firms. This will encourage more firms to enter the market, increasing competition,

innovation, and ultimately benefiting the industry. While the amended directives are in effect, regulatory interpretation and administrative capabilities have not been fully developed. Therefore, it is essential for the government to make dedicated efforts to enhance the capacity of regulators and allocate the necessary resources to ensure their compliance with the amendments and eliminate remaining inefficiencies. Additionally, initiatives should be undertaken to address other regulatory obstacles, creating a more conducive, practical, effective, and coherent regulatory environment to achieve sustainability goals for SMCs.

R&D institutions are expected to play a significant role in generating substantial technological advances and providing policymakers with crucial information necessary for informed decisions, which is considered vital for Ethiopia's economy as a whole. However, according to R4, these institutions have been unable to meet these expectations due to their limited resources and capacity. R4 attributes this to a lack of financial resources, inadequate infrastructure, and a shortage of qualified personnel. R1, R2, R7, and R9 have suggested that the government should provide the necessary resources, including financial assistance and infrastructure, and create specialized training programs to enhance the skills and knowledge of researchers and staff. They also emphasize the importance of fostering cooperation between R&D institutions and industry players to ensure that technological innovations align with market requirements. This collaboration will not only make the research relevant to Ethiopia's economic and developmental aspirations but also contribute to its success.

In improving the capabilities of R&D institutes, R1 and R2 proposed creating a national research and development strategy that would prioritize research areas and ensure progress toward specific goals. Innovation centers, developed in partnership with universities and research institutions, would also function as incubators for start-ups by providing resources, mentorship, and access to funding. Additionally, R7 highlighted the significance of investing in research infrastructure such as laboratories, equipment, and facilities, enabling researchers to conduct advanced research and attract more skilled researchers. Last but not least, R9 further suggested establishing an evaluation system to assess the

impact of research conducted by R&D institutes and making necessary adjustments to align with the country's economic and developmental goals.

8.2.2.2.2. Enhancing Operating Environment

The operating environment, in its complete form, is a business environment in which SMCs perform a multitude of functions. The challenges emanating from the operating business environment in their total form were discussed in chapters 2 and 6 of this report. Interviewees were asked to express their perceptions about enhancing the business environment. Accordingly, a number of synchronized responses were collected from the interviewees. R2, R3, R5, and R8 provided feedback on four critical areas to improve the operating environment for SMCs in Ethiopia. These areas include promoting ethical practices and professionalism (establishing a corruption-resistant business environment, and maintaining mutual trust among all parties involved in the economy), enhancing information exchange and communication systems. By enhancing ethical standards, businesses can operate fairly and compete ethically. Improving communication systems can facilitate access to vital information, such as market trends and regulatory updates. Preventing bribery and other corrupt practices through a corruption-resilient business environment is crucial in promoting the growth and success of SMEs. Maintaining mutual trust can also establish a stable and predictable business environment essential for SMCs to thrive. These recommendations emphasize the importance of creating a favorable business environment for SMCs in Ethiopia by addressing challenges in the operating environment, implementing measures to improve communication, and preventing corruption. The findings from the interview also corroborated with (Vee and Skitmore (2003); Rahman et al. (2007); Van Klinken and Aspinall (2010); Hamzah et al. (2010); Ibrahim et al. (2018); Loosemore et al. (2021); Kuoribo et al. (2022) findings.

8.2.2.3. Construction Technology Development and Innovation

Interviewees revealed the importance of construction technology development and innovation for the sustainable competency development of SMCs. The interviewees' perceptions also indicate their agreement with the listed management mechanisms if they are properly implemented. During the interviews, various technologies were discussed,

including the promotion of labor-based and labor-intensive technology, the utilization of information and communication technology (ICT) to enhance project management processes, and the adoption of technology domestication and incubation, which involves transferring technology to the small and medium enterprise sector.

Regarding the promotion of labor-based and labor-intensive technologies, the interviewees emphasized the importance of promoting these technologies for the sustainable development of SMEs. They believed that adopting such technologies would improve the cost-effectiveness of SMEs, increase domestic demand, and generate more job opportunities, leading to enhanced competitiveness. Implementing these technologies is also linked to the project area's environmental, socioeconomic, and sustainability aspects. According to R13, there have been some successful initiatives in road sector development, such as URRAP, where labor-based and labor-intensive technologies were promoted to facilitate SMCs development. However, these technologies have yet to be widely adopted, and there is a need for better coordination among various government agencies. Hence, R13 suggested that training and effective implementation of labor-based and labor-intensive technologies are essential for SMCs to reap the benefits of this technology. According to R13, effective implementation and training of labor-based and labor-intensive technologies are crucial. R13 also acknowledges that these technologies must be promoted more effectively, and better collaboration among stakeholders such as federal and regional road agencies, donor agencies, financial institutions, and R&D institutes is essential to achieve sustainable results. R7 agrees that there is still room for improvement in implementing labor-based and labor-intensive technology, emphasizing the importance of stakeholder collaboration to achieve better results. He suggests taking inspiration from other developing countries, like Ghana, Nigeria, and Kenya, which have successfully implemented these technologies in similar fields and using their experiences to establish common standards, create a better policy framework, and formulate appropriate strategies for implementing these technologies.

In today's CI, the integration of information and communication technology (ICT) is vital for SMCs seeking to establish sustainable businesses (Osisioma, 2009). Concerning this topic, R7 stated that the application of ICT in construction practices in Ethiopia is still in

the developmental stage and that there is a need to explore how these technologies can be utilized in the CI. R7 identified SMEs' lack of awareness regarding the importance of ICT in construction practices, limited knowledge of ICT, poor management and decision-making skills, and limited access to ICT as major concerns affecting SMEs' ability to incorporate ICT into their competitiveness in the CI. The interviewee also highlighted that the government's inability to stimulate SMEs' use of ICT, inadequate infrastructure availability and connectivity, and limited policy mandates in ICT are critical issues facing the government and SMCs in Ethiopia. Hence, R7 suggested that the government must demonstrate a strong commitment by incentivizing the use of ICT in construction practices and enforcing policies that stimulate SMCs' development and adoption of ICT applications to enhance their competitiveness in the CI. Further, the government should provide political, legal, and economic support to address these concerns.

The transfer of technology is another crucial area for improvement to ensure the sustainability of SMCs. The interviewee acknowledged the government's efforts to support technology transfer and integrate new technologies into business operations through several policy measures. These measures include signing MOUs for technology transfer, providing training with foreign construction firms undertaking megaprojects, conducting R&D on construction materials and methods, and providing technical and operational support for major construction projects. These measures aim to assist SMCs to become sustainable. However, according to R6, local construction firms, including SMCs, have not achieved satisfactory results in implementing these measures due to inadequate policy implementation and institutional capability, insufficient planning, organization, and monitoring constraints, and inadequate logistics and human resources, among other factors that hinder the benefits of technology transfer. R1, R4, R9, and R13 offered suggestions on how to tackle technology transfer challenges. One solution is to enhance policymakers' and regulators' capacity by providing them with training and continuous upgrading programs. Another approach is to strengthen coordination among stakeholders, such as academic institutions, research institutions, governmental bodies, and other industry players, to enhance the effectiveness and quality of technology transfer. Additionally, improving the infrastructure for technology transfer would reduce its cost and increase its speed.

8.2.2.4. Sustainable Construction Material Supply Chain

Research in the field of the supply chain in the CI has identified sustainable construction material supply chains as important areas that can enhance the competitiveness and performance of SMCs (Thakkar et al., 2008; Naipinit et al., 2014; Hamisi, 2021; Tukamuhabwa et al., 2021). However, according to the interviewee, SMCs in the Ethiopian CI face a significant challenge due to an inadequate supply chain of local construction materials. The sector relies heavily on imports from overseas markets. In addition, SMCs face issues with the lack of standardization and certification practices, multiple regulatory barriers and procedures, and other related concerns. The interviewees suggested exploring research and development on local construction materials, standardization and certification, effective supply chain management, and regulatory reforms to enable the proper use of locally available construction materials as potential solutions to these challenges.

The interviewees agreed on the importance of conducting research and development on local construction materials. R10 suggested that universities and research centers should expand their scope beyond academic research and contribute to developing materials suitable for local use, including production techniques and guidelines on construction techniques. Further, R10 emphasized the crucial role of stakeholders in funding R&D to support the success of local construction material development, leading to a sustainable future for SMCs. Similarly, the interviewees also emphasized the importance of standardization and certification practices for local construction materials. R2 pointed out that the absence of standardization hinders the adoption of local construction materials, as it creates doubts about their quality and reliability. Therefore, it is crucial to develop national standards and certification processes for locally produced construction materials, which would help to build trust and enhance the confidence of stakeholders. In addition to that, R5 highlighted the importance of appropriate supply chain management, including logistics and transportation, inventory management, and supplier development. According to R5, SMCs need to develop strong relationships with upstream and downstream suppliers to ensure timely and cost-effective delivery of construction materials. The interviewees highlighted that developing and promoting local construction materials and appropriate

supply chain management practices are crucial to enhancing SMEs' competitiveness and performance in the Ethiopian CI. Furthermore, interviewees recommended that the government undertake policy measures and regulatory reforms to properly utilize locally available construction materials. This could involve revising current standards, codes, rules, and regulations and seeking technical expertise from stakeholders at various levels. Additionally, R13 suggested the introduction of incentives such as tax exemptions or rebates to promote SMCs' use of local construction materials.

8.2.2.5. Human Resource Development

Developing human resources in the CI is crucial as it ensures that the workforce can deliver quality work within the set timelines and standards. This, in turn, enhances the firm's competitiveness over its competitors in the industry. Research studies by Rodrigues, 2000; Neyestani, 2014; Ameh and Daniel, 2017 have highlighted the significance of effective human resource development in the CI for increased productivity and efficiency. Due to its growth and increasing complexity, the CI has been experiencing a surge in demand for competent, reliable, and relevant human resources. The availability of human resources, whether skilled, semi-skilled, or unskilled, is a critical factor in the development of any country's CI and serves as an indicator of the industry's domestic capacity. The shortage of skilled labor in the CI is a major challenge, especially as the industry's complexity continues to grow. While unskilled labor is the most abundant resource, the demand for specialized and skilled labor is increasing, necessitating the development of effective human resource strategies. Achieving and maintaining effective human resource development in the CI has been a significant area of interest (Sargent, 2018), as it is essential to ensure a workforce that is capable of increasing productivity, completing projects on time, and with required efficiency, all of which contribute to a firm's competitive advantage. Addressing the shortage of skilled labor in the CI is crucial for the industry's growth and development.

When discussing the matter in relation to Ethiopia, the interviewees were asked for their thoughts on the topic and suggestions for improvement. R5 and R9 noted that the Ethiopian CI is facing a significant shortage of skilled and experienced personnel, which is essential for its successful growth. Despite an overabundance of lower-level construction workers

and laborers, the lack of qualified staff remains a persistent issue. R6 pointed out that the Ethiopian construction sector faces significant challenges in terms of capacity and implementation. Most registered construction firms, including SMCs, rely heavily on outsourcing manpower to handle routine tasks. As a result, skills training and expertise retention in the industry have been severely impacted, with construction workers frequently moving in and out of the industry based on performance in other sectors of the economy. Additionally, R6 reported that labor input into construction work in Ethiopia is only around 40%, while the output is approximately 55%, significantly lower than the global average. This suggests a considerable underutilization of manpower in the CI, which is unsustainable given the growing demand for skilled personnel and the expanding construction sector. To address these issues, interviewees suggested several areas for improvement, including strengthening professional associations, enhancing the education and training systems, and improving the licensing system.

In terms of enhancing human resource development in the Ethiopian CI, interviewees suggested the importance of strengthening professional associations. R4 emphasized that professional associations are crucial in providing technical services such as capacity building, skills development, and human resource training. R6 also highlighted the role of the government in supporting these associations to increase their effectiveness in promoting human resource development. Providing support for professional associations can play a significant role in improving human resource development and enhancing the skills of personnel in the industry. In addition to strengthening professional associations, improving higher education and training institutions was also suggested to enhance human resource development in the Ethiopian CI. Interviewees highlighted the importance of equipping educational and training institutions with practical training and hands-on experience. R9 stressed that solely acquiring theoretical knowledge from higher education is inadequate to meet the industry's demands, and academic qualifications should be complemented with practical skills. Specialized training centers and vocational schools can also play a role in bridging the skills gap. R5 noted a disparity between the skills and knowledge graduates of higher education and training institutions are expected to possess and their actual competencies in practical settings. While higher education and training

institutions emphasize theoretical knowledge, practical skills and competencies are often overlooked, presenting an opportunity for improvement.

The interviewee noted the urgent need for broad-based reforms in higher education and training systems. Some of the reform areas, according to R5, include improving educators' intellectual power and professional competence; creating conducive environments for advancement to postgraduate study; creating favorable environments for work-oriented training and an industry-based education system; and providing career guidance and counseling services for those about to enter the workforce. Further, R5 suggested establishing an independent government entity responsible for studying the CI's educational and training needs and supporting vocational guidance and training institutions. The importance of revising higher education and training institutions' curricula to align with the requirements of the construction sector was also stressed by R7. Further, R7 suggested the importance of developing and strengthening mechanisms for evaluating and auditing educational institutions and curricula to ensure compliance with sustainability principles, which is essential for increased accountability in higher education and training. This suggestion corroborates the suggestions made by Aniekwu and Ozochi, 2010; Ofori and Toor, 2012; Mengistu and Mahesh, 2019.

8.3. Chapter Summary

The study investigated management mechanisms that are crucial for the sustenance of SMCs, emanating from five core sources. The results of the study identified the major improvement mechanisms emanating from their respective sources as the practice of project planning, scheduling, and performance tracking; the introduction of sector-specific financing programs from enhancing institutional capability and operating environment; technology domestication and incubation services; encourage local construction material producers and develop their capacity; and encourage an industry-based education system. Similarly, fifteen components were identified through FA of five core sources. As a prominent stakeholder and industry regulator, the government should assist SMCs with advisory services on "strategic" technologies, improved access to information technology, and investment capital to acquire those technologies. It should continuously improve and

update codes, regulations, and standards; conduct periodic reviews of professional registration and licensing systems; monitor and support sustainable and cost-effective construction materials and technology development; and develop strategies to address potential problems. Efforts and priorities should also be made to facilitate human resources development, promote R&D, and establish a harmonized regulatory and institutional framework. Higher education sectors also play a vital role by delivering a well-rounded qualification that provides graduates with a clear grasp of what is required for a job in construction. Similarly, SMCs should enhance their organizational design to assemble creative, flexible, and productive teams that can capitalize on business opportunities.

CHAPTER NINE

FRAMEWORK FOR SUSTAINABLE COMPETENCY IMPROVEMENT FOR SMCs

9.1. Introduction

This chapter introduces a framework aimed at improving the sustainable competitiveness of SMCs. These frameworks include revaluing the entrepreneurial aspects of the firm, enhancing institutional capability and the operating environment, fostering construction technology development and innovation, establishing sustainable construction material supply chains, and investing in human resource development. They aim to provide a roadmap for enhancing the sustainable competitiveness of SMCs. Furthermore, the section explores the responsibilities of various industry stakeholders in promoting sustainable competency within SMCs.

9.2. Framework for Revaluing Entrepreneurial Features of the Firm

Entrepreneurial features of firms play a key role in developing the sustainable competency of SMCs. Therefore, it is important to revalue these features to enhance competitiveness and thrive in the long run. The findings from interviews and questionnaires reveal that revaluing the entrepreneurial characteristics of a firm is a multifaceted process that requires a holistic approach. This comprehensive approach involves modifying the overall strategy, which includes restructuring the organizational structure and culture to enable more agile and transparent decision-making, ensuring effective communication throughout all levels of the organization, and optimizing resource utilization. Furthermore, it enables SMCs to address potential threats and challenges, better identify and capitalize on new opportunities, and adapt to changing business environments.

Creating an environment where employees are motivated to take initiative and innovate, while ensuring that the organization's values and goals remain at the forefront and aligned with its position, requires effective leadership and clear delegation of responsibilities (Ugoani, 2020; Faulks, 2021). Additionally, the survey findings identified key areas for

improvement in revaluing the entrepreneurial features of SMCs. These areas encompass initiatives for employee training and development, the enhancement of risk management strategies, improved performance management systems, and the implementation of monitoring systems to track the performance of SMCs. Based on the survey findings, SMCs' entrepreneurial characteristics could be improved through adequate training and staff development opportunities, a willingness to take risks, adaptability to changing market conditions, a focus on innovation and growth, as well as better risk management approaches and performance management systems. In addition, policymakers and industry stakeholders can play a critical role in promoting a supportive environment for SMCs' development by removing barriers and promoting fair competition.

The proposed framework for revaluing the firm's entrepreneurial features in Figure 9.1 presents a comprehensive solution to improving SMCs' entrepreneurial capabilities. It outlines a potential pathway for creating an environment that nurtures the growth and development of small and medium-sized contractors. External macro- and micro-level competency drivers play a vital role in determining the sustainability of competency in a competitive business environment. The macro-level drivers include legal and regulatory requirements, the socio-cultural environment, government policies and procedures, technology and innovation, the economic landscape, and R&D, education, and training. These macro-level drivers shape the overall business environment and significantly impact organizational operations. On the other hand, micro-level drivers encompass market structure and competition, industry stakeholders, and market trends. These factors directly influence an organization's internal operations, strategic decisions, and overall capability. To maintain a competitive advantage and achieve success in the business arena, it is imperative for SMCs to thoroughly understand the impacts and implications of both macro and micro drivers on their business activities. This understanding enables them to adapt and navigate the external environment effectively.

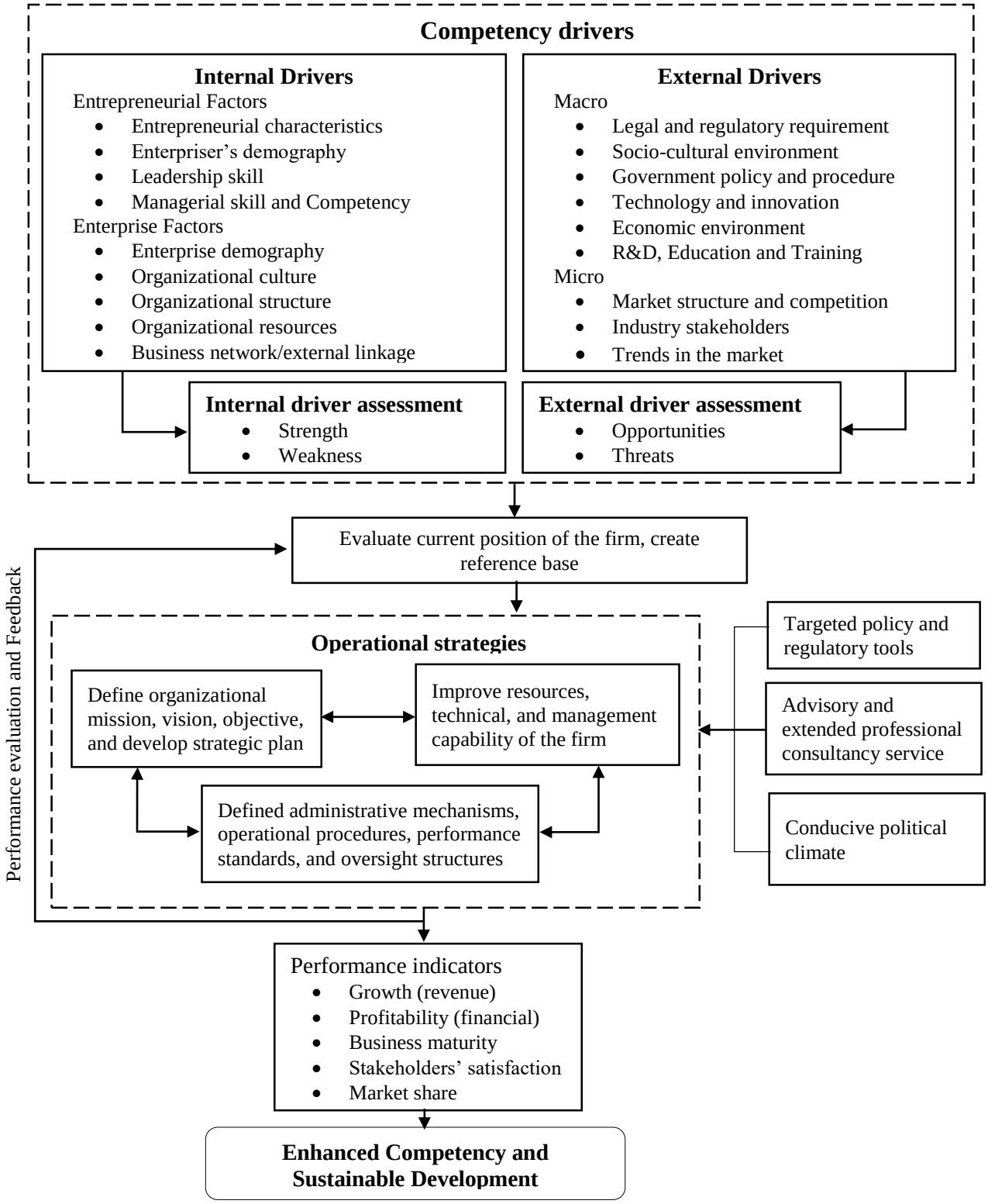

Figure 9. 1. Framework for Revaluing Entrepreneurial Features of the Firm

9.3. Framework for Enhancing Institutional Capability and Operating Environment

9.3.1. Improving Institutional Capability

Improving the institutional capability of government agencies in regulating the CI ensures effective and efficient oversight. With this improved oversight, government agencies can develop the expertise and resources necessary to create a favorable business environment that promotes the sustainable competency of SMCs in the CI. Achieving this goal may involve institutional restructuring and reforms, capacity building and development, and enhancing institutional resources. Implementing these reforms and initiatives ensures that government agencies acquire a deeper understanding of the CI and gain insights into the requirements of SMCs.

Institutional restructuring and reforms are key strategies for improving the institutional capability and effectiveness of government regulatory agencies. Such restructuring may involve introducing new structures and/or changes to the agency's policies, processes, and procedures. Examples of such changes include modifying the organizational structure and reporting lines, decentralizing decision-making authority between the federal and regional levels, adjusting the roles, responsibilities, and accountability of government agencies, formalizing and standardizing administrative procedures, and implementing better governance systems to ensure sustainable and effective operations of regulatory agencies. Other potential reform measures may involve enhancing monitoring and control systems, increasing transparency and accountability, and establishing a comprehensive legal and regulatory framework to facilitate the successful implementation of these reforms and changes.

Institutional capacity building and development are crucial approaches to enhancing the capability of regulatory agencies. It involves equipping them with the knowledge, skills, and competencies required to carry out their functions effectively. Such activities may include improving the capacity to formulate, implement, assess, monitor, and evaluate policy outcomes, strategic frameworks, and regulatory impacts. Capacity building and

development programs should be customized to meet the specific needs of each regulatory agency and provide staff with the necessary technical expertise to perform their duties effectively.

In the regulatory environment of the CI, the development of institutional resources is another vital capability that regulatory agencies must acquire to perform their duties effectively. These capabilities may include human resources, infrastructure, technology, innovation, and information resources. Providing regulatory institutions with sufficient resources can help create a more conducive, effective, and efficient business environment that enables them to carry out their mandate more efficiently. Therefore, investing in institutional resources, capacity building, and development programs is essential to enhance the effectiveness of regulatory agencies and promote sustainable development in the CI.

9.3.2. Improving the Operating Environment

SMCs play a vital role in the CI; however, they frequently encounter substantial challenges when operating in a competitive environment. Establishing a more conducive operating environment for them can enhance their sustainability, ultimately benefiting the entire CI. To attain this goal, several crucial areas necessitate improvement, including:

Improve the regulatory environment: Enhancing the regulatory environment is crucial for creating a more business-friendly setting for SMCs. This can be achieved by harmonizing regulatory frameworks, reducing bureaucratic and administrative processes, and improving professional and business registration and licensing procedures. Furthermore, governments should ensure that regulations are transparent, predictable, consistent, and enforced fairly and impartially.

Improve procurement systems: SMCs are often disadvantaged in traditional procurement systems, as they may lack the resources and experience to compete with larger firms. Governments should consider ways to improve procurement systems and promote the participation of SMCs in the procurement process. This can be achieved by introducing systems that provide more flexibility, affirmative procurement mechanisms, and incentive

structures. Furthermore, alternative project delivery systems and transparent, corruption-free procurement processes can also help SMCs participate in procurement effectively.

Improve supply chain management: Supply chain management is a critical aspect of the CI, as it affects the flow of resources and ultimately impacts the success of SMCs. Improving supply chain management can lead to better market systems and supply chain structures, as well as improved capacity for supply chain stakeholders to manage, monitor, and facilitate the flow of resources. By doing so, the CI can become more efficient and effective, ultimately leading to success for SMCs.

Improve the access to finance: SMCs often face difficulties accessing finance, hindering their sustainable competency. These issues can be improved by implementing sector-specific financing programs, simplifying procedures for assessing finance, and promoting traditional financing mechanisms, innovative financial systems, and alternative funding sources. Moreover, the government should also implement policies that reduce the financial burden for SMCs, such as tax exemptions, reduced interest rates on loans, and lower deposit and collateral requirements.

Improve the quality of the development programs: The quality of development programs should be enhanced to provide more effective services and technical assistance for SMCs. This can be achieved by establishing an independent institution to study, coordinate, promote, and provide guidance to CDPs. This ensures that the design and implementation of development programs are properly aligned with the needs of SMCs, promote professionalism and accountability among CI stakeholders, and provide effective contractor development programs and institutional support.

Improve access to work: Enhancing access to work opportunities is also essential to ensure that SMCs can compete in the industry. This can be achieved by promoting the outsourcing of work to subcontractors and providing incentives for larger contractors to collaborate with SMCs. Other strategies include encouraging public-private partnerships, facilitating the formation of contractor alliances, promoting alternative project delivery systems such as Design-Build (DB), increasing access to venture capital for SMCs, making government contracts more accessible to them, and using contract splitting and other means to provide equal and fair access to work.

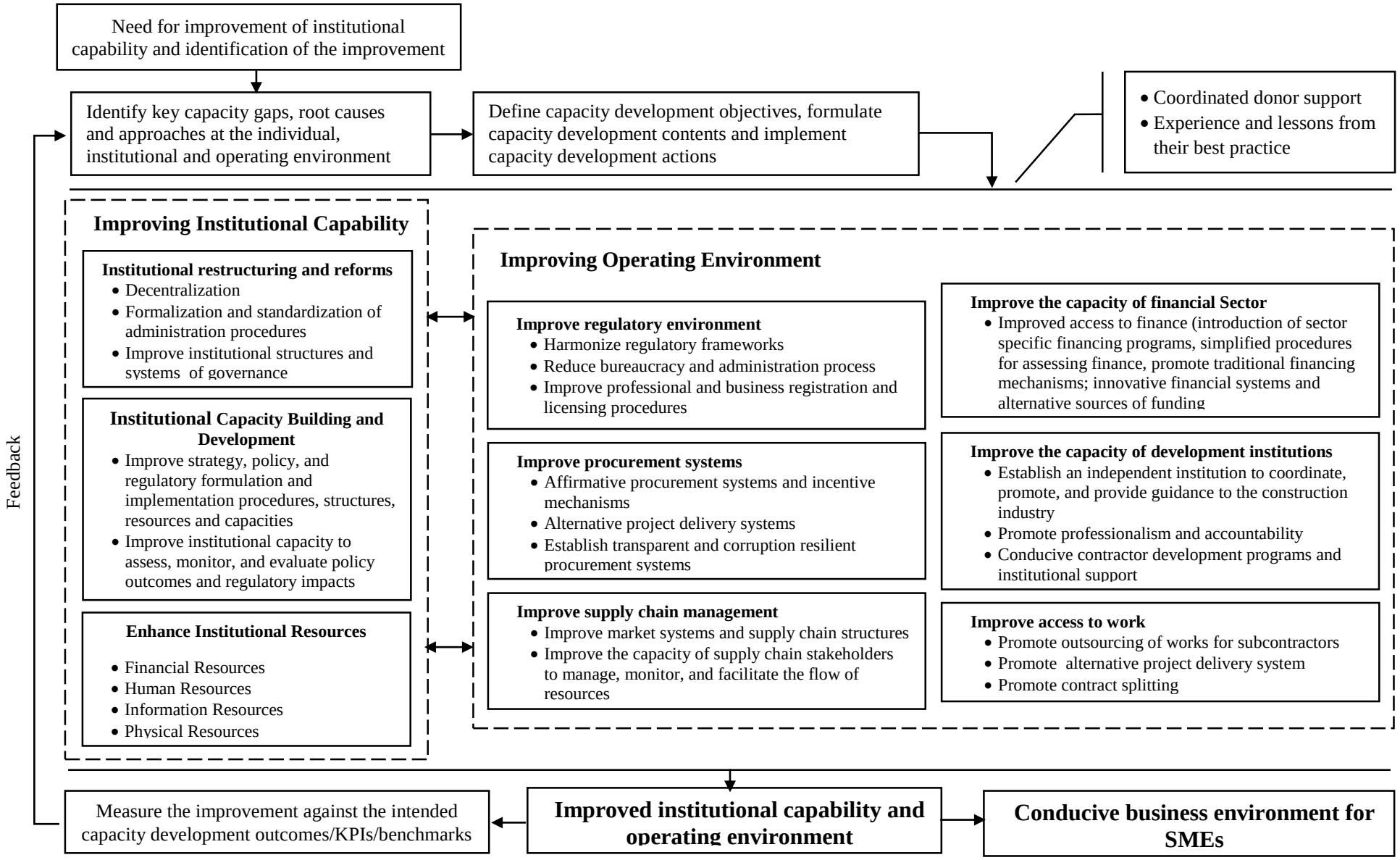

Figure 9. 2. Framework for Enhancing Institutional Capability and Operating

9.4. Framework for Construction Technology Development and Innovation

9.4.1. Role at the Organizational Level

Construction technology development and innovation have played a crucial role in the growth and development of the CI. These advancements have made construction methods more efficient and cost-effective, resulting in a more productive and profitable industry. However, studies indicate that the Ethiopian CI has been slow to adopt new technologies and practices, leading to inefficiencies, wasted resources, and suboptimal outcomes. This is a significant concern, as the CI plays a crucial role in Ethiopia's infrastructure development plans. While this is a concerning issue, it also represents an opportunity for the industry to make necessary changes to become more efficient and productive. Hence, a framework has been developed to improve the sustainable competencies of SMCs in the CI.

Establishing supportive managerial and organizational capabilities at the organizational level is crucial for achieving success in this domain. Improving the organizational culture and structure is a significant method to enhance construction technology and innovation capability in the CI. An effective organizational culture can stimulate creativity, innovation, and a sense of shared ownership and commitment among employees. Construction organizations can enhance their culture by promoting continuous learning and development, encouraging collaboration and teamwork, and acknowledging and rewarding innovative ideas and initiatives. Fostering a culture of transparency, trust, and open communication can further create a more collaborative and innovative environment.

In improving technology development and innovation at the organizational level, creating an enabling environment is crucial for encouraging companies to adopt more efficient and sustainable technologies and practices. Improving construction technology and innovation requires organizations to enhance their organizational culture and structure. A positive organizational culture that fosters creativity, innovation, and employee engagement can be achieved by promoting continuous learning and development,

encouraging collaboration, and recognizing and rewarding innovative ideas and actions. Furthermore, promoting transparency, trust, and open communication can also help foster a collaborative and innovative environment.

The organizational structure holds significant importance in successfully adopting new technologies and innovations. A well-designed structure can facilitate efficient communication, coordination, and decision-making while ensuring that the organization's goals and objectives align with its technology development and innovation endeavors. To optimize the organizational structure for construction technology development and innovation, companies can form cross-functional teams that comprise experts from diverse areas, including engineering, information technology, and project management. By doing so, the organization ensures it has the necessary expertise and knowledge to effectively support the development and implementation of new technologies and innovations.

Leadership and management competence are critical factors for the successful development and innovation of construction technology in the CI. Effective leaders and managers in the CI must possess technical knowledge, business acumen, and leadership skills to drive progress and innovation in the field. Improving leadership and management competence in the CI involves ensuring that leaders and managers have a deep understanding of the latest construction technologies and industry trends. This can be achieved through regular training and education programs and active participation in industry groups and associations. Additionally, fostering a culture of innovation and experimentation within the CI is vital. Encouraging diverse perspectives and ideas and providing opportunities for employees to experiment with new technologies and methods can contribute to cultivating this innovative culture.

In addition, leaders and managers in the CI must be able to communicate effectively with a wide range of stakeholders, including clients, contractors, and regulatory bodies. Clear and effective communication is essential for building trust and fostering collaboration, which are crucial for driving progress and innovation in the field. Effective leadership and management are also essential for ensuring that construction projects are completed

on time, within budget, and to a high-quality standard. This requires a strong focus on project management, including setting clear goals and objectives, establishing timelines, and identifying and managing risks.

9.4.2. The Role of the Government

The government plays an essential role in developing strategies to facilitate the development and adoption of new and improved innovative technologies. This encompasses measures such as providing support, fostering a favorable operational atmosphere, and conducting audits on the impact of regulatory policies. The next section discusses the government's role in enhancing SMCs' technological capability.

Provide Supportive Actions

Promoting labor-based and labor-intensive technologies: These technologies are designed to be operated and maintained by local personnel, which can help create jobs and promote economic development in the area. They are more sustainable and have lower capital requirements than complex and capital-intensive technologies. Furthermore, promoting indigenous knowledge and skills is also crucial for developing the CI. This indigenous knowledge and skills, unique to a particular region or culture, can be used to develop technologies and practices well-suited to the local environment and resources, helping ensure the CI is sustainable and responsive to local needs. The government plays a crucial role through policy support, incentives, and targeted initiatives.

Improving academic, research, and development institutions' capacity: These institutions play a vital role in identifying and developing new technologies and providing training and education for the industry's workforce. Enhancing the capacity of these institutions allows the CI to tap into the latest research and knowledge, facilitating progress and fostering innovation. Furthermore, the procurement of technical and advisory services plays an indispensable role in this multifaceted development. It equips the construction sector with specialized expertise, facilitating the seamless integration of innovative techniques, methodologies, and systems to optimize project outcomes.

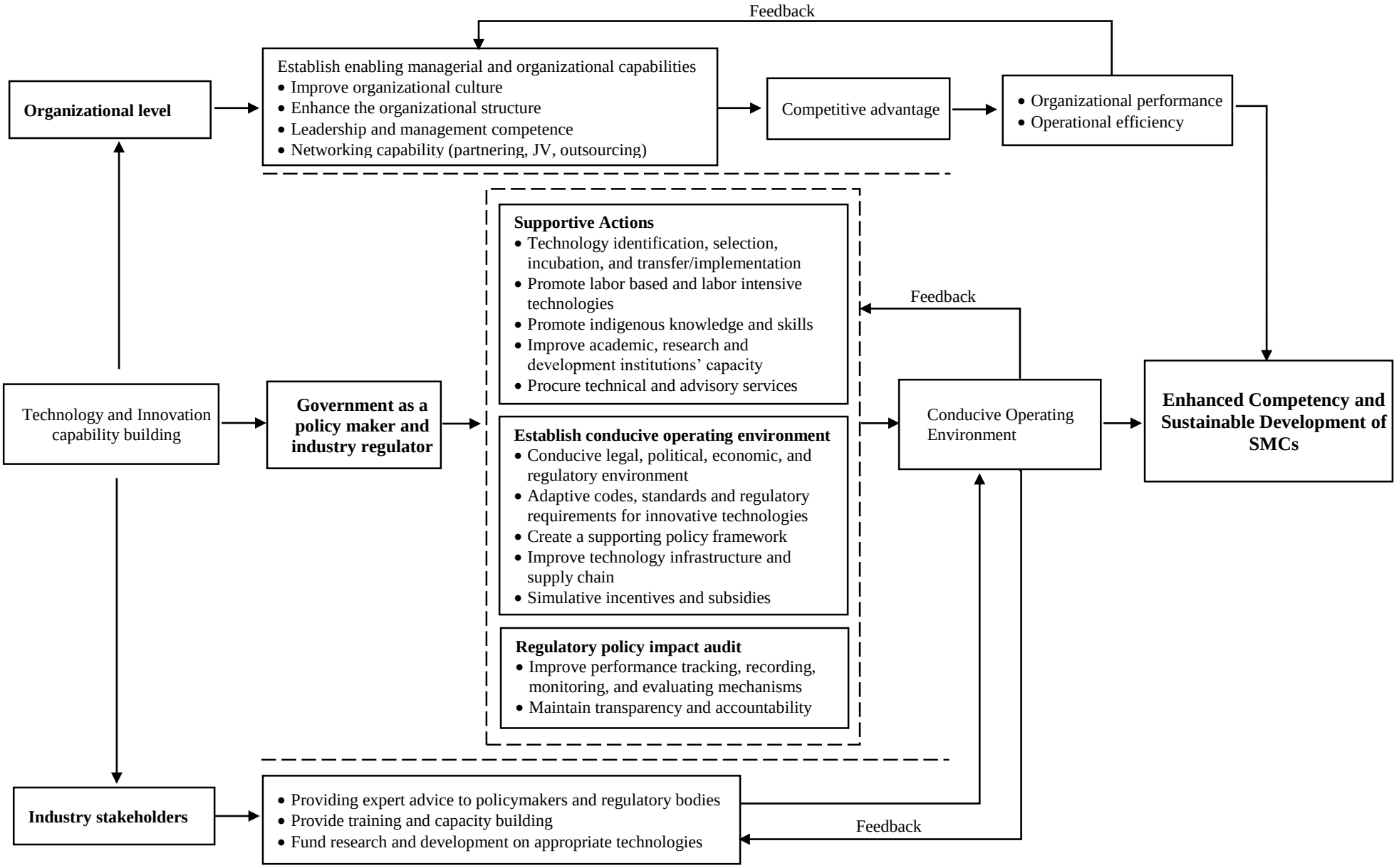

Figure 9. 3. Framework for Construction Technology Development and Innovation

Establish Conducive Operating Environment

Conducive legal, political, economic, and regulatory environment: The legal, political, economic, and regulatory environment should support the growth and development of new technologies in the CI. This includes having laws and regulations that are conducive to the use of new technologies and a political environment that encourages innovation and economic conditions that support the growth of new businesses.

Adaptive codes, standards, and regulatory requirements: Codes, standards, and regulatory requirements should be adaptable to using new technologies in the CI. This includes having codes and standards that are flexible enough to accommodate new technologies and can be easily updated as new technologies are developed.

Supporting policy framework: A supporting policy framework should be in place to encourage the development and use of new technologies in the CI. This includes having policies that provide financial incentives for companies to invest in research and development and subsidies for developing and implementing new technologies.

Improved technology infrastructure and supply chain: Improved technology infrastructure and supply chain are essential for developing new technologies in the CI. This includes having access to high-speed internet, advanced manufacturing facilities, and a supply chain that can support the production of new technologies. Stimulative incentives and subsidies for construction technology development: Incentives and subsidies should be in place to encourage the development of new technologies in the CI. This includes financial incentives for companies to invest in R&D and providing subsidies for developing and implementing new technologies.

Regulatory Policy Impact Audit: Conducting an audit of the impact of regulatory policies serves as a method to enhance the tracking, recording, monitoring, and evaluating mechanisms. It includes auditing metrics such as collecting data on key indicators of construction costs, project completion times, safety records, institutional efficiency, industry competitiveness, resource efficiency, quality standards, and other crucial performance markers. It also increases transparency and accountability of policies and regulations related to construction technology development. Key aspects of regulatory policy impact audits

include performance tracking metrics such as collecting data on key indicators of construction costs, project completion times, and safety records. Policymakers can spot places where performance is inadequate and take action to fix problems by monitoring these metrics. Transparency and accountability are other critical components of regulatory policy impact audits. This auditing includes ensuring that all stakeholders, including industry representatives, government officials, and public members, have access to relevant information about construction technology development. Furthermore, policymakers must be held accountable for their actions and decisions and be transparent about the reasoning behind their policies and regulations.

9.4.3. Role of Industry Stakeholders

Expert advice: Expert advice to policymakers and regulatory bodies is essential to construction technology development. Policymakers and regulatory bodies play a vital role in shaping the direction of the industry and fostering an environment that promotes innovation and growth. However, they often lack the technical knowledge necessary to make informed decisions about the most suitable technologies and regulations for the CI. Expert advice can assist policymakers and regulatory bodies in understanding the latest advancements in construction technology and the potential advantages and disadvantages of different technologies. This can include providing information on the costs and benefits of different technologies, identifying potential risks and challenges, and suggesting the most suitable technologies for particular projects or applications. Experts can also help policymakers and regulatory bodies stay up-to-date on the latest industry trends and developments and guide in creating an environment that supports innovation and growth.

Training and capacity building: This includes providing training and education to industry professionals, policymakers, and regulatory bodies on the latest technologies and best practices. Training can help ensure that professionals have the skills and knowledge to effectively implement new technologies and work in a constantly evolving environment. Additionally, capacity building can help policymakers and regulatory bodies understand construction technology development's technical and regulatory aspects and make informed decisions about the most appropriate technologies and regulations.

Funding research and development: Research and development can help identify new technologies and applications that can improve the CI's efficiency, safety, and sustainability. However, many small and medium-sized enterprises lack the resources to invest in R&D, and government funding can help bridge the gap. Governments can facilitate the timely and efficient development and implementation of new technologies by offering funding for R&D initiatives.

9.5. Framework for Sustainable Construction Material Supply Chain

The survey results underscore the importance of the construction material supply chain in promoting the sustainability and competitiveness of SMCs. Achieving a sustainable construction material supply chain conducive for the success of SMCs, a collaborative approach is essential, involving diverse stakeholders in the CI. This collaborative network should include SMCs, government entities, and a range of industry participants such as suppliers, manufacturers, logistics and transportation providers, industry associations, R&D institutions, financial institutions, and others. SMCs need to prioritize strengthening their organizational capacity and advancing their supply chain management practices at the organizational level. Enhancing organizational capacity entails developing the necessary skills and capabilities within their organizations to effectively navigate the complex dynamics of the construction material supply chain. This process requires setting specific objectives and implementing efficient procedures to attain these goals effectively. SMCs can enhance their organizational capacity by cultivating a supportive organizational culture that promotes knowledge sharing, fosters a shared understanding. Furthermore, they can enhance their organizational capacity by focusing on: improving organizational leadership and management skills (i.e., technical, strategic, knowledge, relationship, and stakeholder management); enhancing communication through the utilization of effective channels, tools, techniques, and methods; and strengthening their human resources capacity (i.e., developing core competencies, knowledge, skills, and technical know-how among their workforce).

Another vital aspect is the enhancement of supply chain management practices within the organization, covering areas like inventory management, supplier relationship management, quality control, risk management, demand planning, information management, procurement

and sourcing, logistics and transportation management, and more. Effective management of these aspects is essential for ensuring the smooth and sustainable operation of the construction material supply chain. Collaborative efforts involving various stakeholders also play a crucial role in promoting sustainable practices within the construction material supply chain. This collaborative approach should engage local governments, universities, research institutes, industry associations, and supply chain partners, aiming for a coordinated and integrated approach to advancing sustainability in the construction material supply chain. Such collaboration fosters a more holistic and efficient approach to addressing the challenges faced by the construction industry, fostering the adoption of best practices and innovative solutions.

Another essential role to be played is by the government, which plays a crucial role in creating an enabling environment to promote a sustainable construction material supply chain through policy-making, regulation, and facilitation. This includes the government's responsibility to regulate construction materials by implementing standardization and certification processes for locally manufactured materials following building codes and standards. These codes and standards outline the minimum requirements for design, construction, and the materials used in the construction process. For instance, international standards like the International Building Code (IBC) and the American Society for Testing and Materials (ASTM) provide guidelines for factors such as fire resistance and the performance of specific construction materials. In the Ethiopian context, the building code is based on international standards like the IBC and ASTM to ensure the safety and performance of construction materials used in projects. Standardizing and certifying locally manufactured construction materials in Ethiopia is crucial for reducing reliance on imports, minimizing foreign currency outflows, and promoting the growth of a robust domestic construction materials industry. To achieve this, certain crucial actions need to be taken, including establishing flexible and adaptable regulatory processes, improving procurement procedures and contract documentation, addressing bureaucratic and administrative barriers, implementing effective quality monitoring measures for construction materials, and ensuring effective coordination among the government, industry, and academic institutions.

Enhancing the infrastructure of various aspects related to construction materials is crucial for advancing supply sustainability and efficiency. A key element of this improvement involves strengthening quality control and assurance by implementing a robust system for testing and certifying construction materials and establishing mechanisms for inspecting and monitoring project quality. This approach ensures that sustainable materials adhere to the highest standards, promoting confidence and trust in their application. Another critical area that demands attention is the financial infrastructure. Sufficient funding and financing mechanisms must be in place to support R&D, production, and commercialization of sustainable construction materials. Investing in these areas will not only drive innovation but also make sustainable materials more economically viable and readily available for adoption in construction projects. Leveraging the potential of ICT tools and technologies can be a transformative approach. Embracing ICT capability, communication, collaboration, and information sharing can be greatly enhanced, leading to reduced costs, increased efficiency, and improved productivity in the construction sector. Integrating ICT can streamline processes, optimize resource allocation, and facilitate seamless coordination among stakeholders, all working together to drive sustainable construction practices forward. The following figure (Figure 9.4.) illustrates a framework for improvement, outlining a thorough strategy to enhance the management of the sustainable construction material supply chain.

The role of other industry stakeholders is also indeed crucial in shaping a sustainable construction material supply chain, ultimately benefiting SMCs. These stakeholders play a significant role by actively engaging in various capacity-building and policy advocacy endeavors, leading to substantial enhancements in the construction material supply chain. Capacity development encompasses various aspects, including knowledge sharing, expert guidance, support for capacity development programs, leadership and management capacity development, and investment in research and development initiatives, thus facilitating knowledge sharing and the dissemination of expertise, ultimately strengthening the industry's capabilities.

Furthermore, these stakeholders play an integral part in advocating for essential regulatory reforms, often involving lobbying for policy enhancements to promote sustainability and efficiency within the construction sector. Industry stakeholders also champion logistics efficiency, leveraging their influence to streamline transportation and logistics processes, systems, and techniques, thereby enhancing supply chain efficiency. They further advocate for quality control and assurance, elevating the overall quality and sustainability of construction materials and promoting the integration of technology. In the context of improving the financial infrastructure, industry stakeholders play a vital role by contributing to the development of financial mechanisms that support sustainability and innovation in the manufacturing and supply of construction materials. This multifaceted involvement across various dimensions leads to several overarching outcomes, including heightened quality and sustainability, policy enhancements and regulatory reforms, and the enhanced capacity of stakeholders, ensuring they are well-prepared to operate within a sustainable construction material supply chain.

The framework underscores the collaborative approach of diverse stakeholders to enhance the sustainability and competitiveness of SMCs through improved supply chain management. The study suggests that an improved supply chain ecosystem provides a conducive environment for supply chains, supporting the competitiveness of SMCs. Furthermore, SMCs, as key participants in this ecosystem, have the opportunity to strengthen their internal capacity and advance their supply chain management practices by concentrating on organizational capacity. This strategic emphasis on organizational development and supply chain enhancements empowers SMCs to cultivate enhanced internal capabilities and more efficient supply chain practices.

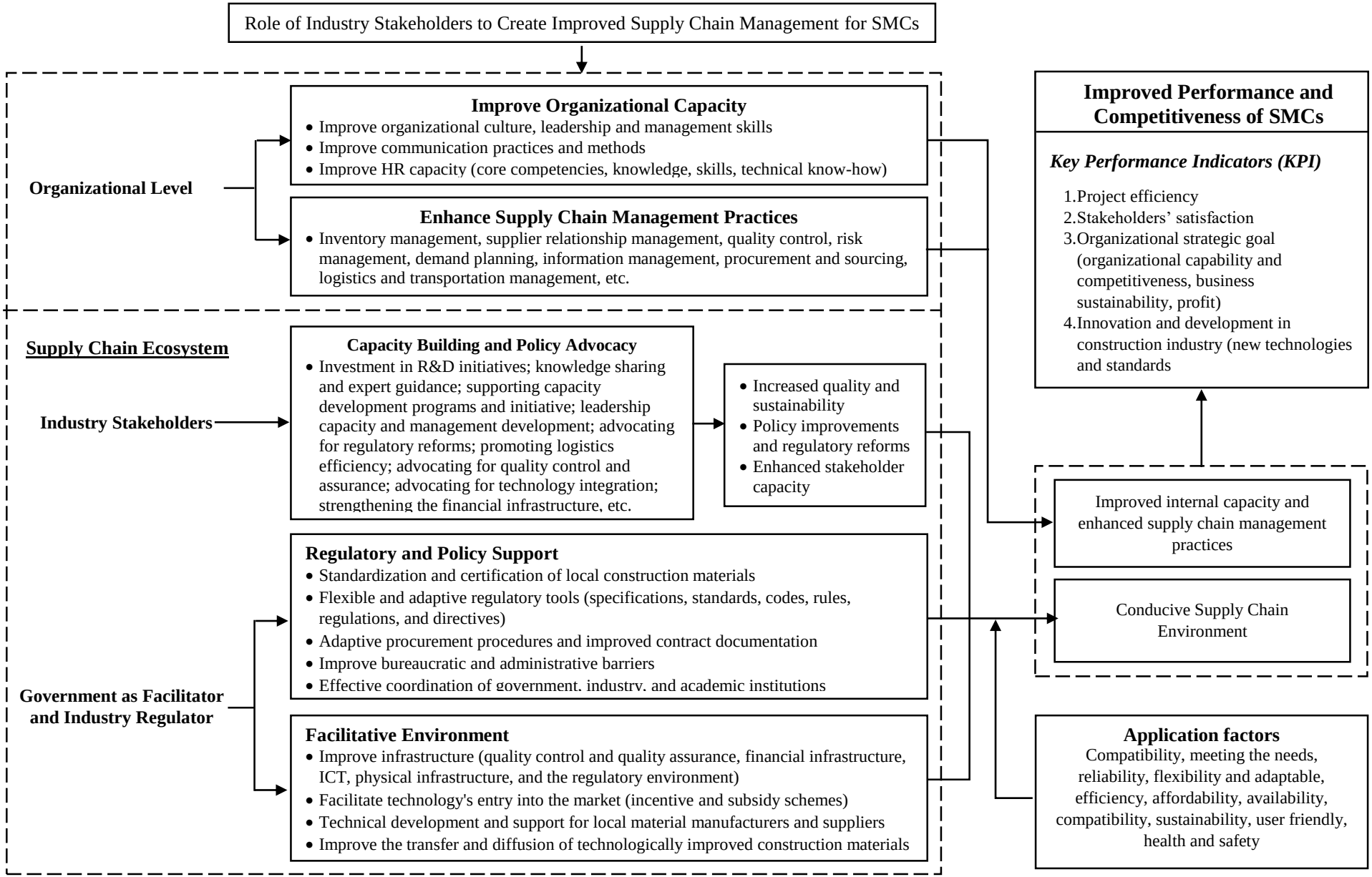

Figure 9. 4. Framework for Sustainable Construction Material Supply Chain Management

9.6. Framework for Human Resource Development

Human resource development (HRD) holds significant importance in the CI. It facilitates the industry in upgrading the skills and capabilities of its workforce, leading to enhanced performance, productivity, and efficiency at both the individual and organizational levels. Moreover, HRD positively impacts the industry, enabling it to adapt to evolving demands and effectively tackle challenges that arise (Debrah and Ofori, 2006; Kalinichenko et al., 2019). HRD in the CI requires the identification of relevant human resource needs, the development of effective strategies to meet those needs, and the implementation of measures to ensure that these strategies are executed successfully. Figure 9.5 illustrates that achieving successful HRD requires collaborative efforts from individuals, organizations, and the government, with academic and training institutions also playing a significant role.

At the individual level (micro), employees play a vital role in the process. They must continually demonstrate willingness and motivation to learn and enhance their skills and competencies. Advancing their careers through ongoing education and training is also essential. Additionally, performance appraisal practices should be introduced and actively pursued, which include evaluating personal technical skills, problem-solving abilities, communication skills, teamwork capabilities, and other relevant factors.

Investing in personal capacity development ensures construction professionals have the skills and knowledge to keep up with these changes and stay competitive. It also helps them achieve individual goals and objectives, such as self-actualization, self-esteem, and self-efficacy, improved competency and commitment at work, enhanced problem-solving skills, individual growth, and improved productivity and efficiency. Given these significant benefits, enhancing individual capacities through personal capacity development becomes indispensable to ensuring construction professionals remain competitive and well-informed about industry advancements. Consequently, construction professionals must take ownership of their personal capacity development and actively foster a learning environment that encourages the meaningful application and development of their skills.

Investing in personal capacity development ensures construction professionals have the skills and knowledge to keep up with these changes and stay competitive. It also helps to achieve individual goals and objectives, such as self-actualization, self-esteem, and self-efficacy; improved competency and commitment at work; enhanced problem-solving skills; individual growth; and improved productivity and efficiency. Given these significant benefits, enhancing individual capacities through personal capacity development becomes indispensable to ensuring construction professionals remain competitive and well-informed about industry advancements. Consequently, construction professionals must take ownership of their personal capacity development and actively foster a learning environment that encourages meaningful application and development of their skills.

Another crucial aspect of HRD within the CI pertains to organizational-level capacity development. This focus involves enhancing the organization's collective capabilities and performance levels, thereby enabling construction professionals to improve their skills and competencies as a cohesive group, aiming to achieve organizational objectives. Organizational HR capacity development encompasses several elements, including the design and implementation of an effective organizational structure, which includes supportive policies, well-defined systems and procedures, and delineated roles and responsibilities. Additionally, established channels of communication are essential for smooth operations. A conducive organizational culture that fosters collaboration and teamwork is also critical.

Furthermore, having effective leadership and supportive management for HRD initiatives significantly promotes organizational capacity development. Viewed as an investment, HRD has the potential to boost performance by continuously motivating employees and implementing ongoing performance appraisal practices. For a successful HR capacity development process, it is crucial to provide institutional support for training and capacity development, allocate the necessary resources (including financial, equipment, and technological resources) for training, and evaluate the effectiveness of the programs. This evaluation ensures that the organizational objectives are being achieved through HRD efforts.

The government plays a significant role in the development of HR within the CI. One of its key responsibilities is utilizing regulatory tools, such as professional registration, licensing, certification, and accreditation processes. These regulatory measures ensure that construction professionals possess adequate training and qualifications, ultimately leading to higher-quality construction services. The government has introduced various regulatory tools in the Ethiopian CI to ensure that construction professionals meet the necessary qualifications and training requirements. However, enforcement of these regulations has been lacking, resulting in the prevalence of unqualified professionals in the industry. To help improve the quality of construction services in Ethiopia, the government should ensure greater enforcement of its regulatory tools. Potential measures to improve enforcement include automating compliance checks, establishing a centralized database to track professionals in the industry, implementing a third-party monitoring system, and providing continuous training and support to construction professionals to ensure they remain up-to-date with the required qualifications.

Furthermore, fostering collaboration among the government, professional associations, and the private sector is essential to ensure that Ethiopia's CI can deliver quality services that meet the needs of its citizens. Forming a joint task force responsible for setting standards, developing supportive strategies and programs for the industry, and coordinating regulatory oversight and enforcement would be beneficial. Additionally, establishing a collaborative framework that encourages the exchange of best practices, resources, and technical advice among stakeholders is vital for further advancement in the construction sector. Through these collective efforts, the government can effectively contribute to the comprehensive development of HR within the CI, ultimately leading to an improved construction landscape in Ethiopia.

Another important role of the government in HRD is the development of adequate infrastructure and resources for HRD. This includes making investments in areas such as infrastructure (laboratories and R&D centers), human resources (educational institutions, skills training centers, and workforce development programs), technology (hardware and software), and information and communication technologies (ICTs). These investments will foster an environment favorable to the successful development of human resources (HR).

Furthermore, the government should also take the lead in facilitating and coordinating the creation of a network of educational institutions, career training centers, and research centers to provide support and expertise in the field of HRD.

Academic institutions also play a vital role in developing HR in the CI. In the Ethiopian CI, academic and training institutions are key players in preparing professionals who can efficiently perform their duties and responsibilities. The survey findings discussed in Chapter 8 emphasize the need for academic and training institutions to focus on developing education systems, curriculum designs, and teaching approaches closely aligned with industry requirements. Practical education and hands-on training, equipped with the latest technology and equipment, are essential aspects that these institutions should incorporate to adequately prepare students for the job market.

Moreover, employers in the CI should actively establish strong working relationships with local and international academic institutions. This collaboration ensures that their workforce remains updated with industry-specific advancements and technological developments. In parallel, there is a growing necessity to enhance the intellect and competence of educators specializing in construction. This measure is crucial for them to effectively address the challenges in developing and delivering high-quality teaching and training programs in construction management, engineering, science, and technology. By focusing on these aspects, academic institutions can significantly contribute to the continuous growth and advancement of human resources within the CI.

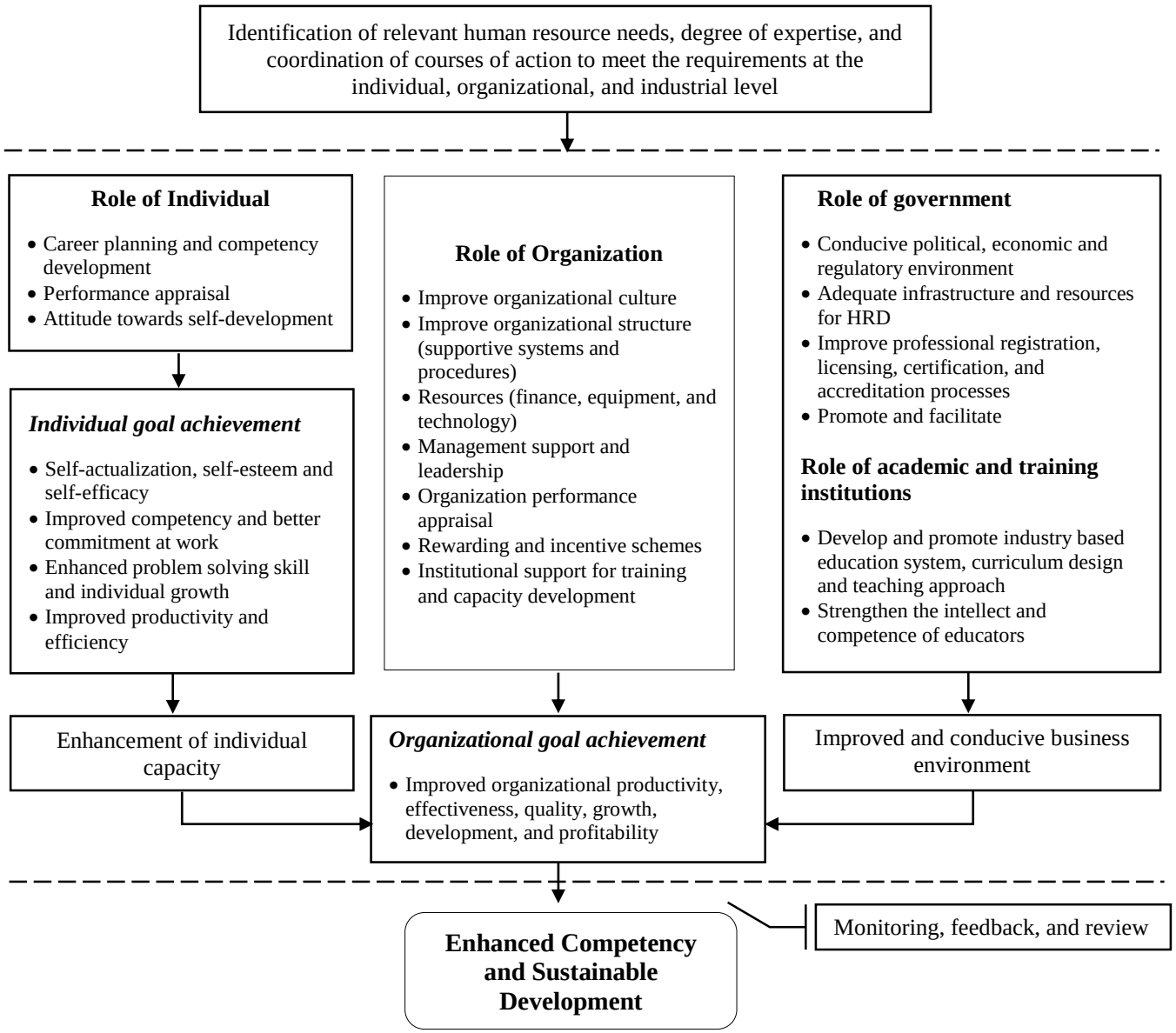

Figure 9. 5. Framework for Human Resource Development

Adopting a comprehensive and multi-faceted approach that addresses various aspects at individual, organizational, industry stakeholder, and government levels is essential to enhance the competitiveness and sustainability of SMCs in the construction business. Each of these elements plays a crucial role in shaping the success and growth of SMCs within the CI. At the individual level, SMCs employees must possess diverse skills and attributes that contribute to their personal and professional growth. At the organizational level, the improvement of various aspects contributes to the overall success and sustainability of

SMCs. Industry stakeholders, such as larger construction firms, professional associations, and research institutions, play a pivotal role in supporting the growth and development of SMCs.

Furthermore, the role of the government in supporting the competitiveness and sustainability of SMCs is paramount. By enhancing its administrative capacity, the government can effectively create an enabling environment that fosters the growth and success of these enterprises within the CI. It should also conduct routine monitoring and evaluation of policies and regulations to ensure their effectiveness and relevance in supporting SMCs' needs and aspirations. Overall, the collective commitment towards the growth and success of SMCs will ultimately contribute to the overall development and progress of the construction sector. The following figure (Figure 9.6) summarizes a comprehensive framework for enhancing the competitiveness and sustainability of SMCs.

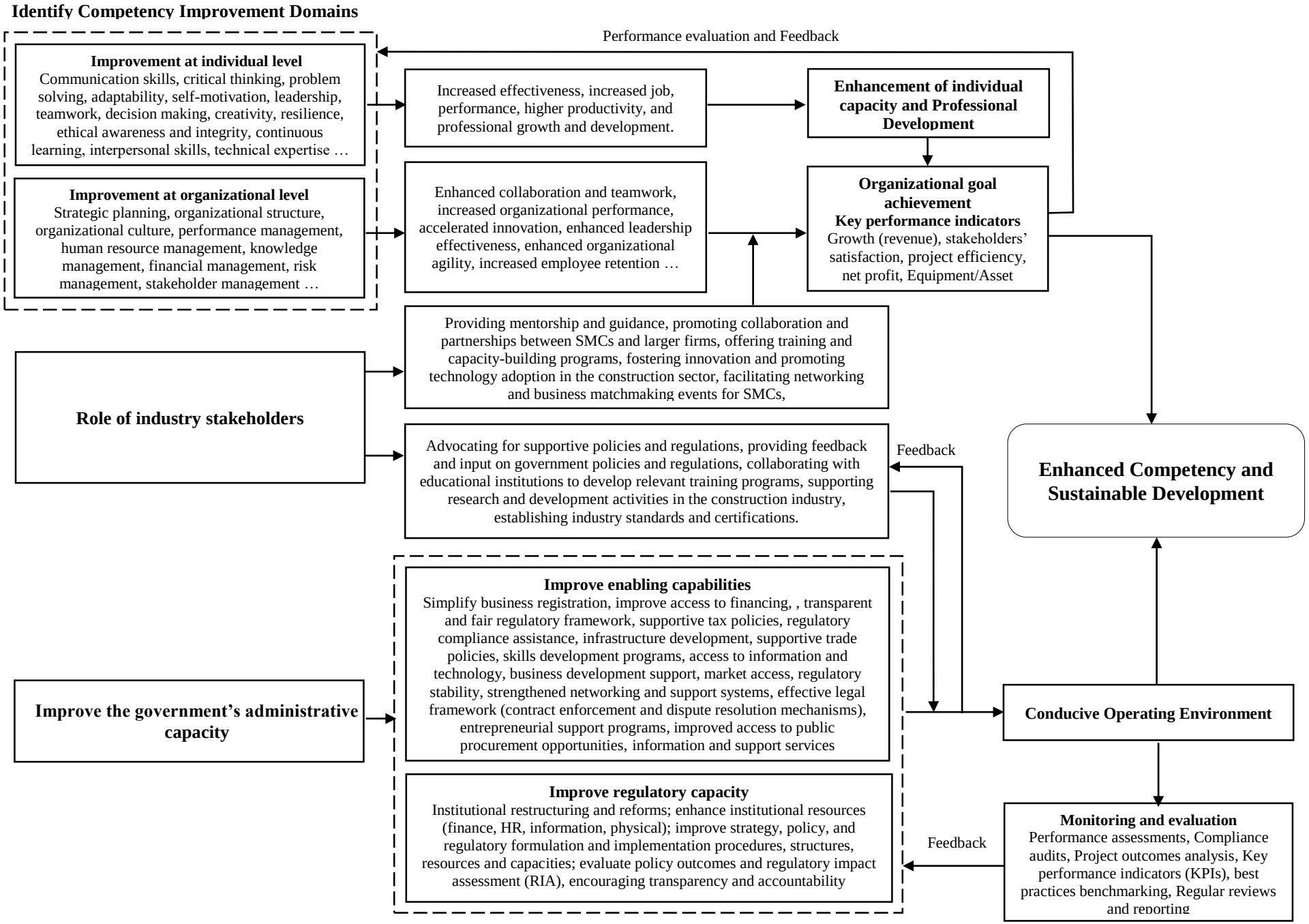

Figure 9. 6. Framework for Sustainable Competency Development of SMCs

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

10.1. Introduction

The study began with a review of the literature to better understand the context of the Ethiopian CI, particularly regarding SMCs competency. It aimed to identify the endogenic and exogenic factors influencing SMCs competency, as well as the status of improvement measures. The review was also used to assess the impact of development programs to improve SMCs competency and the degree of improvement achieved in the Ethiopian CI. The literature review identified gaps in the existing body of research. It provided the basis for selecting the key constructs to be included in the study and developing a conceptual framework to operationalize the variables for empirical research.

The research was focused on identifying the factors influencing the sustainable competency of SMCs and developing a competency improvement framework for SMCs in the Ethiopian CI. With the aim of achieving these objectives, a mixed-method approach consisting of a questionnaire survey, semi-structured interviews, and document analysis was adopted for the empirical data collection. Given that the sustainable competency improvement framework was provided in the prior chapter, this last chapter recaps the study's key findings, discusses the implications of these findings, and summarizes the major contributions of the research. It further identifies the study's limitations and suggests areas for further research.

10.2. Conclusions

The first objective, addressed in Chapter 5, required an identification of the factors (endogenic and exogenic) affecting the sustainable competency of SMCs in the Ethiopian CI, as well as the improvement mechanisms. The findings from the first objective have provided empirical evidence to support the study's hypotheses, confirming that both endogenic factors such as organizational structure, organizational culture, characteristics of entrepreneurs, competitive strategy, organizational resources, managerial skill and competency, and tendering and contract administration, as well as exogenic factors such as government policies, regulatory frameworks, industry networks, and the culture of the industry, are impeding the sustainable competency of SMCs in the Ethiopian CI.

Furthermore, a detailed assessment of the factors improvement needs has been carried out considering the impacting factors' relationship with improvement status. Endogenic and exogenic influencing factors were mapped to comprehensively understand the improvement needs for SMCs in the Ethiopian CI.

Under the revaluing of the entrepreneurial features of the firm, all the endogenic factors were assessed, and it was determined that the factors were key areas for improvement to ensure SMCs have sustainable competency in the Ethiopian CI. Similarly, exogenic factors such as government policies, regulatory frameworks, industry networks, and the industry's culture were assessed under enhancing institutional capability and operating environment. Dimensions such as construction technology development and innovation, sustainable construction material supply chain, and human resource development were identified as vital elements in improving the performance of SMCs. They were further explored regarding their implications for improving SMCs' performance in the Ethiopian CI.

Furthermore, the findings revealed that, in light of the identified influencing factors, the following are significant endogenic challenges/factors emanating from their respective sources as: organizational structure and corporate diversification from organizational structure; leadership, staff development, and rewarding system from organizational culture; entrepreneur’s demography and self-efficiency from characteristics of an entrepreneur. Similarly, marketing strategy; inability to access resources and high cost of construction inputs; poor corporate management skills; lack of technical expertise, and inability to meet technical requirements were identified from the competitive strategy; organizational resources; managerial skill and competency; and tendering and contract administration, respectively.

The study also revealed the significant exogenic challenges/factors emanating from their respective sources as unfavorable financial policies from government policies; unfavorable economic regulations from the regulatory framework; a lack of trust between parties in the industry (i.e., honesty, integrity, and openness) from industry networks; the inability of SMCs to compete with bigger construction companies from the culture of competitive bidding; and poor linkages between CI and R&D institutions from technology and innovation.

The study's second objective was to evaluate the effectiveness of the development programs aimed at improving the SMC's performance, which was used to develop an improvement framework. Results showed that the strategies employed did not significantly improve SMCs performance. The program failed to provide important skills and knowledge for SMCs growth, such as entrepreneurship and business development, construction resource management, construction project management, procurement and contract management, and information management. Challenges, including a lack of funding, poor coordination among agencies, inadequate supply chain management, and a dedicated support unit for SMCs, were also identified as reasons for the program's ineffectiveness. This emphasizes the need for a more comprehensive development program that addresses all necessary skills and knowledge for SMCs growth and addresses underlying challenges that hinder program success. It also calls for government investment in R&D and innovation management, promoting public-private partnerships for technology transfer, strengthening institutional mechanisms for technology development, implementing a comprehensive legal and policy framework for SMCs, and an effective monitoring mechanism for related projects.

The third objective was developed to evaluate the prevailing opportunities to create sustainable SMCs in the Ethiopian CI and develop appropriate improvement mechanisms to exploit these opportunities. Ethiopia has a variety of opportunities for SMCs to participate in the construction, transport, power supply, and housing development sectors. The government has proposed a comprehensive amendment to the Construction Professionals and Contractors Registration and Certification Directive, which aims to create ease of entry into the industry, reduce the cost of registering and certifying construction professionals, and create a better environment for employers. Additionally, the government has formulated a national logistics strategy and policy and a 10-year perspective plan for the transport sector that includes multiple projects open for private sector investment. The power supply sector presents opportunities for SMCs to participate in construction projects and specialized power supply infrastructure. Ethiopia's population is rapidly growing, which presents an opportunity for investment in the housing development sector. However, SMCs must ensure they have the necessary resources and expertise, and the government must implement reforms to create a favorable environment for them to operate.

Regarding the improvement mechanisms, the findings indicated that the key to improving the performance of SMCs in the Ethiopian CI lies in five key areas: revaluing the entrepreneurial features of the firm, enhancing institutional capability and the operating environment, fostering construction technology development and innovation, establishing a sustainable construction material supply chain, and investing in human resource development. The study has also identified major improvement mechanisms from their respective sources, such as enhanced entrepreneurial traits and improved organizational structures from revaluing entrepreneurial features of the firm; improved operating environment and sustainable financial supply from enhancing institutional capability and operating environment; conducive technology transfer environment and capacity development from construction technology development and innovation; standardized operating procedures and discouraging imports from sustainable construction material supply chain and human resource development and performance appraisal from human resource development.

The empirical analysis of improvement mechanisms revealed a positive relationship between the constructs, indicating that improving one would lead to improving the other. Construction technology development and innovation significantly correlate with sustainable construction material supply chains, indicating a strong positive relationship. This is due to the fact that construction technology development and innovations often necessitate the demand for sustainable materials that are cost-effective and meet the needs of the changing industry, pushing stakeholders to invest in R&D for the development of such materials.

Similarly, there is a relationship between improving institutional capability and the operating environment; development of sustainable construction materials; construction technology development and innovation; and human resource development. These aspects complement one another, leading to a synergistic relationship between all parties. As the institutional capability and the operating environment improve, so do sustainable construction material supply chains, human resource development, and construction technology development and innovation in the industry. It furthers the idea that a symbiotic relationship exists between various aspects of the CI, each helping to bolster and improve the other to reach a common goal: an initiative that works as efficiently and sustainably as possible.

The fourth objective was to develop improvement frameworks that could be implemented in order to ensure the sustainable competency development of SMCs. The study indicated that the success of SMCs in the CI depends on several key factors, such as entrepreneurial features, institutional capability, technology adoption, sustainable construction material supply chain, and HRD. Improving these factors requires collaboration between SMCs, the government, industry stakeholders, and academic institutions. The government has a crucial role in creating a supportive policy and regulatory environment, providing resources for HRD, standardizing construction materials, and promoting innovation in the field. SMCs must focus on restructuring their organizational culture and structure, promoting innovation, and enhancing leadership and management skills. Industry stakeholders and academic institutions play an important role in promoting training and development, researching sustainable solutions, and ensuring the quality of construction services. Collaboration and effective communication among all stakeholders is necessary to ensure the competitiveness and sustainability of SMCs in the CI.

10.3. Contribution to Knowledge

This research is intended to provide a better understanding of the current situation of SMCs in the Ethiopian CI, identify factors impacting their sustainability, and suggest areas for improvement. The findings highlight priority areas for improving competitiveness and offer practical strategies for decision-makers in the Ethiopian CI, including policymakers, regulators, construction stakeholders, academics, and researchers. They also provide guidance for addressing deficiencies in developing, coordinating, and monitoring policies that support sustainable SMCs development.

Furthermore, the findings provide entrepreneurs with insights to help them make informed decisions when pursuing opportunities and establishing sustainable businesses. The information can also serve as a benchmark, assist in developing a framework to create a conducive business environment, and serve as an introduction for future studies.

10.4. Scope and Limitations of the Study

No single piece of empirical evidence can facilitate the identification of the most important parameters, or perhaps it does not guarantee their perfection (Babbie, 1992). The results may not be completely accurate as other factors not included in the study might impact the business environment, which was not considered. However, it is crucial

to note that significant theoretical and empirical evidence was used to support the choice of these parameters, and various research methods were employed to reduce potential biases. The purpose of the empirical aspect of the research was to provide valuable insights and improve competitiveness in the business environment. To achieve this, the affecting factors were used as a general guide and proxies to assess the endogenous and exogenous factors impacting the sustainable competency and progress of SMCs.

The study considered respondents' views within the Addis Ababa city boundary (the capital of Ethiopia) and selected towns in the Oromia regional state. The findings were limited to the results obtained from the questionnaire survey, interviews, and document analysis. A more qualitative research approach might have been preferable; however, conducting qualitative research (such as focus group discussions and/or participatory observations) within the context of the COVID-19 pandemic restrictions and ongoing conflicts in the northern and western parts of Ethiopia presented challenges.

Another limitation arises from the purposive sampling technique, which could potentially lead to biased results as respondents were chosen based on their familiarity with the topic. However, the researchers managed to mitigate these inherent biases by conducting a preliminary survey using the questionnaire beforehand. These limitations mentioned here, however, do not cast doubt on the validity of the findings, and it's important to remember that scientific research is an ongoing pursuit to better understand certain phenomena.

10.5. Recommendation for Further Research

The research uncovered key factors that play a role in the success of SMCs, with a specific focus on Addis Ababa and selected towns in the Oromia region. However, for a more comprehensive understanding and to establish stronger conclusions, future studies should expand their scope to include a broader geographical region in Ethiopia. This would enable a more generalized assessment of the link between these factors and the sustainable competency of SMCs across the country. In light of the research findings and acknowledged limitations, several recommendations are proposed for future research. The following potential areas of concern are suggested for further investigation.

Comparative analysis: Conduct a comparative evaluation of the factors affecting the sustainable competency of SMCs in the Ethiopian CI with those in other countries. This

analysis aims to explore best practices and lessons learned, identify similarities and differences, and determine the transferability of strategies.

Industry-wide survey: While the study exclusively examined SMCs, comparing them with larger construction firms can uncover unique challenges and opportunities that SMCs face in the CI. Furthermore, exploring the factors that impact the sustainability of large construction firms could provide a more comprehensive understanding of the industry and identify strategies applicable to enhancing sustainability for both SMCs and large firms.

Cross-sectoral analysis: Conduct a cross-sectoral analysis of the linkages between SMCs and other sectors of the economy to identify potential areas for collaboration and mutual benefit.

Longitudinal study: Conduct a longitudinal study to track the progress of SMCs in Ethiopia over time and assess the impact of the proposed improvements on their sustainability. This would help determine the effectiveness of the framework developed in this study and identify any additional factors that need to be addressed.

Sustainability metrics: Develop sustainability metrics for Ethiopia's SMCs to assess their performance and progress toward sustainable development goals. This could involve tracking the progress of a sample of contractors over a period of time after implementing the proposed solutions and evaluating their impact on sustainability. It can further help to track progress over time, benchmark against industry standards, and identify areas for improvement. This will provide insights into the feasibility and scalability of the proposed solutions and help identify any areas that need improvement.

REFERENCES

Aasonaa, D. N. (2022). “Materials Management Practices on Public Projects in the Upper West Region.” *Journal of Sustainable Materials Processing and Management,* 2(2), 48-56. DOI: https://doi.org/10.30880/jsmpm.2022.02.02.007

Ababa, A. (2006). “Ethiopia: building on progress a Plan for Accelerated and Sustained Development to End Poverty (PASDEP).” Ministry of Finance and Economic Development (MoFED). Addis Ababa, Ethiopia

Abagissa, J. (2021). “The Assessment of Micro and Small Enterprises Performance and Challenges in Addis Ababa, Ethiopia.” *International Journal of Applied Economics, Finance and Accounting,* 9(1), 8-18. DOI: https://doi.org/10.33094/8.2017.2021.91.8.18

Aboneh, A. and Mahesh, G. (2023), "Understanding the key factors of operating environment for small and medium contractors in the developing economies: the case of Ethiopia", *Journal of Engineering, Design and Technology*, https://doi.org/10.1108/JEDT-07-2022-0354

Abotaleb, I. S., & El-adaway, I. H. (2018). “Managing construction projects through dynamic modeling: Reviewing the existing body of knowledge and deriving future research directions.” *Journal of Management in Engineering,* 34(6), 04018033. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000633

Addisu Mosisa (2013). “Contributions of Small, Medium and Micro Enterprise Contractors on road Construction Projects in Ethiopia” (MSc. thesis, Addis Ababa University)

Ahiawodzi, A. K., and Adade, T. C. (2012). “Access to Credit and Growth of Small and Medium Scale Enterprise in the Ho Municipality of Ghana.” *British Journal of Economics, Finance and Management Sciences,* 6(2), 34–51.

Ainuddin, R. A and Sa'odah H. J, 2001. "Characteristics of Entrepreneur-Owned Companies in Malaysia", The Fourth AsianAcademy of Management (AAM) Conference 2001 Proceedings (volume 1), Johor Bahru, University Sains Malaysia, 133-140.

Aje, I. O., Oladinrin, T. O., & Nwaole, A. N. C. (2016). “Factors influencing success rate of contractors in competitive bidding for construction works in South-East, Nigeria.” . Journal of Construction in Developing Countries, 21(1): 19–34. doi: 10.21315/jcdc2016.21.1.2

Akinboade, O.A. and Kinfack, E. (2012). "Regulation, awareness, compliance and SME performance in Cameroon's manufacturing and retail sectors", *International Journal of Social Economics*, Vol. 39 No. 12, pp. 933-950. https://doi.org/10.1108/03068291211269073

Akintoye, A. and Main, J. (2007). "Collaborative relationships in construction: the UK contractors' perception", *Engineering, Construction and Architectural Management*, Vol. 14 No. 6, pp. 597-617. https://doi.org/10.1108/09699980710829049

Alaloul, W. S., Musarat, M. A., Rabbani, M. B. A., Iqbal, Q., Maqsoom, A., & Farooq, W. (2021). “Construction sector contribution to economic stability: Malaysian GDP distribution. *Sustainability*, 13(9), 5012. https://doi.org/10.3390/su13095012

Albaloushi, H., & Skitmore, M. (2008). “Supply chain management in the UAE construction industry.” *International Journal of Construction Management,* 8(1), 53-71. https://doi.org/10.1080/15623599.2008.10773108

Ali, Y., Saad, T.B., Sabir, M., Muhammad, N., Salman, A. and Zeb, K. (2020). "Integration of green supply chain management practices in construction supply chain of CPEC", Management of Environmental Quality, Vol. 31 No. 1, pp. 185-200. https://doi.org/10.1108/MEQ-12-2018-0211.

Al Khajeh, E. H. (2018). “Impact of leadership styles on organizational performance.” *Journal of Human Resources Management Research*, 2018, 1-10. DOI: 10.5171/2018.687849.

Al-Nuaimi, S., Banawi, A. A. A., & Al-Ghamdi, S. G. (2019). “Environmental and economic life cycle analysis of primary construction materials sourcing under geopolitical uncertainties: A case study of Qatar.” *Sustainability*, 11(21), 6000. https://doi.org/10.3390/su11216000

Al-Tit, A., Omri, A., & Euchi, J. (2019). “Critical success factors of small and medium-sized enterprises in Saudi Arabia: Insights from sustainability perspective.” Administrative Sciences, 9(2), 32. https://doi.org/10.3390/admsci9020032

Alashwal, A. M., Rahman, H. A., & Beksin, A. M. (2011). “Knowledge sharing in a fragmented construction industry: On the hindsight.” *Scientific research and essays*, 6(7), 1530-1536.

Ajayi, S. O., Jones, W., & Unuigbe, M. (2019). “Occupational stress management for UK construction professionals: Understanding the causes and strategies for improvement.” *Journal of engineering, design and technology*, 17(4), 819-832. https://doi.org/10.1108/JEDT-09-2018-0162

Amadi, V. C., Ukoha, O., & Alagah, K. D. (2018). “Government entrepreneurship development programmes and small & medium scale enterprise success in Rivers State.” *International Journal of Advanced Academic Research,* 4(4), 202-219.

Amaratunga, D., Baldry, D., Sarshar, M. & Newton, R. (2002). “Quantitative and qualitative research in the built environment: application of mixed research approach.” *Work Study,* 51(1). 17-31.

Amoah P, Ahadzie D.K, and Dansoh A. (2011). “The Factor Affecting Construction Performance In Ghana: The Perspective of Small-Scale Building Contractors.” *The Ghana Surveyor*, Vol. 4, No. 1, . 41 – 48.

Aniekwu, A. (1995). “The business environment of the construction industry in Nigeria.” *Construction Management and Economics*, 13(6), 445-455.

Aniekwu, N., & Ozochi, C. A. (2010). “Restructuring education, training and human-resource development in the Nigerian construction industry.” *Journal of science and Technology education research*, 1(5), 92-98.

Animut Arega (2019). “Assessing the Cause of Failure of Small, Medium and Micro Enterprise (SMME) Construction Companies in Addis Ababa.” (MSc. thesis Addis Ababa University)

Anwar, G., & Abdullah, N. N. (2021). "The impact of Human resource management practice on Organizational performance." *International journal of Engineering, Business and Management* (IJEBM), 5(1), 35-47. https://dx.doi.org/10.22161/eec.62.2

Apulu, I., & Ige, E. O. (2011). "Are Nigeria SMEs Effectively Utilizing ICT." *International Journal of Business and Management,* 6(6), 207-214.

Arneson, E. (2018). "Construction Capacity: How Regional Construction Supply Chains Respond to Disruptions." (Doctoral dissertation, University of Colorado at Boulder, USA).

Asad, S., Fuller, P., Pan, W., & Dainty, A. R. (2005). "Learning to innovate in construction: a case study." *University of London: Association of Researchers in Construction Management*, 2, 1215-1224.

Asres, G. A. (2021). "Renewable Energy Potential, Energy Access, and Climate Change Mitigation in Ethiopia." In Handbook of Climate Change Management: Research, Leadership, Transformation (pp. 2603-2625). Cham: Springer International Publishing

Atibu, M. (2015). "An investigation into factors causing delays in road construction projects in Kenya." *American Journal of Civil Engineering*. 3(3): 51-63. DOI: 10.11648/j.ajce.20150303.11

Ayalew, T., Dakhli, Z., & Lafhaj, Z. (2016). "Assessment on performance and challenges of Ethiopian construction industry." *Journal of Architecture and Civil Engineering*, 2(11), 01-11.

Balasubramanian, S., and V. Shukla. (2018). "Environmental supply chain management in the construction sector: Theoretical underpinnings." *International Journal of Logistics Research and Applications* 21 (5): 502–528. https://doi.org/10.1080/13675567.2018.1452902

Barlow, J. (2000). "Innovation and learning in complex offshore construction projects." *Research policy*, 29(7-8), 973-989. https://doi.org/10.1016/S0048-7333(00)00115-3

Barrett, P.S. and Barrett, L.C. (2003). “Research as a kaleidoscope on practice”, *Construction Management and Economics,* Vol. 21 No. 7, pp. 755-66. https://doi.org/10.1080/0144619032000093314

Bartel, A. P. (2000). “Measuring the employer's return on investments in training: Evidence from the literature.” *Industrial relations: a journal of economy and society*, 39(3), 502-524. https://doi.org/10.1111/0019-8676.00178

Bartlett, W., & Bukvič, V. (2001). “Barriers to SME growth in Slovenia.” *MOST: Economic Policy in Transitional Economies, Kluwer Academic Publishers*. 11, 177-195.

Baum, J. R., Frese, M., & Baron, R. A. (2014). “Born to be an entrepreneur? Revisiting the personality approach to entrepreneurship. In The psychology of entrepreneurship” (pp. 73-98). Psychology Press.

Baymout, M. (2015). “Supply chain management for small and medium size enterprises.” *International Journal of Advancements in Research & Technology*, 4(5), 20-34.

Biedenbach, T. and Müller, R. (2011). "Paradigms in project management research: examples from 15 years of IRNOP conferences", International Journal of Managing Projects in Business, Vol. 4 No. 1, pp. 82-104. https://doi.org/10.1108/17538371111096908

Blayse, A.M. and Manley, K. (2004). "Key influences on construction innovation", *Construction Innovation,* 4 (3), pp. 143-154. https://doi.org/10.1108/14714170410815060

Blundell, R., Dearden, L., Meghir, C., & Sianesi, B. (1999). “Human capital investment: the returns from education and training to the individual, the firm and the economy.” *Fiscal studies,* 20(1), 1-23.

Bouazza, A. B., Ardjouman, D., and Abada, O. (2015). “Establishing the Factors Affecting the Growth of Small and Medium-sized Enterprises in Algeria.” *American International Journal of Social Science,* 4(2), 101–115.

Bozkurt, Ö. Ç., Kalkan, A., and Arman, M. (2014). “The relationship between structural characteristics of organization and followed business strategy: An application in Denizli.” 10th International Strategic Management Conference. *Procedia-Social and Behavioral Sciences,* 150, 222-229. Doi: 10.1016/j.sbspro.2014.09.041

Bryan, L. A. (2012). “Research on science teacher beliefs.” Second international handbook of science education, 477-495. DOI 10.1007/978-1-4020-9041-7_33

Bryman, A., Bell, E. (2011). “Business Research Methods.” 3rd edn. Oxford University Press

Burrell, G., & Morgan, G. (2016). “Sociological paradigms and organisational analysis: Elements of the sociology of corporate life.” Routledge.

Caldwell, N., Walker, H., Harland, C., Knight, L., Zheng, J., & Wakeley, T. (2005). “Promoting competitive markets: The role of public procurement.” *Journal of Purchasing and supply management,* 11(5-6), 242-251.

Cameron, K. S., & Quinn, R. E. (1999). Diagnosing and changing organizational culture.

Cammelli, A. and Ferrante, F., (2014). “Entrepreneurship and innovation: the role played by graduates” The AlmaLaurea working paper series (No. 69).

Cao, Z., Huo, B., Li, Y. and Zhao, X. (2015). "The impact of organizational culture on supply chain integration: a contingency and configuration approach", *Supply Chain Management*, Vol. 20 No. 1, pp. 24-41. https://doi.org/10.1108/SCM-11-2013-0426

Cardoza, G., Fornes, G., Farber, V., Duarte, R. G., & Gutierrez, J. R. (2016). “Barriers and public policies affecting the international expansion of Latin American SMEs: Evidence from Brazil, Colombia, and Peru.” *Journal of Business Research*, 69(6), 2030-2039. https://doi.org/10.1016/j.jbusres.2015.10.148

Chavan, A. J. (2013). “Value engineering in construction industry.” *International Journal of Application or Innovation in Engineering & Management,* 2(12), 18-26.

Chew, D. A. S., Yan, S., & Cheah, C. Y. J. (2008). “Core capability and competitive strategy for construction SMEs in China.” *Chinese Management Studies*, 2(3), 203-214. DOI 10.1108/17506140810895898

Chilipunde, R. L., and Shakantu, W. (2010). “Constraints and challenges faced by SMME contractors: A case study of Malawi.” COBRA 2010 - Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors

Chinowsky, P. S. (2000). “Strategic management in construction organizations. In Construction Congress VI: Building Together for a Better Tomorrow in an Increasingly Complex World” (pp. 493-502).

Chi, S., Moon, S., & Kim, D. Y. (2021). “Internal communication effectiveness model for construction companies: a case study of the Korean construction industry.” *KSCE Journal of Civil Engineering*, 25(12), 4520-4534. https://doi.org/10.1007/s12205-021-0483-1

Christie, A. A., Joye, M. P., & Watts, R. L. (2003). “Decentralization of the firm: theory and evidence.” *Journal of Corporate Finance*, 9(1), 3-36.

Chua, X. J., Kasim, N., Zainal, R., & Musa, S. M. S. (2022). “ICT implementation for improving communication among SME contractors in construction industry.” *Research in Management of Technology and Business*, 3(1), 417-430. DOI: https://doi.org/10.30880/rmtb.2022.03.01.031

C. R. Snyder and Shane J. Lopez (2009). “Oxford Handbook of Positive Psychology.” Oxford University Press. ISBN 978-0-19-518724-3.

Creswell, J. W. (2003). “Research design: qualitative, quantitative, and mixed method approaches,” Thousand Oaks, Calif., Sage Publications.

Creswell, J. W. (2014). “Research design: Qualitative, quantitative, and mixed methods approaches.” Sage publications.

Crossan, F. (2003). “Research philosophy: towards an understanding.” *Nurse Researcher* (through 2013), 11(1), 46.

Czaja, R. & Blair, J. (1996). “Designing surveys: a guide to decisions and procedures,” Thousand Oaks, California; London, Pine Forge Press.

Daft, R L (1992). “Organizational Theory and Design”. M. N. St Paul: West Publishing Company.

Dania, A. A. (2017). “Sustainable construction at the firm level: case studies from Nigeria” (Doctoral dissertation, University of Reading).

Daoanis, L. E. (2012). “Performance Appraisal System: It’s Implication to Employee Performance.” *International journal of economics and management science*s, 2(3), 55-62.

Dar, M. S., Ahmed, S., & Raziq, A. (2017). “Small and medium-size enterprises in Pakistan: Definition and critical issues.” *Pakistan Business Review,* 19(1), 46-70.

De Winter, J. C. F., Dodou, D., & Wieringa, P. A. (2009). “Exploratory factor analysis with small sample sizes.” *Multivariate Behavioral Research,* 44, 147-181. DOI: 10.1080/00273170902794206

Debrah, Y. A., & Ofori, G. (2006). “Human resource development of professionals in an emerging economy: The case of the Tanzanian construction industry.” *The International Journal of Human Resource Management,* 17(3), 440-463. https://doi.org/10.1080/09585190500521425

Derbew, D. (2013). “Ethiopia’s renewable energy power potential and development opportunities.” Ministry of Water and Energy: Abu Dhabi, UAE.

Derbie, T. (2021). “The Impact of Access to Finance on firm’s growth and Innovation: Evidence from Ethiopia” (MSc. thesis, St. Mary’s University, Addis Ababa, Ethiopia).

Desalegn, G., & Tangl, A. (2022). “Enhancing Green Finance for Inclusive Green Growth: A Systematic Approach.” Sustainability, 14(12), 7416. https://doi.org/10.3390/su14127416

Dey, S., Arora, B., Dewangan, A., and Das, M. (2018). “Assessment of Competitive Bidding Strategy Scenarios in the Construction Industry of India.” *International Journal for Research in Applied Science and Engineering Technology,* 6(7) 371-381

Dhareshwar, C. (2018). “Technology utilization patterns and business growth in Small/Medium Enterprises.” arXiv preprint arXiv:1808.03956.

Dilger, R. J. (2013). “Small Business Administration 7 (a) loan guaranty program” (pp. 7-5700). Congressional Research Service.

Donkor, S. (2011). “Determinants of Business Failure: The Perspective of SMEs Building Contractors in the Ghanaian Construction Industry.” Master’s Thesis, Kwame Nkrumah University of Science and Technology, Kumasi.

Dubois, A., & Gadde, L. E. (2000). “Supply strategy and network effects—purchasing behaviour in the construction industry.” *European journal of purchasing & supply management,* 6(3-4), 207-215.

Durdyev, S., & Ismail, S. (2012). “Role of the construction sector in the economic development of Turkmenistan”. *EEST Part A: Energy, Science and Research,* 29, 883–890.

Durowoju, S. T. (2017). “Impact of Technological Change on Small and Medium Enterprises Performance in Lagos State.” *Economic and Environmental Studies,* 17(44), 743-756. https://doi.org/10.25167/ees.2017.44.7

Dziallas, M., & Blind, K. (2019). “Innovation indicators throughout the innovation process: An extensive literature analysis.” *Technovation,* 80, 3-29. DOI:10.1016/j.technovation.2018.05.005

Easterby-Smith, M., Thorpe, R., & Jackson, P., (2012). “Management Research.” London: Sage Publications.

Ebolor, A., Agarwal, N., & Brem, A. (2022). “Sustainable development in the construction industry: The role of frugal innovation.” *Journal of Cleaner Production*, 380, 134922. https://doi.org/10.1016/j.jclepro.2022.134922

Edwards, D. J., & Holt, G. D. (2009). “Construction plant and equipment management research: thematic review.” *Journal of Engineering, Design and Technology*, 7(2), 186-206. DOI 10.1108/17260530910974989

ERA, Ethiopian Road Authority, (2010). “Universal Rural Road Access Program. Addis Ababa.” Addis Ababa, Ethiopia

ERA, Ethiopian Road Authority, (2016). “Road sector development program 19 years performance assessment. Addis Ababa.” Addis Ababa, Ethiopia

EREDPC & SNV. (2008). “Ethiopian Rural Energy Development and Promotion Center (EREDPC) and Netherlands Development Organization (SNV). National Biogas Programme Ethiopia: Programme Implementation Document.”

Essien, U. I., & Ezekiel, N. 2021. “An Evaluation of Construction Workers Engagement and Management Approaches in Akwa Ibom State.” *International Research Journal of Modernization in Engineering Technology and Science*. Vol. 03(3), P499-504

Estay, C., Durrieu, F., & Akhter, M. (2013). “Entrepreneurship: From motivation to start-up.” *Journal of international Entrepreneurship*, 11(3), 243-267. https://doi.org/10.1007/s10843-013-0109-x

Faulks, B., Song, Y., Waiganjo, M., Obrenovic, B., & Godinic, D. (2021). “Impact of empowering leadership, innovative work, and organizational learning readiness on sustainable economic performance: an empirical study of companies in Russia during the COVID-19 pandemic.” *Sustainability*, 13(22), 12465. https://doi.org/10.3390/su132212465

Fida, B. A. (2008). “The Role of Small and Medium Enterprises (SMEs) in Economic Development.” Enterprise Development, Free Online Library.

Field, A. (2000). “Discovering Statistics using SPSS for Windows.” London – Thousand Oaks –New Delhi: Sage publications.

Fox, P.W., 2003. “Construction industry development: analysis and synthesis of contributing factors” (Doctoral dissertation, Queensland University of Technology).

Francom, T., Ariaratnam, S. T., & Asmar, M. E. (2016). “Cost performance of job order contracting (JOC) applied to wastewater pipeline engineering and construction projects.” Conference: Pipelines 2016 (pp. 64-70). DOI:10.1061/9780784479957.007

Ganesan, S., & Kelsey, J. (2006). “Technology transfer: international collaboration in Sri Lanka.” *Construction Management and Economics*, 24(7), 743-753. https://doi.org/10.1080/01446190600704703

Gebrehiwot, A., & Wolday, A. (2006). “Micro and small enterprises (MSE) development in Ethiopia: Strategy, regulatory changes and remaining constraints.” *Ethiopian journal of economics,* 10(683-2016-46843), 1-32. http://dx.doi.org/10.22004/ag.econ.249856

Ghoshal, S., & Bartlett, C. (2000). “Transnational management. In text, cases, and readings in cross-border management” (3rd ed.). Boston.

Giang, D.T. and Pheng, L.S., (2011). “Role of construction in economic development: Review of key concepts in the past 40 years.” *Habitat international*, 35(1), pp.118-125. https://doi.org/10.1016/j.habitatint.2010.06.003

Gimenez-Espin, J. A., Jiménez-Jiménez, D., & Martínez-Costa, M. (2013). “Organizational culture for total quality management.” *Total Quality Management & Business Excellence*, 24(5-6), 678-692. http://dx.doi.org/10.1080/14783363.2012.707409

Glowka, G., Kallmünzer, A., & Zehrer, A. (2021). “Enterprise risk management in small and medium family enterprises: the role of family involvement and CEO tenure.” *International Entrepreneurship and Management Journal*, 17(3), 1213-1231. DOI: 10.1007/s11365-020-00682-x

Godfrey, T. (2012). “Assessment of the causes of failure among small and medium sized construction companies in the Free State province.” (Doctoral Dissertation, University of Johannesburg), 1–268.

Guba, E. and Lincoln, Y. (1994). “Competing paradigms in qualitative research”, in Denzin, N.K. and Lincoln, Y.S. (Eds), Handbook of Qualitative Research, Sage, London.

Guarte, J. M., & Barrios, E. B. (2006). “Estimation under purposive sampling.” *Communications in Statistics-Simulation and Computation*, 35(2), 277-284. https://doi.org/10.1080/03610910600591610

Gulghane,A. A., & Khandve,P. V. (2015). “Management for construction materials and control of construction waste in construction industry: A review.” *International Journal of Engineering Research and Applications,* 5(4),59-64

Guta DD (2018). “Determinants of household adoption of solar energy technology in rural Ethiopia.” J Cleaner Prod 204: 193-204. DOI:10.1016/j.jclepro.2018.09.016

GTZ (2007). “Eastern Africa Resource Base: GTZ Online Regional Energy Resource Base: Regional and Country Specific Energy Resource Database: II - Energy Resource”

Haile, T. G. (2015). “Comparative Analysis for the SDPRP, PASDEP and GTP of the FDR of Ethiopia.” *Global Journal of Business, Economics and Management: Current Issues*, 5(1), 13-25. Doi: http://dx.doi.org/10.18844/gjbem.v5i1.61

Hailu, A. D., & Kumsa, D. K. (2021). “Ethiopia renewable energy potentials and current state.” *AIMS Energy,* 9(1), 1-14. DOI: 10.3934/energy.2021001

Hair J. F., Black, W. C., Babin, B. J &Anderson, R. E. (2010). “Multivariate data analysis: a global perspective” (7th ed.) Upper Saddle River, N.J.; London: Pearson Education.

Hakeem, I. Y., Althoey, F., & Hosen, A. (2022). Mechanical and durability performance of ultra-high-performance concrete incorporating SCMs. Construction and Building Materials, 359, 129430. https://doi.org/10.1016/j.conbuildmat.2022.129430

Hanák, T., & Marović, I. (2022). “Performance management in Czech construction: Public investors’ perspective.” *Tehnički glasnik*, 16(1), 113-120. https://doi.org/10.31803/tg-20211203121521

Hassab Elnaby, H. R., Hwang, W., & Vonderembse, M. A. (2012). “The impact of ERP implementation on organizational capabilities and firm performance.” *Benchmarking: An International Journal,* 19(4/5), 618-633. https://doi.org/10.1108/14635771211258043

Hassan, Z. A., Schattner, P., & Mazza, D. (2006). “Doing a pilot study: why is it essential?.” *Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia,* 1(2-3), 70.

Hardie, M., and Newell, G. (2011). “Factors influencing technical innovation in construction SMEs: an Australian perspective.” *Engineering, Construction and Architectural Management*. 18(6), 618 – 636. https://doi.org/10.1108/09699981111180926

Harris, S., & Wheeler, C. (2005). “Entrepreneurs' relationships for internationalization: functions, origins and strategies.” *International business review*, 14(2), 187-207. https://doi.org/10.1016/j.ibusrev.2004.04.008

Hawkins, J. (2011). “Promoting social opportunities in the procurement of construction projects.” *In Contemporary Issues in Construction in Developing Countries*.1st Edition (pp. 61-82). London Routledge. https://doi.org/10.4324/9780203847350

Haynie, J. M., Shepherd, D., Mosakowski, E., & Earley, P. C. (2010). “A situated metacognitive model of the entrepreneurial mindset.” *Journal of business venturing*, 25(2), 217-229. doi:10.1016/j.jbusvent.2008.10.001

He, Q., Wang, T., Chan, A. P., & Xu, J. (2021). “Developing a list of key performance indicators for benchmarking the success of construction megaprojects.” *Journal of Construction Engineering and Management*, 147(2), 04020164. DOI:10.1061/(ASCE)CO.1943-7862.0001957

Hillebrandt, P. M. (1985). “Economic theory and the construction industry” (pp. 12-19). London: Macmillan.

Hulin, C., Netemeyer, R. and Cudeck, R., (2001). “Can a reliability coefficient be too high?.” *Journal of Consumer Psychology,* 10(1/2), pp.55-58.

Ibrahim Yahaya Wuni & Geoffrey Qiping Shen (2020). “Critical success factors for modular integrated construction projects: a review,” *Building Research & Information*, 48:7, 763-784, DOI: 10.1080/09613218.2019.1669009

Ibrahim, A. R. B., Roy, M. H., Ahmed, Z., & Imtiaz, G. (2010). “An investigation of the status of the Malaysian construction industry.” *Benchmarking: An International Journal*, 17(2), 294-308.

ILO (2020). “Small-scale contractor development in the construction sector Employment-Intensive Investment Programme (EIIP)”, International Labor Office Geneva

Infelise, F. (2014). “Supporting Access to Finance by SMEs: Mapping the initiatives in five EU countries.” ECMI Research Report.

Islam, A., & Wahab, S. A. (2021). “The intervention of strategic innovation practices in between regulations and sustainable business growth: a holistic perspective for Malaysian SMEs.” *World Journal of Entrepreneurship, Management and Sustainable Development*, 17(3), 396-421. https://doi.org/10.1108/WJEMSD-04-2020-0035

Jekale, W. (2004). “Performance for public construction projects in developing countries: Federal road and educational building projects in Ethiopia.” (Doctoral dissertation, Doctoral Dissertation, Norwegian university of science and technology, Norway).

Jensen, M. C. (2003). “A theory of the firm: governance, residual claims, and organizational forms.” Harvard University Press.

Johnson, R., Onwuegbuzie, A., & Turner, L. (2007). “Towards a definition of mixed methods research.” *Journal of Mixed Methods Research,* 1, 112-133. DOI: 10.1177/1558689806298224

Jusoh, R., & Parnell, J. A. (2008). “Competitive strategy and performance measurement in the Malaysian context: An exploratory study.” *Management Decision*, 46(1), 5 – 31. DOI 10.1108/00251740810846716

Kalinichenko, L., Smachylo, V., & Khalina, V. (2019). “Realities and perspectives for human resources development of the construction sector.” *Economics. Ecology. Socium*, 3(1), 56-66. https://doi.org/10.31520/2616-7107/2019.3.1-6

Kamal, E. M., & Flanagan, R. (2014). “Key Characteristics of Rural Construction SMEs.” *Journal of Construction in Developing Countries*, 19(2) 1–13.

Keffa, S. (2014). “Integrated Housing Development Program (IHDP) As Instrument to Alleviate Urban Poverty The case of Addis Ababa Engaging the Challenges-Enhancing the Relevance Kuala Lumpur.”

Khan, B., & Singh, P. (2017). “The current and future states of Ethiopia’s energy sector and potential for green energy: A comprehensive study.” *In International Journal of Engineering Research in Africa* (Vol. 33, pp. 115-139). doi:10.4028/www.scientific.net/JERA.33.115

Kimberly, J. R., & Bouchikhi, H. (1995). “The dynamics of organizational development and change: How the past shapes the present and constrains the future.” *Organization Science*, 6(1), 9-18. https://doi.org/10.1287/orsc.6.1.9

Kimms, A. (2007). “On the amount and timing of project payments with hints to customary contracting in Germany.” *Gestão and Produção*, 14(3), 441-451. https://doi.org/10.1590/S0104-530X2007000300002

Kines, P., Andersen, L. P., Spangenberg, S., Mikkelsen, K. L., Dyreborg, J., & Zohar, D. (2010). “Improving construction site safety through leader-based verbal safety communication.” *Journal of safety research*, 41(5), 399-406. https://doi.org/10.1016/j.jsr.2010.06.005

Kongolo, M. (2010). “Job creation versus job shedding and the role of SMEs in economic development.” *African journal of business management*, 4(11), 2288.

Korkmaz, S., & Messner, J. I. (2008). “Competitive positioning and continuity of construction firms in international markets.” *Journal of Management in Engineering*, 24(4), 207-216. DOI: 10.1061/(ASCE)0742-597X(2008)24:4(207)

Koriom, N. K., Brahim, J., Zakaria, I., Kaish, A. A., & Mohsen, M. (2019). “The State of the art of materials management research in the construction industry.” In MATEC Web of Conferences (Vol. 266, p. 05013). EDP Sciences.

Kothari, A. R., Bickford, J. J., Edwards, N., Dobbins, M. J., & Meyer, M. (2011). “Uncovering tacit knowledge: a pilot study to broaden the concept of knowledge in knowledge translation.” *BMC health services research,* 11(1), 1-10. https://doi.org/10.1186/1472-6963-11-198

Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International.

Kruger, W., Fezeka, S., & Olakunle, A. (2019). “Ethiopia country report. Report 5: Energy and Economic Growth Research Programme (W01 and W05) PO Number: PO00022908. ”

Kulemeka, P.J., Kululanga, G. and Morton, D. (2015). “Critical factors inhibiting performance of small- and medium- scale contractors in sub-saharan region: a case for Malawi.” *Journal of Construction Engineering*, Vol. 2015, pp. 1-17, http://dx.doi.org/10.1155/2015/927614

Kulkarni, V., Sharma, R., & Hote, M. (2017). “Factors affecting material management onconstruction site.” In*ternational Research Journal of Engineering and Technology* (IRJET), 04(01), 474-478

Kumaraswamy, M., & Dulaimi, M. (2001). “Empowering innovative improvements through creative construction procurement.” *Engineering, Construction and Architectural Management*, 8(5/6), 325-334.

Kuoribo, E., Owusu-Manu, D. G., Yomoah, R., Debrah, C., Acheampong, A., & Edwards, D. J. (2021). “Ethical and unethical behaviour of built environment professionals in the Ghanaian construction industry.” *Journal of Engineering, Design and Technology*, Vol. 21 No. 3, p.840-861, DOI:10.1108/JEDT-02-2021-0108

Kuratko, D.F., (2005). “The emergence of entrepreneurship education: Development, trends, and challenges.” Entrepreneurship theory and practice, 29(5), pp.577-597. https://doi.org/10.1111/j.1540-6520.2005.00099.x

Kuratko, D. F., Fisher, G., & Audretsch, D. B. (2021). “Unraveling the entrepreneurial mindset.” *Small Business Economics*, 57(4), 1681-1691. https://doi.org/10.1007/s11187-020-00372-6

Langston, C., & Zhang, W. (2021). “DfMA: Towards an integrated strategy for a more productive and sustainable construction industry in Australia.” *Sustainability*, 13(16), 9219. https://doi.org/10.3390/su13169219

Land, T. (2000). “Implementing institutional and capacity development: conceptual and operational issues.” ECDPM Discussion Paper 14. 2000, Maastricht: ECDPM

Laryea, S.A. (2010). “Challenges and opportunities facing contractors in Ghana”, Presented at West Africa Built Environment Research (WABER) Conference, Accra.

Lechner, C., & Dowling, M. (2003). “Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms.” *Entrepreneurship & regional development,* 15(1), 1-26. DOI: 10.1080/08985620210159220

Legge, K. (2020). “Human resource management: Rhetorics and realities.” Bloomsbury Publishing.

Lema, N. M. (1996). “Construction labour productivity analysis and benchmarking - The case of Tanzania.” (Doctoral dissertation, Loughborough University, London, United Kingdom).

Le, P.L. and Nguyen, N.T.D. (2022). "Prospect of lean practices towards construction supply chain management trends", International Journal of Lean Six Sigma, Vol. 13 No. 3, pp. 557-593. https://doi.org/10.1108/IJLSS-06-2020-0071

Loader, K. (2018). “Small-and medium-sized enterprises and public procurement: A review of the UK coalition government's policies and their impact.” *Environment and Planning C: Politics and Space*, 36(1), 47-66.

Loens, K., Van Heirstraeten, L., Malhotra-Kumar, S., Goossens, H., & Ieven, M. (2009). “Optimal sampling sites and methods for detection of pathogens possibly causing community-acquired lower respiratory tract infections.” *Journal of clinical microbiology*, 47(1), 21-31. doi:10.1128/JCM.02037-08

Longenecker, J. G., Moore, C. W., Petty, J. W., Palich, L. E., & McKinney, J. A. (2006). “Ethical attitudes in small businesses and large corporations: Theory and empirical findings from a tracking study spanning three decades.” *Journal of Small Business Management*, 44(2), 167-183.

Loosemore, M. (2015). “Barriers to social enterprise in the UK construction industry.” In: Raidén, A B and Aboagye-Nimo, E (Eds) Procs 31st Annual ARCOM Conference, 7-9 September, Lincoln, UK, Association of Researchers in Construction Management, 407-416.

Lorenzoni, G., & Lipparini, A. (1999). “The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study.” *Strategic management journal*, 20(4), 317-338.

Ma, Z., Cai, S., Mao, N., Yang, Q., Feng, J., & Wang, P. (2018). "Construction quality management based on a collaborative system using BIM and indoor positioning." *Automation in Construction,* 92, 35-45. https://doi.org/10.1016/j.autcon.2018.03.027

Mafimidiwo, B., and Iyagba, R. (2016). "Comparative Study of Problems Facing Small Building Contractors in Nigeria and South Africa." *Journal of Emerging Trends in Economics and Management Sciences* (JETEMS), 7 (2), pp. 101–109.

Mahajan, Y. (2019). "A study and review of Pradhan Mantri Mudra Yojana (PMMY) in the state of Maharashtra." *International Journal of Advance and Innovative Research*, 6(2).

Makinde, T. (2005). "Problems of policy implementation in developing nations: The Nigerian experience." *Journal of Social sciences,* 11(1), 63-69.

Mahlanga, I. N. (2018). "The effectiveness of a contractor development programme in the development of small contractors-an evaluation of a road construction project in the Eastern Cape" (Master of Science in Engineering, University of the Witwatersrand, Johannesburg, South Africa).

Manikandan, M., Adhiyaman, M., & Pazhani, K. C. (2018). "A study and analysis of construction equipment management used in construction projects for improving productivity." *International Research Journal of Engineering and Technology*, 5(3), 1297-1303.

Mann, P. S. (2007). "Introductory statistics." (7th edition) John Wiley & Sons.

Manqoba S.M. Soni & John J. Smallwood (2023). "Perceptions of Corruption in the South African Construction Industry." *International Journal of Construction Education and Research*, DOI: 10.1080/15578771.2023.2179138

Martínez-Rosales, E., Hernández-Martínez, A., Sola-Rodríguez, S., Esteban-Cornejo, I., & Soriano-Maldonado, A. (2021). "Representation of women in sport sciences research, publications, and editorial leadership positions: are we moving forward?." *Journal of science and medicine in sport*, 24(11), 1093-1097.

Marut, J. J., Anigbogu, N. A., & Daniel, M. M. (2020). "Alternative Building Materials (ABM): towards adoption of common terminology and definitions." *Civil and Environmental Research*. 12(11), 16-23.

Mayne, J., and Zapic-Goni, E. (eds) (1997). "Monitoring Performance in the public sector," New Jersey: Transaction Books.

McAllister, D. J. (1995). "Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations." *Academy of management journal, Vol*. 38 No. 1, pp. 24-59.

McGee, J., & Sammut-Bonnici, T. (2015). "Wiley encyclopedia of management," volume 12: strategic management. John Wiley & Sons.

McGrath, R. G., & MacMillan, I. C. (2000). "The entrepreneurial mindset: Strategies for continuously creating opportunity in an age of uncertainty" (Vol. 284). Harvard Business Press.

Meijaard, J., Brand, M. J., and Mosselman, M. (2002). "Organisational structure and performance in Dutch SMEs." *EIM Business and Policy Research, Scientific Analysis of Entrepreneurship and SMEs, Zoetermeer,* (June), 1–23.

Meijaard, J., Brand, M.J. and Mosselman, M., 2005. "Organizational structure and performance in Dutch small firms." *Small Business Economics*, 25(1), pp.83-96.

Mengistu, D. G., & Mahesh, G. (2018). "Factors affecting construction industry development: Relationship with characteristics of the business environment." *International Journal of Advances in Mechanical and Civil Engineering*. 5(5) pp.49-53.

Mengistu, D. G. (2019). "Improving Determinant Factors to Facilitate Construction Industry Development in Ethiopia" (Doctoral dissertation, National Institute of Technology Karnataka, Surathkal).

Mengistu, D. G., & Mahesh, G. (2020). "Challenges in developing the Ethiopian construction industry." *African Journal of Science, Technology, Innovation and Development*, 12(4), 373-384. https://doi.org/10.1080/20421338.2019.1654252

Mengistu, D.G. and Mahesh, G., (2022). "Manpower development framework for Ethiopian construction industry." *International Journal of Construction Management*, 22(2), pp.121-132

Ministry of Finance and Economic Development, (MoFED) (2013). The Federal Democratic Republic of Ethiopia, Growth and Transformation Plan Annual Progress Report for F.Y. 2011/12 Addis Ababa, Ethiopia

Ministry of Finance and Economic Development, (2014). The Federal Democratic Republic of Ethiopia, Growth and Transformation Plan Annual Progress Report for F.Y. 2012/13, Addis Ababa, Ethiopia

Ministry of Works and Urban Development (MoWUD), (2010). Housing development report 2005-2010, Addis Ababa

Mjakuškina, S., Kavosa, M., & Lapiņa, I. (2019). "Achieving sustainability in the construction supervision process." *Journal of Open Innovation: Technology, Market, and Complexity*, 5(3), 47. Doi:10.3390/joitmc5030047

Mondal, M., Alam, H., Gebremeskel, A. G., Gebrehiwot, K., & Ringler, C. (2018). "Ethiopian universal electrification development strategies." Intl Food Policy Res Inst.

Moo, F. and Eyiah, A. (2020). "Factors influencing the growth of small and medium construction firms in northern Ghana." *Journal of African Business,* Vol. 21 No. 3, pp. 416-431. DOI:10.1080/15228916.2019.1641306

Moo, F., and Eyiah, A. (2019). "Factors Influencing the Growth of Small and Medium Construction Firms in Northern Ghana." *Journal of African Business*, 00(00), 1–16.

Morgan, G (1991). "Images of Organization Sage". Beverly Hills: CA.

Mouchi, G., Olabode Rotimi, J., & Ramachandra, T. (2011). "The skill sets required for managing complex construction projects." *Business Education & Administration*, 3(1), 89-100.

MoUDC (2012). "Construction Industry Policy", Ministry of Urban Development and Construction, Addis Ababa, Ethiopia.

Mueller, S. L., & Thomas, A. S. (2001). “Culture and entrepreneurial potential: A nine country study of locus of control and innovativeness.” *Journal of business venturing*, 16(1), 51-75.

Mukiibi, S. (2015). “The potential of local building materials in the development of low cost housing in Uganda.” *International Journal of Technoscience and Development (IJTD),* 2(1), 84-92.

Mullen, J., & Davison, P. (2019). “Evaluating Contract Claims (3rd ed.),” John Wiley & Sons.

Munn, P., & Drever, E. (1990). “Using Questionnaires in Small-Scale Research. A Teachers' Guide.” Scottish Council for Research in Education, 15 St. John Street, Edinburgh, EH8 8JR, Scotland, United Kingdom..

Murison, K. (Ed.). (2002). “Africa south of the Sahara 2003. Psychology Press.” Europa Publications, London, England

Musarat, M. A., Alaloul, W. S., & Liew, M. S. (2021). “Impact of inflation rate on construction projects budget: A review.” *Ain Shams Engineering Journal*, Vol. 12 No. 1, pp. 407-414. https://doi.org/10.1016/j.asej.2020.04.009

Mwelu, N., Davis, P. R., Ke, Y., Watundu, S., & Jefferies, M. (2021). “Success factors for implementing Uganda’s public road construction projects.” *International Journal of Construction Management,* 21(6), 598-614.

National Contractor Development Programme (NCDP), (2011). “Guidelines for Implementing Contractor development programs, South AfricaNeedle, David (2004). Business in Context: An Introduction to Business and Its Environment.”

Naumann, C. (2017). “Entrepreneurial mindset: A synthetic literature review.” *Entrepreneurial Business and Economics Review*, 5(3), 149-172.

Naoum S.G. (1998) “Dissertation Research and Writing for Construction Students”. Oxford: Reed Educational and Professional Publishing Ltd

Ndiaye, N., Razak, L. A., Nagayev, R., & Ng, A. (2018). "Demystifying small and medium enterprises'(SMEs) performance in emerging and developing economies." Borsa Istanbul Review, 18(4), 269-281.

Needle D. (2004). "Business in context: An introduction to business and its environment by David Needle (4th ed.)." Andover, Hampshire: Cengage Learning Business Press.

Neneh, B. N. (2011). "The impact of entrepreneurial characteristics and business practices on the long term survival of small and medium enterprises (SMEs)" (Doctoral dissertation, University of the Free State).

Neuman, W. L (1997). "Social research methods: qualitative and quantitative approaches" (3rd ed.), USA, Allyn & Bacon.

Ngek, B. N. (2012). "An exploratory study on entrepreneurial mindset in the small and medium enterprise (SME) sector: A South African perspective on fostering small and medium enterprise (SME) success." *African Journal of Business Management*, 6(9), 3364-3372.

Nguyen, C. (2020). "The impact of training and development, job satisfaction and job performance on young employee retention." *Job Satisfaction and Job Performance on Young Employee Retention* (May 1, 2020).

Nguyen, N. T., and Wongsurawat, W. (2012). "The impact of government policies on the development of small–and medium–sized enterprises: the case of Vietnam." *Journal for International Business and Entrepreneurship Development*, 6(2), 188.

Nguyen, P. T., Nguyen, V. N., Pham, L. H., Nguyen, T. A., Nguyen, Q. L. H. T. T., & Huynh, V. D. B. (2018). "Application of supply chain management in construction industry." *Advances in Science and Technology. Research Journal*, 12(2).

Nikpour, A. (2017). "The impact of organizational culture on organizational performance: The mediating role of employee's organizational commitment." *International Journal of Organizational Leadership*, 6, 65-72.

Nunnally, J. C., & Bernstein, I. H. (1994). "Psychometric theory, (3rd edition)." New. York: McGraw-Hill

Nwachukwu, C., & Chladkova, H. (2019). “Firm resources, strategic analysis capability and strategic performance: organisational structure as moderator.” Inte*rnational Journal for Quality Research*, 13(1) pp75-94.

Nzo, K. (2020). “Understanding the role of public preferential procurement on the development of black owned construction SMME'S IN South Africa” (Master's thesis, Faculty of Commerce).

Obodoh, D. A., & Obodoh, C. (2016). “Causes and effects of construction project delays in Nigerian construction industry.” Inte*rnational Journal of Innovative Science, Engineering & Technology*, 3(5), 65-84.

Odor, H. O. (2018). “Organisational culture and dynamics.” *Global Journal of Management and Business Research,* 18(A1), 23-29.

Oduro W. (2005). “Housing, Environment and the Poor in Ghana” Denmark: Aalborg University.

OECD (1997). “The OECD (Organization for Economic Commission and Development) Report on Regulatory Reform.” https://doi.org/10.1787/9789264189751-en

Offei, I., Kissi, E., and Nani, G. (2019). “Factors affecting the capacity of small to medium enterprises (SME) building construction firms in Ghana.” *Journal of Construction in Developing Countries,* 24(1), 49–63. https://doi.org/10.21315/jcdc2019.24.1.3.

Ofori, G. (1994). “Construction industry development: role of technology transfer.” *Construction management and economics,* 12(5), 379-392.

Ofori, G. and Toor, S.R. (2012). “Leadership and construction industry development in developing countries.” *Journal of Construction in Developing Countries,* 17(1): 1–21

Ofori, G. (Ed.). (2012). “New perspectives on construction in developing countries.” Oxon spon press, pp 253-276.

Ofori, G. (2012). “Developing the Construction Industry in Ghana: the case for a central agency. A concept paper prepared for improving the construction industry in Ghana.” National University of Singapore, 13(1), 3-18.

Ofori, G., 2015. “Nature of the construction industry, its needs and its development: A review of four decades of research.” *Journal of construction in developing countries*, 20(2), p.115.

Ofori, G. (2018). “Developing the construction industries in developing countries to enhance performance: the case of Ethiopia.” In Seventh Ethiopian Construction Technology and Management Professionals Association (ECoTMPA) International Workshop on Recent Trends in Construction Industry.

Ofori-Kuragu, J.K. (2020). “Construction industry developments in Ghana”, Improving the Performance of construction Industries for Developing Countries: Programmes, Initiatives, Achievements and Challenges, Routledge, Abingdon, Oxon, pp. 145-168.

Ogunbiyi, Moses A., Bamgboye, O. A. (2016). “Factors Affecting the performance of indigenous Small-Sized Indigenous Construction Firms in Lagos State.” *International Journal of Advance Research*, 4(1), 1–18.

Ojo, A., Ogunsina, O., & Ogunsemi, D. R. (2022). “Assessment of cost management practices of civil engineering (project procurement) organisations in Ondo State, Nigeria.” *Journal of Financial Management of Property and Construction*, 27(1), 57-75. DOI 10.1108/JFMPC-06-2020-0044.

Olabode, Y. B. (2021). “Effect of Entrepreneurial Characteristics on Business Performance of Selected SMEs in Kwara State.” (Doctoral dissertation, Kwara State University, Malete).

Olaniyan, O. M., Omodunbi, B. A., Adebimpe, E., Bolanle, W. W., Oyedepo, O. M., & Adanigbo, O. O. (2020). “Power Aware and Secured Routing Protocol in Mobile-Hoc Network: Ad A Survey.” *Technology*, 11(7), 706-717.

Olugboyega Adams, (1997). “Contractor development in Nigeria: perceptions of contractors and professionals,” *Construction Management and Economics*, vol. 15, no. 1, pp. 95–108,.

Okudan, G. E., & Rzasa, S. E. (2006). “A project-based approach to entrepreneurial leadership education.” *Technovation*, 26(2), 195-210.

Osabutey, E. L., Williams, K., & Debrah, Y. A. (2014). "The potential for technology and knowledge transfers between foreign and local firms: A study of the construction industry in Ghana." *Journal of world business,* 49(4), 560-571. https://doi.org/10.1016/j.jwb.2013.12.009

Osabutey, E. L., & Croucher, R. (2018). "Intermediate institutions and technology transfer in developing countries: The case of the construction industry in Ghana." *Technological Forecasting and Social Change,* 128, 154-163. https://doi.org/10.1016/j.techfore.2017.11.014

Osei, V. (2013). The construction industry and its linkages to the Ghanaian economy-polices to improve the sector's performance. International Journal of Development and Economic Sustainability, 1(1), 56-72.

Osisioma, H. E. (2009). "Effect of gender, age, and religion on choice of conflict management style in Nigerian organizations." *African Journal of Business and Economic Research,* 4(1), 90-105.

Othman, I., Idrus, A. and Napiah, M., (2012). "Human resource management in the construction of a sustainable development project: towards successful completion." *WIT Transactions on Ecology and the Environment,* 162, pp.169-180.

Oyewobi, L.O. (2014). "Modeling performance differentials in large construction organisations in South Africa." Ph.D. thesis, University of Cape Town, South Africa.

Papula, J. (1995). "Minimum of a manager: Profession that pays out (English version)." Bratislava: Elita

Patel, K. V., & Vyas, C. M. (2011). "Construction materials management on project sites." In National Conference on Recent Trends in Engineering & Technology (pp. 1-5).

Pearce, J. A., Robinson, R. B., & Subramanian, R. (2000). "Strategic management: Formulation, implementation, and control." Columbus, OH: Irwin/McGraw-Hill.

Pettit, T. J. (2008). "Supply chain resilience: development of a conceptual framework, an assessment tool and an implementation process." (PhD. thesis, Ohio State Univ Columbus)

Pihie, Z. A. L., Asuimiran, S., & Bagheri, A. (2014). “Entrepreneurial leadership practices and school innovativeness.” *South African Journal of Education,* 34(1). DOI:10.15700/201412120955

Piškanin, A. – Rudy, J. et al. (2006). “Introduction to management (English version).” Bratislava: Comenius University

Phaladi, M. J., & Thwala, W. D. (2008, March). “Critical success factors for small and medium sized contractors in North West province, South Africa.” In 5th Post Graduate Conference on Construction Industry Development (pp. 16-18).

Phan, P. H. (2000). “Knowledge creation in strategic alliances: another look at organizational learning.” *Asia Pacific Journal of Management* 17(2), 201–222. DOI:10.1023/A:1015857525048

Polit, D. F., & Beck, C. T. (2008). “Nursing research: Generating and assessing evidence for nursing practice.” Lippincott Williams & Wilkins.

Porter, M. E. (1985). “Competitive Advantage.” New York, the Free Press.

Pradhananga, P., ElZomor, M., & Gada, G. M. (2023). “Investigating the impact of alternative technical concepts for project delivery of accelerated bridge construction.” *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction* 15(2), P.04522059-1-11. DOI:10.1061/JLADAH.LADR-909

Quinn, R. E., & Cameron, K. (1983). “Organizational life cycles and shifting criteria of effectiveness: Some preliminary evidence.” *Management science,* 29(1), 33-51. DOI:10.1287/mnsc.29.1.33

Rakshit, B. and Bardhan, S. (2023), "Bank competition and SMEs access to finance in India: evidence from World Bank Enterprise Survey." *Asian Review of Accounting,* Vol. 31 No. 2, pp. 317-347. https://doi.org/10.1108/ARA-05-2022-0124

Ranjit Kumar, (1999). “Research methodology: a step by step guide for beginners 1st edition.” SAGE Publications Ltd1 Oliver’s Yard 55 City Road London EC1Y 1SP.

Rezgui, Y. (2007). “Exploring virtual team-working effectiveness in the construction sector.” *Interacting with computers,* 19(1), 96-112.

Robinson, H.S., Carrillo, P.M., Anumba, C.J. and A-Ghassani, A.M. (2005). "Review and implementation of performance management models in construction engineering organizations", *Construction Innovation,* Vol. 5 No. 4, pp. 203-217. https://doi.org/10.1108/14714170510815258

Rodell, J. B., & Colquitt, J. A. (2009). “Looking ahead in times of uncertainty: The role of anticipatory justice in an organizational change context.” *Journal of applied psychology,* 94(4), 989.

Ruchkina, G., Melnichuk, M., Frumina, S., & Mentel, G. (2017). “Small and medium enterprises in the context of regional development and innovations.” *Journal of International Studies,* 10(4).

R. Milford (2009). “Construction Industry Development in developing countries: Lessons and Opportunities.” CD3-KN05: 3rd *International Conference on Concrete & Development* pp 59-70

Sabir, M. N. (2015). “The Relationship between Entrepreneurship Characteristics and Attitude Towards Knowledge Commercialization” (Doctoral dissertation, Universiti Teknologi Malaysia).

Sahu, D., & Mohibullah. (2022). “Effective Criterion for Equipment Management in Construction Industry. In Recent Developments in Sustainable Infrastructure (ICRDSI-2020).” Structure and Construction Management: Conference Proceedings from ICRDSI-2020 Volume 1 (pp. 185-199). Singapore: Springer Nature Singapore.

Saltzman, L. (2006). “Making memory matter: Strategies of remembrance in contemporary art.” University of Chicago Press.

Salvi, S. S., & Kerkar, S. S. (2020). “Quality assurance and quality control for project effectiveness in construction and management.” *International Journal of Engineering Research & Technology* (IJERT), 9(2), 26-29.

Sánchez, A. G., Popescy, D., Chivu, I., Ciocârlan-Chitucea, A., and Popescu, D. O. (2011). "How to Improve Small and Medium-Sized Enterprises Profitability by Practicing an Efficient Human Resources Management." *Theoretical and Applied Economics*, 18(1).

Saunders, M., Lewis, P. H. I. L. I. P., & Thornhill, A. D. R. I. A. N. (2007). "Research methods." Business Students 4th edition Pearson Education Limited, England.

Schenkel, M. T., Farmer, S., & Maslyn, J. M. (2019). "Process improvement in SMEs: The impact of harmonious passion for entrepreneurship, employee creative self-efficacy, and time spent innovating." *Journal of Small Business Strategy*, 29(1), 71-84.

Schwab, K., & Sala-i-Martin, X. (2014, May). "The global competitiveness report 2014–2015." *In World economic forum* (Vol. 549, pp. 36-38).

Seker, M. (2010). "Trade performance in Eastern Europe and central Asia." *Enterprise surveys note series*, (19).

Setiawan, H., & Erdogan, B. (2020). "Key factors for successful corporate entrepreneurship: a study of Indonesian contractors." *International Journal of Construction Management*, 20(3), 252-268.

Shah, A., & Mali, A. (2019). "Impact of Pradhan Mantri MUDRA Yojana in India." *Research review, international journal of multidisciplinary* 4(4), 9-12

Shakantu, W.M.W. (2003). "Corruption in the construction industry: Forms, Susceptibility and Possible Solutions," 1st Postgraduate conference 2003 of the CIDB ON Construction industry development, Port Elizabeth, Construction South Africa pp. 274-283.

Shane, S. A. (2003). "A general theory of entrepreneurship: The individual-opportunity nexus." Edward Elgar Publishing.

Shane, S., & Venkataraman, S. (2000). "The promise of entrepreneurship as a field of research." Academy of management review, 25(1), 217-226.

Shibia, A. G., & Barako, D. G. (2017). “Determinants of micro and small enterprises growth in Kenya.” *Journal of Small Business and Enterprise Development*, 24(1), 105-118.

Shifidi, I. (2010). “Small Builders in the Namibian Construction Sector: Opportunities, Challenges and Support Strategies.” *Economic Research Southern Africa, Cape Town*, 1–30.

Shi, C., Chen, Y., Hua, Y. and Tang, Y. (2023). "Understanding subcontracting organizational arrangements for construction projects in China: integrating capabilities and uncertainty", *Engineering, Construction and Architectural Management*, Vol. 30 No. 6, pp. 2381-2399. https://doi.org/10.1108/ECAM-11-2019-0631

Shooshtarian, S., Maqsood, T., Wong, P. S., Khalfan, M., & Yang, R. J. (2021). “Extended producer responsibility in the Australian construction industry.” *Sustainability*, 13(2), 620. https://doi.org/10.3390/su13020620

Slaughter, E.S., 2000. “Implementation of construction innovations.” *Building research & information*, 28(1), pp.2-17.

Sianipar, C., Dowaki, K., Yudoko, G. and Adhiutama, A., (2013). “Seven pillars of survivability: Appropriate technology with a human face.” *European Journal of Sustainable Development*, 2(4), pp.1-18.

Smallbone, D., & Welter, F. (2001). “The role of government in SME development in transition economies.” *International Small Business Journal*, 19(4), 63-77.

Smiley, J. P., Fernie, S., & Dainty, A. (2014). “Understanding construction reform discourses.” *Construction management and economics*, 32(7-8), 804-815. DOI:10.1080/01446193.2014.909049

Sianipar, C. P. M., Yudoko, G., Adhiutama, A., & Dowaki, K. (2013). “Community empowerment through appropriate technology: Sustaining the sustainable development.” *Procedia Environmental Sciences*, 17, 1007-1016.

Singh, S., R.D. Pathak, Himanshu Shee, Azhar Kazmi, and David Parker (2013). "Interplay between entrepreneurial characteristics, organisational structure, corporate culture and SME performance: Empirical results from Fiji Islands." *International Journal of Entrepreneurship and Small Business,* 18(2), 229–246.

Soomro, B. A., Abdelwahed, N. A. A., & Shah, N. (2019). "The influence of demographic factors on the business success of entrepreneurs: An empirical study from the small and medium-sized enterprises context of Pakistan." *International Journal of Entrepreneurship,* 23(2), 1-12.

Stewart, J. and Hamlin, B. (1992). "Competency-based Qualifications: The Case against Change", Journal of European Industrial Training, 16(7): 21–32.

Stiles, J. (2003). "A philosophical justification for realist approach to strategic alliance research." *Qualitative Market Research: An International Journal,* 6(4), 263-271. DOI:10.1108/13522750310495346

Suprun, E. V., & Stewart, R. A. (2015). "Construction innovation diffusion in the Russian Federation: Barriers, drivers and coping strategies." *Construction Innovation.* 15(3):278-312 DOI:10.1108/CI-07-2014-0038

Swinscow, T. D. V., & Campbell, M. J. (2002). "Statistics at square one" (10th edition). London: Bmj.

Teo, E. A. L., Chan, S. L., & Tan, P. H. (2007). "Empirical investigation into factors affecting exporting construction services in SMEs in Singapore." *Journal of Construction Engineering and Management,* 133(8), 582-591. DOI: 10.1061/(ASCE)0733-9364(2007)133:8(582).

Tendai, C. (2013). "Networks and performance of small and medium enterprises (SMEs) in different stages of the life cycle: A case study of a small business in the Netherlands." *Journal of Communication,* 4(2), 89-94

Tesha, D. N. G. A. K., Luvara, V. G., Samizi, M., & Lukansola, D. (2017). "Growth trend of local building contractors for the period of 2005-2015 in Dar Es Salaam, Tanzania." *International Research Journal of Engineering and Technology,* 4(7), 2082-2102.

Thakkar, J., Kanda, A., & Deshmukh, S. G. (2008). “Supply chain management in SMEs: development of constructs and propositions.” *Asia Pacific Journal of Marketing and Logistics*, 20(1), pp.97- 131.

Thwala, W. D., & Mvubu, M. (2009). “Problems facing small and medium size contractors in Swaziland.” *Journal of Service Science and Management,* 2(04), 353.

Toor, S. U. R., & Ofori, G. (2008). “Developing construction professionals of the 21st century: Renewed vision for leadership.” *Journal of Professional Issues in Engineering Education and Practice,* 134(3), 279-286. DOI:10.1061/(ASCE)1052-3928(2008)134:3(279)

Ugoani, J. (2020). “Effective Delegation and its impact on employee Performance.” *International Journal of Economics and Business Administration,* 6(3), 78-87.

UNDP, (2009). “A Handbook for Planning, Monitoring and Evaluating for development results.” New York: United Nations Plaza.

UN-HABITAT, (2011). “Condominium Housing in Ethiopia,” volume: 978-92-1-132326-9, pp 1-53, Nairobi, UNON publishing Services Section.

Upite, I., Pilvere, I., & Nipers, A. (2011). “Economic Evaluation of Administrative Burden for Construction in Jelgava Municipality.” *International Journal of Economics and Finance Studies*, 3(2), 127-136.

Vacharapoom Benjaoran , Anucha Anucha , and Wisitsak Tabyang (2012). “A development of a cost control system for small and medium-sized contractors.” *International Journal of Engineering and Technology* 4(3):243-247 DOI:10.7763/IJET.2012.V4.358

Walker, D. H. T. (1997). “Choosing an appropriate research methodology.” *Construction Management & Economics,* 15 (2), 149.

Walliman, N. (2010). “Research methods: The basics.” Routledge.

Wei, Y. (2007). “Factors influencing the success of virtual cooperation within Dutch–Chinese strategic alliances.” University of Twente.

Westhead, P., Wright, M. and Ucbasaran, D., 2004. “Internationalization of private firms: environmental turbulence and organizational strategies and resources.” *Entrepreneurship & Regional Development,* 16(6), pp.501-522. https://doi.org/10.1080/0898562042000231929

Wirahadikusumah, R. D., & Pribadi, K. S. (2011). “Licensing construction workforce: Indonesia's effort on improving the quality of national construction industry.” *Engineering Construction & Architectural Management* 18(5):431-443 DOI:10.1108/09699981111165158

Wolf, C., & Cheng, S. K. (2018). “Chinese FDI in Angola and Ethiopia: between flying geese and resource colonialism?” *IDCEA working paper 2. London:* SOAS University of London.

World Economic Forum. (2016). “Shaping the future of construction: a breakthrough in mindset and technology.” Cologny, Switzerland.

Worku, I. (2011). “Road Sector Development and Economic Growth in Ethiopia”, No. 4, Ethiopian Development Research Institute (EDRI), Addis Ababa

Xiao, H. (2002). “A comparative study of contractor performance based on Japanese, UK and US construction practice,” PhD thesis, SEBE, University of Wolverhampton, Wolverhampton.

Yahya, M. Y. (2015). “The development of strategic planning concept process model for small medium enterprise (SME) in the construction industry” (Doctoral dissertation, Universiti Tun Hussein Onn Malaysia).

Yamin, S.Gunasekaran, A., & Mavondo, F. T. (1999). “Relationship between generic strategies, competitive advantage and organizational performance: an empirical analysis.” *Technovation,* 19, 507-518. https://doi.org/10.1016/S0166-4972(99)00024-3

Yoon, J. H., & Pishdad-Bozorgi, P. (2022). “State-of-the-art review of blockchain-enabled construction supply chain.” *Journal of construction engineering and management,* 148(2), 03121008 (1-19). https://doi.org/10.1061/(ASCE)CO.1943-7862.0002235

Yu, X., Yan, J., & Assimakopoulos, D. (2015). “Case analysis of imitative innovation in Chinese manufacturing SMEs: Products, features, barriers and competences for transition.” *International Journal of Information Management,* 35(4), 520-525. https://doi.org/10.1016/j.ijinfomgt.2015.03.003

Zakeri, M., Olomolaiye, P.O., Holt, G.D. and Harris, F.C. (1996). “A survey of constraints on Iranian construction operatives’ productivity.” *Construction Management and Economics*, Vol. 14 No. 5, pp. 417-25. DOI: 10.1080/014461996373287

Zaneldin, E. K. (2018). “Investigating the types, causes and severity of claims in construction projects in the UAE.” *International Journal of Construction Management* 20(2):1-17 DOI:10.1080/15623599.2018.1484863

Zegeye A., Worku A., Tefera D., Getu M., Sileshi Y. (2009) “Introduction to Research Methods: Preparatory module for Addis Ababa University graduate programs” Addis Ababa, Addis Ababa University.

Zhang, S.B., Chen, J. and Fu, Y. (2020). "Contract complexity and trust in construction project subcontracting." *Engineering, Construction and Architectural Management,* Vol. 27 No. 9, pp. 2477-2500. https://doi.org/10.1108/ECAM-02-2019-0113

Zhao, L., & Aram, J. D. (1995). “Networking and growth of young technology-intensive ventures in China.” *Journal of business venturing*, 10(5), 349-370. https://doi.org/10.1016/0883-9026(95)00039-B

Zhou, Y., Dongjian, Z., Zhuoyan, C. and Yongtao, L., 2020. “Research on a novel inclinometer based on distributed optical fiber strain and conjugate beam method.” *Measurement*, 153, p.107404. https://doi.org/10.1016/j.measurement.2019.107404

APPENDIX I: QUESTIONNAIRE NUMBER ONE

(Questionnaire for all Construction Industry Stakeholders)

Dear Sir/Madam

Thank you so much for taking time out of your busy day to answer the questionnaire. We value your support in such a great amount, as your input will legitimately assist us with improving Ethiopian small and medium construction contractors' sustainable competency.

The research is conducted for the partial fulfillment of the requirement for the degree of Doctor of Philosophy in civil engineering submitted to National Institute of Technology Karnataka Surathkal, India. The attached questionnaire investigates factors affecting the sustainable competency of small and medium contractors in Ethiopian construction industry. To successfully conduct this research, it is mandatory to look into the issues from different perspectives by involving different stakeholders and professionals. In this respect, you are the one who can give the correct information; hence we kindly request you to respond to the questions.

We would like to confirm you that your response will be kept strictly confidential and it will be used exclusively for the purpose of this research. Besides, your quick response is vitally important in order to finalize the research timely and maintain paper quality.

Thank you very much once again for your time and cooperation, and we are looking forward to receive your response sooner.

For any questions or suggestions please contact us at: email: abriti2007@gmail.com or Mob. +251941294295

Kind Regards,

The Researchers

1. **Part 1.**

Objective of the Survey

- ✓ Identify factors affecting sustainable competency of SMCs in Ethiopian CI and the status of improvement;

1. **Part 2.**

General Information

1.1. Respondent's background

- ✓ Educational background ☐ BSc. ☐ MSc. ☐ Ph.D. ☐ Other
- ✓ Current position ……
- ✓ Work experience ……..... (in years)

Address (Optional)

Name: ……..….

Phone: ……..…….

E-mail: ……..……

1.2. Company's background

- ✓ Company's Name *(Optional)* ……
- ✓ Company category ☐ Contractor ☐ Consultant ☐ Govt. organization ☐ Other
- ✓ Area of establishment ☐ Building ☐ Road ☐ General contractor ☐ Other
- ✓ Experience in the industry……..... (in years)
- ✓ Grade of the company……..

2. **Part 3.**

Variables Affecting the Sustainable Competency of Small and Medium Contractors (SMCs)

This part has three subsections. The first part of this subsection deals with the internal factors affecting the sustainable competency of SMCs whereas, the second subsection deals with the external factors affecting the sustainable competency of SMCs and the last subsection deals with the identification of comprehensive development approaches and improvement mechanisms in the areas of sustainable competency development.

2.1. Internal factors affecting the sustainable competency of SMCs

No.	According to your experience, which one of the following internal factor affects the sustainable competency of SMCs? Please rate their impact level in relation to your personal experiences as per the following measurement scales: *[1] = Very low; [2] = Low;[3] = Moderate; [4] = High; [5] = Very high*	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1	**Variables emanating from organizational structure**					
	Organizational specialization and task diversification					
	Existence of comprehensive control systems					
	Company policies and procedures					
	Suitability of the organization structure (i.e. number of existing organizational units and their hierarchical levels)					
	Communication and coordination between organizational units					
	Company demographics (age of the firm, stage of maturity, number of employees, and geographic region)					
	Formalization and standardization of activities within the company					
	Employee's strategic and operational decision making power (i.e. decentralization)					
2	**Variables emanating from organizational culture**					
	Presence of defined task assignment and measurement techniques					
	Presence of organizational adhocracy culture (i.e. creativity, innovation, and risk-taking)					
	Presence of organizational clan culture (i.e. participation, discretion teamwork, and integration)					
	Presence of organizational bureaucratic culture (i.e. common attitudes, values, convictions, and orientations)					
	Attitude of top management					
	Training and staff development					
	Availability of rewarding and incentive systems					
	Organizational leadership style					
3	**Variables emanating from characteristics of entrepreneur**					
	The practice of searching and discovering new solutions					
	The practice to forecast the future from once own instinct					
	The practice to make decision based on own judgment					
	Existence of matured and developed entrepreneurial mind-sets					
	The practice of searching for additional opportunities for reaching the set objectives					
	The practice to lead individuals by inspiration and by motivation					
	The practice to set a genuine objective and sense for achieving it					
	Confidence in own quality and capacity to accomplish objectives					
	Entrepreneur's demography (i.e. age, education, gender, socio- economic origin, and ethnicity)					
	The practice of receiving and disseminating information					
	The practice of self-control and regulation of own behavior					
4	**Variables emanating from competitive strategy**					
	Market coverage					
	Bidding factors (i.e. experience and resources)					
	Availability of institutional and business relationships (i.e. relationship and alliances with suppliers, owners, competitors, government entities, and etc.)					
	Image and reputation of the organization					
	The practice of setting a defined corporate strategy (i.e. vision, mission, objectives, strategies and plans) and implement them accordingly					
	Ability to compete (number, kind of competitors and range of competitive pressure from the level of equilibrium in demand and supply)					
	The practice to utilize external advice (i.e. accountant; lawyer, and business consultant)					

	The practice of being less expensive than competitors (i.e. cost leadership strategy)					
	The practice to make a strategic selection of potential client (i.e. focus strategy)					
5	**Variables emanating from organizational resources**					
	Inappropriate financial policies adopted within the country					
	Inability to access plants and equipment					
	Inability to access financial resources (i.e. strict credit terms; high-interest rate; strict requirements for obtaining bonds/guarantees/sureties)					
	High cost of materials, labor force, innovation and technology					
	High staff turnover					
	Poor quality and competencies of human capital					
	Inability to access information resources					
	Ineffective and inconsistent resource management practice					
6	**Variables emanating from managerial skill and competency**					
	Inability to establish and implement strategy					
	Inability of entrepreneurs in understanding the construction process					
	Lack of contractual negotiation skill					
	Lack of project management skills (i.e. planning, organizing, controlling, motivating, communicating, and leading)					
	Lack of supply value chain management skills					
	Lack of technical skills					
	Lack of ICT and information management skills					
	Lack of human resources management skills					
	Lack of legal skills					
	Ineffective financial management ability (i.e. estimating, cash flow and cost control)					
	Inability to handle multiple project at once (i.e. at organization level)					
7	**Variables emanating from tendering and contract administration**					
	Inability to cover tendering expense					
	Failure to complete and submit the bid document within the allotted tender floating time					
	Poorly designed contract document (i.e. inappropriate and incomplete contract documents; weak enforcement of contract conditions; and failure to resolve contract disputes)					
	Routine discontinuity of work					
	Inability to utilize preferential/affirmative procurement systems					
	Reviling BOQ pricing in secret and unethical behavior within a firm staffs					
	Low profit margin due to competition					
	Inability to understand, administer and interpret specifications and contract clauses					
	Failure to secure prequalification criteria and technical threshold					
	Poor pricing and contract administration skill					

If there are any other internal factors, please list/specify on the following table and please scale them in relation to your personal experiences as per the following measurement scales.

No.	Internal factors affecting the sustainable competency of SMCs.	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1						
2						
3						
-						
-						

2.2. External factors affecting the sustainable competency of SMCs

No.	According to your experience, which one of the following external factor affects the sustainable competency of SMCs? Please rate their impact level in relation to your personal experiences as per the following measurement scales: *[1] = Very low; [2] = Low;[3] = Moderate; [4] = High; [5] = Very high*	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1	**Variables emanating from government policies**					
	High interest rates and inflation (magnitude and stability)					
	Weak institutional capacity to execute policy frameworks					
	Poor infrastructure development policy					
	Highly fragmented and inconsistent construction industry policy					
	Inadequate policy vision and failure to understand local needs and demands					
	Unfavourable macroeconomic policies					
	Inadequate supportive institutional arrangements					
	Unfavourable financial policy					
2	**Variables emanating from regulatory framework**					
	Poor co-ordination and collaboration of institutions responsible for formulation and amendment of regulatory framework					
	Stringent social regulations (i.e. environmental and social cohesion)					
	Regulatory and legal restrictions					
	Weak institutional capacity to execute regulatory frameworks					
	Unfavorable economic regulations (i.e. restriction on pricing and competition, market entry/exit, pricing controls, restrictions on normal commercial practices)					
	Regulatory and legislative inflation					
	Unfavorable administrative regulations (i.e. strict administrative formalities and regulatory rigidity)					
3	**Variables emanating from Industry Networks**					
	Lack of trust between parties in the industry (i.e. honesty, integrity, and openness)					
	Poor supply chain relationships					
	Weak professional and industry associations					
	Weak joint risk assessment and management practice					
	Poor construction R and D					
4	**Variables emanating from culture of competitive bidding**					
	Fragmented competitive bidding process					
	Presence of informal construction system					
	Shrinkage in construction demand					
	Uncertainty in supplies of materials and prices					
	Threat from substitute commodities in the construction industry					
	Higher buyer's and suppliers bargaining power					
	Construction industry dynamics					
	Undesirable effect of globalization					
	Inability of SMCs to compete with bigger construction companies					
5	**Variables emanating from Technology and Innovation**					
	Reliance on foreign sources (i.e. materials, professional consultancy and contracting)					
	Inability to afford innovative construction technologies					
	Gap in linking modern technology with the traditional practice					
	Inability of development models to stimulate the development of local technologies					
	Insufficient investment in science and technology					
	Technological sophistications					
	Inability to select and manage suitable technologies					
	Inadequate or poor coordination of government agencies in promoting and/or supporting technology development initiatives					

	Poor linkages between CI and R&D institutions					
	Inadequate physical infrastructure and information necessary for investments in technology					
	Non supportive social structures and culture of implementing technology					
	Inefficient mechanisms to facilitate the transfer technologies and inability to know what is to be transferred					
	Poor access to technology					

If there are any other external factors, please list/specify on the following table and please scale them in relation to your personal experiences as per the following measurement scales.

No.	External factors affecting the sustainable competency of SMCs.	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1						
2						
3						
-						

2.3. Management mechanisms used to improve the factors affecting the sustainable competency of SMCs

No.	According to your experience, rate the required level of management mechanisms used to improve the factor affecting the sustainable competency of SMCs? Please scale them in relation to your personal experiences as per the following scales: *[1] = Very low; [2] = Low;[3] = Moderate; [4] = High; [5] = Very high*	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1	**Variables emanating from revaluing entrepreneurial features of the firm**					
	Improved organizational structure and culture					
	Adoption of decision support system, avoiding intuition and personal judgment for decision-making;					
	Effective risk management and proper financial management practices					
	Effective working interactions, goal alignment and reliance					
	Practice of project planning, scheduling and performance tracking					
	Improving contract management practice					
	Improve documentation and information management					
	Strategic workforce planning, smart hiring, and enhanced retention					
	Improving communication management practice					
	Enhance corporate leadership, commitment and decision making capacity					
	Well defined appropriate structures and operating models					
	Defined appropriate structures and operating models within the firm					
	Align the organizational design with individual capabilities, roles, accountabilities and collaboration					
2	**Variables emanating from enhancing institutional capability and operating environment**					
	Promote traditional financing mechanisms; innovative financial systems and alternative sources of funding					
	Establishment of a government agency accountable for studying and promoting the industry					
	Develop financial institutions' capacity and establish new financial institutions					
	Introduction of sector specific financing programs					
	Simplify business registration and licensing procedures					
	Conducive contractor development programs and institutional support					
	Development of appropriate training and mentorship services					
	Improved and simplified procedures for assessing finance					

	Promote outsourcing of works for subcontractors					
	Promote alternative project delivery system					
	Strengthen professional institutions and trade associations					
	Developed construction ethics and professionalism					
	Harmonized regulatory frameworks					
	Develop appropriate construction regulations, standards and codes					
	Continuous contractor registration, grading and performance assessment					
	Introduce affirmative procurement and incentive mechanisms					
	Flexibility of govt. attitudes in modifying regulations, procurement system and contract conditions with less bureaucracy and administration process					
	Employ innovative and corruption-resilient procurement environment					
	Attention to best practice and use of industry benchmarking					
	Effective claim management and dispute resolution methods					
	Develop integrated market system and value chain as a focus					
	Strengthen government capacity to coordinate, track, monitor and evaluate the effective implementation of policies and development frameworks					
	Economic liberalization					
	Promote contract splitting					
3	**Variables emanating from construction technology development and innovation**					
	Promote the purchase of technical and advisory services on technologies					
	Appropriate labour-intensive techniques and management approaches					
	Promote indigenous knowledge and skills					
	Strategic use of construction information technology					
	Smart and life-cycle-optimizing equipment					
	R&D on locally suitable technologies					
	Foster innovation and diffusion of affordable technology					
	Technology domestication and incubation services					
	Build absorptive capacity for already existing technologies					
	Formulation and updating of regulations and standards for technologies and best practices					
4	**Variables emanating from sustainable construction material supply chain**					
	Development, adaptation or exploration of hybrid techniques and tools (i.e. modern with the traditional)					
	Promotion of local material suppliers					
	Infrastructure development for quality assessment					
	Research and development on local materials					
	Revision of codes, procedures and documents on construction materials					
	Protection- discouraging imports of construction materials					
	Standardization of local construction materials and quality guidelines					
	Adoption of appropriate technologies					
	Education and training on local materials					
	Encourage local construction material producers and develop their capacity					
5	**Variables emanating from human resource development**					
	Promotion of and grants for R&D					
	Reviewing and revising registration and licensing system of industry professionals					
	Encourage industry based education system					
	Procure basic skills of management and continuous profession development					
	Create, encourage and promote self-development opportunities					
	Structured training and enhanced institutional support					
	Promote mentor system (main contractor/subcontractor)					

If there are any other management mechanisms, please list/specify on the following table and please scale them in relation to your personal experiences as per the following measurement scales.

No.	Management mechanisms used to improve the factors affecting the sustainable competency of SMCs	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
1						
2						
3						
-						
-						

APPENDIX II: QUESTIONNAIRE TWO

(Questionnaire for SMCs who participated in CDP)

1. **Part 1.**

Objective of the Survey

- ✓ Examine development strategies practiced and their effect on the sustainability of organizational and industrial competency;

2. **Part 2.**

General Information

2.1. Respondent's background

- ✓ Educational background ☐ BSc. ☐ MSc. ☐ Ph.D. ☐ Other
- ✓ Work experience ……..... (in years)

Address (Optional)

Name: ……..….

Phone: ……..…….

E-mail: ……..……

2.2. Company's background

- ✓ Company's Name *(Optional)* ……
- ✓ Area of establishment ☐ Building ☐ Road ☐ General contractor ☐ Other
- ✓ Experience in the industry……..... (in years)
- ✓ Grade of the company on the contractor register ……..

3. **Part 3.**

This part has three subsections. The first part of this subsection deals with the measure of the development program participant's overall satisfaction, whereas, the second subsection deals measure of overall knowledge gained and skill developed from development program and the last subsection deals with the institutional challenges faced during and post development program.

3.1. Measure of the development program participant's overall satisfaction

According to your experience, kindly indicate the extent of your satisfaction as per the following measurement scales. *[1] = Strongly disagree, [2] = Disagree, [3] = Neutral, [4] = Agree, [5] = Strongly agree*	***Please tick on the box***				
	1	***2***	***3***	***4***	***5***
The program has enhanced my understanding of the construction environment					
The program has afforded me sustainable contracting opportunity to get more contracts and enhanced my chances of tendering					
The program has given financial institutions the confidence and certainty to assist					
The program has improved my performance and enabled me to complete projects within the required quality, cost and time					
The program has improved my relationship with the industry stakeholders					
The program has improved my grading status					
The program approach and mode of delivery was simple and easy to understand					
The program was relevant and responsive to industrial needs					
The program has recognized the psychology of participants					
The program has increased my access to resources (i.e. information, technology, equipment, material, and etc.)					
The program has created an opportunity and support for developing my technical knowledge and skill					
The program has increased my entrepreneurial traits					
The program has helped me to utilize indigenous technologies and local resources					

If there are any other unmentioned satisfactions you've gained, please list/specify on the following table and please rate them in relation to your personal experiences as per the following measurement scales.

Program participant's satisfaction	***Please tick on the box***				
	1	***2***	***3***	***4***	***5***

3.2. Measure of overall knowledge gained and skill developed from development program

Knowledge Area	According to your experience, how do you rate the following knowledge gained and skill developed from the development program that you took part. Kindly scale them in relation to your personal experiences as per the following measurement scales. *[1] = Strongly disagree, [2] = Disagree, [3] = Neutral, [4] = Agree, [5] = Strongly agree*	***Please tick on the box***				
		1	***2***	***3***	***4***	***5***
Construction materials management	Material estimation, budgeting, planning and programming					
	Construction materials supply management					
	Construction materials handling, storage and inventory management					
	Scheduling, purchasing and procurement of construction materials					
Construction site supervision	Project planning, coordinating and controlling (i.e. cost, schedule, quality; project scope and etc.)					
	Construction contract documents management					
	Daily recordings and reports preparation					
	Variation orders management					
Construction equipment and plant management	Construction equipment and plant access, handing and management					
	Construction equipment and plant scheduling and deployment					
	Construction equipment and plant productivity and cost analysis					
Construction Costing (Cost Engineering)	Tender and pre-tender cost estimating					
	Price forecasting, cost norms and price indices preparations					
	Construction price analysis					
	Cost benefit analysis and risk-return assessment					
Construction performance management	Project and site organization					
	Cost and schedule performance analysis					
	Cash flow analysis and monitoring					
	Construction project risk management					
Human resource management	Employment contract and manpower recruitment					
	Human resource development strategies					
	Construction project team development and employees motivation					
	Leadership quality					
	Labor disputes and complain handling systems					
	Employees Health and safety at the construction project site					
Financial management	Financing decisions making, source of finance , financial statement and analysis					
	Working capital management, capital budgeting, system of monitoring and control					
Low cost construction	Low cost construction materials, methods and technologies used					

If there are any other internal factors, please list/specify on the following table and please scale them in relation to your personal experiences as per the following measurement scales.

Knowledge gained and skill developed from development program	***Please tick on the box***				
	1	***2***	***3***	***4***	***5***

3.3. Institutional challenges faced during and post development program

According to your experience, how do you rate your level of agreement on the following institutional challenges faced during and post development program that you were a part. Kindly scale them in relation to your personal experiences as per the following measurement scales. *[1] = Strongly disagree, [2] = Disagree, [3] = Neutral, [4] = Agree, [5] = Strongly agree*	***Please tick on the box***				
	1	***2***	***3***	***4***	***5***
Institutional challenges					
During the Program					
Outrageous work overburden due to a large number of project participants					
Training budget limitation					
Poorly designed training and technical support schemes					
Inadequate and incompetent human capital in delivering the program					
Limited intake capacity					
Shortage of appropriate training materials					
Absence of emphasis on practical training					
The program lacks minimum pre-qualification criteria as pre-requisite					
After graduating from the program (Post Program)					
Poor capacity of financial institutions and inadequate support system					
Unsatisfactory supply chain management					
Absence of appropriate recording, monitoring and evaluation system of the contractors involved within the program					
Limited capacity of the government structure and development partners					
Poor information and communication services					
Delay and poor quality of locally assembled construction equipment					
Corruption					
Political interference in contract award					

If there are any other challenges faced, please list/specify on the following table and please scale them in relation to your personal experiences as per the following measurement scales.

Institutional challenges faced during and post development program	***Please tick on the box***				
	1	***2***	***3***	***4***	***5***

APPENDIX III: INTERVIEW GUIDE ONE

(Interview guide for Industry Professionals)

Objectives of the Survey

- ✓ Identify factors affecting the sustainable competency of small and medium contractors in Ethiopian CI and the status of improvement;

1. Demographics

General Information

Interviewee's background

- ✓ Educational background ☐ BSc. ☐ MSc. ☐ Ph.D. ☐ Other
- ✓ Current position ……
- ✓ Work experience ……..... (in years)
- ✓ Time and Place: ……..……..

Address (Optional)

Name: ……..….

Phone: ……..…….

E-mail: ……..……

2. Questions for the Interview

1. What are the factors affecting the sustainable competency development of small and medium construction contractors in Ethiopian construction industry? Please reflect on the factors in the view of:

Elements of internal factors

- Organizational structure and culture
- Characteristics of entrepreneurs
- Competitive strategy
- Organizational resources
- Managerial skills and competency
- Tendering and contract administration

Elements of external factors

- Government policies and regulatory framework
- Industry networks
- Culture of competitive bidding
- Technology and innovation

Do you think the above stated factors are interrelated with one another?

2. Did the developed national plans (i.e. PASDEP, GTP I, and GTP II) and contractor development programs (URRAP, IHDP, UCBP and etc.) improved the Ethiopian construction industry in general and SMCs in particular? Do you think the devised plans and programs were based on the Ethiopian SMCs' existing context and were effective in achieving their intended goals? What do you suggest for future improvements?
3. How do you describe the areas of improvement for the factors affecting the sustainable competency development of SMCs in the views of:
    - Revaluing entrepreneurial features of the firm
    - Enhancing institutional capability and operating environment
    - Construction technology development and innovation
    - Sustainable construction material supply chain
    - Human resource development
4. What are your views and how do you describe the role of key industry stakeholders?
    - Government as a major proprietor and industry regulator
    - Academic and research institutions
    - Trade and proffesional associations
    - Donors and financial institutions

APPENDIX IV: INTERVIEW GUIDE TWO

(Interview guide for **Small and Medium Contractors who participated on Contractor Development Program)**

1. Objectives of the Survey

- ✓ Examine development strategies practiced and their effect on the sustainability of organizational and industrial competency;

2. Demographics

General Information

2.1. Interviewee's background

- ✓ Educational background ☐ BSc. ☐ MSc. ☐ Ph.D. ☐ Other
- ✓ Current position ……
- ✓ Work experience ……..... (in years)
- ✓ Time and Place: ……..……..

Address (Optional)

Name: ……..….

Phone: ……..……

E-mail: ……..……

2.2. Company's background

- ✓ Company's name *(Optional)* ……
- ✓ Grade of the company on the contractor register …….
- ✓ Area of establishment ☐ Building ☐ Road ☐ General contractor ☐ Other
- ✓ Experience in the industry……..... (in years)
- ✓ Number of employees in the organization ……..

3. Questions for the Interview

1. How do you describe the selection criteria, openness and accessibility of the SMCs development program?
2. Would you say the training program generally met my expectations? Is the contractor development program/s that you were a part was/were efficient in achieving its/their goals in improving competency and sustainable development of participating contractors?
    - If yes please explain in detail
    - If not, explain ways in which the program is not achieving goal

3. Would you say you are benefiting from the contractor development program? Please state your overall experience in the view of:
    - Entrepreneurial development
    - Human resource development
    - Material development
    - Technology development and innovation
    - Improving the operating environment

    Please also reflect your experiences in the view of:
    - Technical qualifications and experience you gained since joined the program
    - Capacity building assistance received (in terms of financial, HR,) during and post contractor development program (Please state and reflect on it in detail)
4. What were the problems that were identified during the program? (Describe problems emerging from the program participants' and government's agencies)
5. If you have any thoughts that you want to share to improve contractor development program? Your recommendations.

APPENDIX V: INTERVIEW GUIDE THREE

*(Interview guide for **Ministry of Construction and its organs (ECWRA and EPMI))***

1. Objectives of the Survey

- ✓ Examine development strategies practiced and their effect on the sustainability of organizational and industrial competency;

2. Demographics

General Information

2.1. Interviewee's background

- ✓ Educational background ☐ BSc. ☐ MSc. ☐ Ph.D. ☐ Other
- ✓ Current position ……
- ✓ Work experience ……..... (in years)
- ✓ Time and Place: ……..……..

Address (Optional)

Name: …….….

Phone: ……..…….

E-mail: ……..……

2.2. Organization's background

- ✓ Organization's name ……..……

3. Questions for the Interview

1. How do you design the program strategy and goal? Do you think all the devised strategies address the challenges faced by SMCs in Ethiopian CI thoroughly?
2. What are the main achievements of the development strategies? Do you think the devised strategies were effective in achieving their goals in improving competency and sustainable development of participating contractors? Please explain in detail.
3. The contractor development programs (i.e. those specific to SMCs)
    a. Are the devised contractor development programs achieve their goals in improving performance, sustainable growth, and development of participants?
        - If yes please state the indicators

- If not, explain ways in which the program/programs did not achieve its/their goals

b. How do you select participants for the program? (selection criteria and its transparency)

c. Please reflect how the devised programs addressed the following points?
    - Technology development
    - Human resource development
    - Entrepreneurship development
    - Improving institutional capability and
    - Enhancing operating environment

d. How do you track, control, and measure their performance and improvement after exiting the program? Please reflect your thoughts on the administrative mechanisms and system for monitoring,

e. How do you assist the participant contractors to gain access to work opportunities, financial assistance, supply chain management, etc. after exiting the program?

f. What were the problems that were identified during the past development programs? (Describe problems emerging from the program participants' and government agencies' viewpoints).

g. Please reflect on the lessons learned/experience gained and plans for future development programs?

4. How do you describe the role of key industry stakeholders?
    - Government as initiator and policymaker
    - Academic and research institutions
    - Trade associations
    - Financial institutions and donors
5. What are the prevailing opportunities to create sustainable SMCs in Ethiopian CI?
6. Do you have any thoughts or recommendations?

APPENDIX VI: DEMOGRAPHIC PROFILE OF INTERVIEWEES

S/No.	Code	Profile of the Interviewees
		Job Title/ Experience (in years)/ Educational Level
1	R1	Project Manager, Private Consulting Company (more than 25 years of industry experience, MSc.)
2	R2	Contract Management expert, Public Consulting Company (more than 20 years of industry experience, MSc.)
3	R3	Professor at Public University (AAU/AAiT) (more than 30 years of academic and industry experience, Ph.D.)
4	R4	General Manager and Procurement Expert, Private Consulting Company (more than 30 years of industry experience, MSc.)
5	R5	Deputy General Director of City Government Construction Bureau (Public client) (more than 20 years of industry experience, MSc.)
6	R6	Project Manager, Private Construction Company (26 years of industry experience, MSc.)
7	R7	Deputy General Manager of Regional Construction Corporation (Public Construction Company) (more than 20 years of industry experience, MSc.)
8	R8	General Manager, Private Construction Company (more than 15 years of industry experience, MSc.)
9	R9	Senior Contract Administrator, Private Consulting Company (27 years of industry experience, BSc.)
10	R10	Senior Project Manager, Private Construction Company (18 years of industry experience, MSc.)
11	R11	Supervision and Contract Administration, Public Construction Company (more than 25 years of industry experience, MSc.)
12	R12	General Manager of Private Construction Company (24 years of industry experience, MSc.)
13	R13	General Manager, Private Construction Company (23 years of industry experience, BSc.)
14	R14	General Manager, Private Construction Company (17 years of industry experience, BSc.)
15	R15	Project Manager, Private Construction Company (more than 15 years of industry experience, BSc.)
16	R16	General Manager, Private Construction Company (more than 15 years of industry experience, MSc.)
17	R17	General Manager, Private Construction Company (more than 10 years of industry experience, MSc.)
18	R18	General Manager, Private Construction Company (more than 15 years of industry experience, BSc.)
19	R19	General Manager, Private Construction Company (22 years of industry experience, MSc.)
20	R20	General Manager, Private Construction Company (28 years of industry experience, BSc.)
21	R21	General Manager, Private Construction Company (13 years of industry experience, MSc.)
22	R22	Advisor to the Minister, Ministry of Construction and Urban Development (more than 20 years of industry experience, MSc.)
23	R23	Senior Research Expert, Ethiopian Project Management Institute (more than 15 years of industry experience, MSc.)
24	R24	Deputy Directorate Director, Construction Work Regulatory Authority (more than 25 years of industry experience, MSc.)
25	R25	Senior Contract Engineer, Ethiopian Roads Authority (more than 20 years of industry experience, Ph.D.)

LIST OF PUBLICATIONS

International Journals

1. **Aboneh, A.** and Mahesh, G. (2023). "Understanding the key factors of operating environment for small and medium contractors in the developing economies: the case of Ethiopia." Journal of Engineering, Design and Technology, https://doi.org/10.1108/JEDT-07-2022-0354
2. **Aboneh, A.** and Mahesh, G. (2023). “Exploring the Impact of Endogenic Factors on the Competency of SMCs in the Ethiopian CI.” Journal of Construction in Developing Countries, https://doi.org/10.21315/jcdc-12-22-0225.
3. **Abraham Aboneh Bekele,** Gangadhar Mahesh & Prachi Vinod Ingle (2024). “Enhancing SMCs’ competitiveness through improving material supply chain management practice.” International Journal of Construction Management, DOI: 10.1080/15623599.2024.2304471
4. **Abraham Aboneh Bekele** & Gangadhar Mahesh (2024): “Impact of Contractor Development Programs on the Competency of Small and Medium Contractors in Ethiopia.” International Journal of Construction Education and Research, DOI: 10.1080/15578771.2024.2333406

International Conferences

1. **Aboneh A., Mahesh G., and Ingle V. P. (2023).** “Enhancing Competency of Small and Medium Construction Contractors in Developing Economies through Technology Development and Innovation: The Case of Ethiopia.” Second International Conference on Innovation in Mechanical and Civil Engineering (i-MACE 2023) (18th and 19th August, 2023), PCCE, Pune, India.

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