



ASSESSMENT OF CHALLENGES AND PROSPECTS OF CONSTRUCTION  
REGISTRATION PRACTICE IN THE CASE OF ADDIS ABABA

MSc. THESIS

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HAWASSA UNIVERSITY, HAWASSA, ETHIOPIA

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A THESIS SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING,  
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**SCHOOL OF GRADUATE STUDIES**  
**INSTITUTE OF TECHNOLOGY**  
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## DECLARATION

I declare that this thesis, entitled "**Assessment of Challenges and Prospects of Construction Registration practice in the case of Addis Ababa**" is my original work. This research thesis paper has not been presented to any other university and is not concurrently submitted in candidature for any other degree. Likewise, all sources of material used for the research thesis paper have been duly acknowledged, as listed in the bibliography.

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## ABBREVIATIONS

BCA	Building and Construction Authority
BC	Building Contractors
COC	Certification of Occupational Competency
CRB	Contractors Registration Board
CRS	Contractors Registration System
CPD	Continues Professionals Development
EACE	Ethiopian Association Civil Engineer
ECA	Ethiopia Construction Authority
ECI	Ethiopia Construction Industry
ERB	Engineers Registration Board
FGD	Focus Group Discussion
FOI	Freedom of Information
GC	General Contractors
KMO	Kaiser Meyer Olkin
ICT	Information and Communication Technology
ISO	International Standard Organization
MoWUD	Ministry of Work Urban Development
NCA	National Construction Authority
NCIC	National Construction Industry Council
PEB	Professional Engineers Board
RC	Road Contractors
RII	Relative Importance Index
SC	Specialized Contractors
SPSS	Statistical Package for Social Science
UK	United Kingdom

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## ***ABSTRACT***

In many countries, professionals, construction firms, and construction projects are required to register with a central government or regional authority. Registration is used to refer to a number of forms of official recognition that construction business organizations must have. The impetus for the registration comes from different sources in different countries, including enabling the collection of information on the industry, facilitating the regulation or management of the industry, generating revenue, and facilitating procurement through a pre-qualification initiative. These studies were guided by the following objectives: assessing the challenges of professional and company registration practices, overseeing the prospects of construction project registration practices, and assessing the improvement mechanisms of registration practices in the Addis Ababa construction industry. Literature was reviewed from different works, which supported the objectives of this research. The study collected data using a mixed-methods research approach and tested variables involving 154 construction professionals chosen through random sampling methods. For quantitative data, the survey approach was used, and for qualitative data, an in-depth interview and document review were conducted in Addis Ababa. For the analysis of quantitative data, SPSS software version 26 was used. A one-sample T-test analysis was used to compare a sample mean to a specific value, and a factor analysis was used to reduce large variables to a small set of dimensions through the grouping of descriptive statistics. Additionally, for the analysis of qualitative data, cross-case analysis was used. The reliability of the data has been checked by Cronbach's alpha. According to the findings of these studies, the current registration practice of professional ethics and lack of competence exams, annual financial turnover, plant and equipment requirements issues, weak involvement of associations in the registration system, forged academic and work experience documents, a poor documentation system, and weak initiation, promotion, and commitment to practicing project registrations are all challenging factors that affect the current registration practice. In addition, the prospects of current registration practices provide good opportunities for eligible companies to participate in the construction industry. Furthermore, the findings of this study show that the mechanisms to improve current registration practices in the construction industry are as follows: effectively using a database registration system; active involvement of stakeholders and professional associations in the registration system; requiring an examination as a requirement for higher level professional registration to ensure continuous professional development; and controlling double registration at the federal and regional levels. Finally, based on these findings, it was concluded that the construction registration practices need significant improvement.

**Keywords:** Building Directive, Company Registration, Professional Registration, Projects Registration

# CHAPTER ONE

## 1. Introduction

### 1.1. Background of the Study

In many countries at all levels of development, in addition to the need for organizations engaged in construction activities on-site to register as business enterprises for revenue and taxation purposes, they are also required to register formally as contractors, and this may indeed be a statutory requirement. In such cases, firms and any concerned professionals must register with a central government agency and, in some cases, with a regional level construction authority. No organization can undertake any construction work within the country if it has not been formally registered. This is quite apart from the need for individual professionals, such as architects and engineers, to register. Industrialized developing countries where contractors and individual professional engineers must register include Australia, Greece, Japan, and Italy. However, registration is not required in many industrialized countries, whereas it seems to be the norm in developing countries, although it is carried out in these nations with different levels of formality, effectiveness, and efficiency (Ofori, 2014).

Engineering registration boards registers engineers, engineering technicians, and engineering consulting and contractors with the primary purpose of protecting the interests of customers and consumers of engineering services, as well as the general public. It assures that registered engineers, engineering technicians, engineering consulting, and contractors can perform respective engineering practices with the desired quality while maintaining the safety of human life, property, and the environment in general.

Construction registration provides the basis for maintaining an up-to-date record of engineers, engineering technicians, and engineering consulting and contractors to allow the engineering registration board to conduct effective performance monitoring and enforcement of compliance with engineering professional requirements and to provide a benchmark through which the public, engineering employers, and clients can have confidence and trust that registered engineers, engineering technicians, and engineering consulting firms have met appropriate professional standards (Gacheru & Diang', 2015).

According to Directive No. 648/2021, registering and issuing certificates of competence for professionals and registering and determining grades of firms (contractors and consultants) are required.

For the registration of contractors obtained from the Ministry of Urban Development and Construction, general contractors are contractors qualified to undertake various construction works such as building, roads, railways, bridges, airports, dams, water work, etc. Building contractors are contractors who are qualified to undertake building construction and supplementary work on buildings. Road contractors are contractors who are qualified to undertake the construction of roads and other related civil engineering work. If a portion of the project work that requires specialization costs more than 15% of the total project cost, it must be subcontracted to the appropriate specialized contractor. Specialized contractors are contractors who are qualified to undertake construction activities in specialized fields as classified under the sub-categories of painting and decoration, sanitary installation, wood and metal work, and landscaping.

On the other hand, consultants who are registered under this regulation shall have the following categories according to their employment preferences: building consultants, consultant architects, Engineering consultants are structural, highway and bridge, geotechnical engineering, electrical and electromechanical, and sanitary engineering consulting firms, construction management consultants, urban planning works consultants, Special consultants are asset valuation, interior design and decoration, landscaping, and construction audit; these are categories of registration in Ethiopia (Ministry of Urban Development & Construction, 2021).

The registration system in the industry should act as a focal point for the development of the construction industry, the number and quality of manpower developments in the industry, and enhance its performance by improving the competitiveness of firms and promoting the continued professional development of professionals. To achieve these, there has to be a feedback mechanism (involvement of the stakeholders in improving the registration system), and the registration system needs to be reviewed periodically to keep it continuously relevant to the needs of the industry (Ofori, 2014). Hence, the main purpose of this study is to investigate and point out the main challenging factors that affect professional, company, and project registration practices and also to oversee the prospects of registration practice to facilitate the management of construction industry development in Ethiopia. Furthermore, these studies recommend better practices for improving the mechanism of the registration system and avoiding or minimizing the most challenging factors in the registration practices.

## **1.2. Statement of the Problem**

The number and size of construction projects that are being constructed in Ethiopia are increasing over time. This increment can also be observed in construction projects that are owned by private investors. When recent construction projects are compared with previous construction, the number of projects is increasing, the size is becoming larger, the number of stories is increasing, new technologies and materials are being introduced, and their use is becoming more multipurpose (Grike, 2020). As long as construction projects continue to expand in multiple dimensions, the new Construction Competency and Registration of Competent Professionals and Competent Construction Companies will be required.

As the construction industry grows, modernization expands, and technology improves, professionals and company firms will raise concerns about construction modernization and competitiveness with regard to the registration and grading system (Ofori, 2014).

Changes in registration and qualification assessment systems will affect not only professionals but also consulting and construction companies. Therefore, it may be necessary to revise the requirements for certificates of competence and registration and the capacity of construction companies.

In the registration process, both professionals and machinery are exposed to forgeries of documents and certificates. Due to these problems, there is no a good practices or mechanisms in Ethiopia to monitor and evaluate this kind of process. The registration requirements practiced in our country's registration system are not updated on a regular basis. Hence, there will be a need to establish an educational accreditation, competence assessment, and registration system to develop qualified professionals who will raise the local industry standard and can compete in the global market.

One of the challenging factors confronting the construction industry, and thus the construction sector, is that the majority of construction projects are not properly registered by federal or state construction registration authorities. Due to these results, difficult situations were happened in the registration practice. Another problem related to registration requirements is unrealistic practice since the registration processes are manual, there is no database system, there is inefficient monitoring, and there is a weak evaluation system. With regard to the construction industry, not enough research has been done so far in relation to the challenging registration practices.

This was an indicator of the presence of a research gap in this area of the construction sector. As a result, the researcher initiates to fill this research gap by conducting this study and making recommendations on the challenges and prospects of construction professionals, companies, and project registration practices in Ethiopia's construction industry.

### **1.3. Research Questions**

To meet the research aims, it is important that the researcher develop appropriate research questions. In particular, the study was initiated to address the following basic research questions:

1. What are the challenges of professional and Company registration practices in Addis Ababa?
2. What are the prospects of construction project registration practice in Addis Ababa?
3. What are the improvement mechanisms of registration practice in Addis Ababa?

### **1.4. Objectives of the Research**

#### **1.4.1. General Objective**

The general objective of this study is to assess the challenges and prospects of construction registration practice in the case of Addis Ababa.

#### **1.4.2. Specific Objectives**

The specific objectives of this study are the following:

1. To assess the challenge of professional and company registration practices in Addis Ababa.
2. To oversee the prospects of construction projects registration practice in Addis Ababa.
3. To assess the improvement mechanism of registration practice in Addis Ababa.

### **1.5. Significance of the Study**

This study has contributed to the construction authority, stakeholders, engineers, and other interested professional associations, trade associations, and experts' understanding of the challenges and opportunities faced by the registration process in Addis Ababa. Additionally, this research helped the corresponding authorities identify the key problems that hinder them from accomplishing their powers and duties, and act accordingly to eradicate those challenged factors.

The main reason for selecting this topic was that there were not enough studies and research done on this topic in Ethiopia. Taking this as a gap, it indicates that there are many problems and challenges associated with the professional, company, and project registration practices in the construction industry.

The purpose of studying this topic was to identify the problems and challenges in the construction industry's professional, company, and project registration practices. Moreover, the researcher hopes to provide some ways to minimize or control the challenging factors that affect professionals', companies', and projects' registration practices. Overall, the goal of this study was to provide improvement mechanisms and recommendations to solve the problems, as well as create a favorable environment for the development and modernization of the construction industry. Generally, this document was considered to indicate that the current study can pave the way for other investigators to uncover untouched aspects of the area.

### **1.6. Scope of the Study**

The scope of the research was bounded by three main characteristics of registration: construction professionals, companies, and project registration practices in Addis Ababa. Moreover, this study also assessed the challenging factors that affect the construction registration practice and its prospects for registration from the perspective of individual professionals, from the contractors, consultants, regulatory officers, and client respondents in Addis Ababa.

This study analyzes the significant assessment of challenges and prospects of construction registration practice in roads, bridges, and building projects only.

### **1.7. Limitation of the Study**

In this area, not very much published research has been carried out before this investigation, and this has created a limitation for the research work in terms of creating a basis for the literature review. This could also lead to finding other sources of information related to the topic under investigation, like proclamations, directives, regulations, government reports, and other different source.

These studies are limited in terms of location; the study area is Addis Ababa, where the projects studied are located and the survey has been conducted. The research is also limited to the construction sector; building, road, and bridge construction projects have been the focus area of the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2. Introduction**

The Engineers Registration Board is a statutory body with the responsibility for regulating the activities and conduct of engineers and engineering consulting firms in Tanzania. Amongst other provisions, the Act requires that all persons practicing engineering to register with the Board and all employers of engineers and engineering services must engage only registered persons. Thus, one of the major involvements of the Board in regulating the engineering practice is to oversee the registration of engineers, engineering technicians and engineering consulting firms in the country. In that regard, the Act has mandated ERB with the following specific functions, amongst others (Tanzania, 2019).

To maintain and keep a register of engineers, engineering technicians and engineering consulting firms and contractors to decide on applications for registration also to certify academic awards given by training institutions for consideration in an application for registration and to conduct examinations for purposes of registration and grant certificates, diplomas and other awards of the Board to successful candidates, to provide facilities and opportunities for learning and professional exposure and skills acquisition; and cause to be held professional training for graduate engineers and continuing development programmers for engineers and engineering technicians, towards promotion of their registration and maintenance of status and also to promote and maintain professional conduct and integrity of the profession, furthermore to take legal action against persons or firms that practice engineering without being registered by the Board; and to impose penalties on engineers, persons, employers of engineers and engineering consulting firms found guilty of professional misconduct for contravening any provisions of the Act (Tanzania, 2019).

In order to operationalize the indicated and other functions, ERB has set and is maintaining standards of professional competence, experience and ethics by which individuals (engineers and engineering technicians), and engineering consulting firms are assessed before registration. These are contained in various ERB Regulations, Rules and By-laws (Tanzania, 2019).

According to Ministry of Urban Development & Construction (2021), streamlining the certification and registration system; Encouraging job creation for novice graduates;

Registration and certification requirements need to be redesigned to ensure that it is close to the outside world registration system and contributes to the growth and competitiveness of the industry and that professionals and organizations are working on the basis of registration and certification of certificates, correcting ethical problems and performance gaps and creating job opportunities for small and medium enterprises.

One of the benefits or the purpose of registration is to regulate the activities and conduct of Contractors, Consultants, and Construction Material Suppliers and Manufacturers. Registered Firms will benefit by operating in a regulated construction industry offering equal opportunities to all parties. For Statutory Requirements registration of persons engaged in the construction industry is mandatory and it is illegal to operate in the construction industry without registration.

## **2.1 The Overview of Professional and Company Registration Practice**

A registration practice is common in most countries and it may include the registration of construction companies, professionals, suppliers, machinery, workers, etc. Registration provides information to facilitate regulation and management of the industry, generate revenue for capacity development programs, and facilitate procurement as a general prequalification criterion. Registration also helps to set targets for firms and professionals to grow (Institute of Technology BhU, 2021).

In Ethiopia, a new professional licensing service is provided for those who have graduated from an accredited educational institution and/or for those with expert experience who have a Certification of Occupational Competency (COC). To register as a new professional, one must have received no professional licenses from this authority before. New professional licensing registration services will be provided by design or construction as appropriate. Design professional licenses are issued, for professionals who are employed in the consulting sector, for professionals who are organized or run a consulting firm; on other hand, construction professional licenses are issued for professionals who are employed in the construction sector, for professionals who are organized or run a construction firm. Contractors wishing to work in Ethiopia must first register with the Ministry of Trade, following the commercial code of Ethiopia and related directives of the Ministry (Institute of Technology BhU, 2021).

### **2.1.1 Registration System**

Registration System is important primarily because it enhances the professional services that are delivered by the construction industry. The system reflects best practices in the professional, consultant, and contractors to ensure confidence in the profession from government, and regulatory authorities. The registration system also ensures that construction professionals have the qualifications, competency, knowledge, and skill to practice and that they understand their scope of practice and commit to relevant continuous professional development, current industry standards, and professional guidelines. This reduces business risk in relation to client safety and helps to assure the delivery of construction industry services with due care and skill. All of this helps to protect and enhance the reputation of the construction industry. Without a strong registration system, there would be no governance of the profession at all. This would have a very detrimental effect on the reputation and credibility of the construction industry.

Registration system should focus on development of the industry and enhance its performance by improving competitiveness of firms and promoting continues professional's development of professionals. The registration system needs to be reviewed periodically to make it continuously relevant to the needs of the industry. Registration of professionals should determine; current competence of the professional, regulate performance (suspension of certificate in case of violation) and ensure continues professional's development. One of the duties of Ministry of Construction is registering and issuing certificates of competence for professionals and determining grades of firm's contractors and consultants.

The ministry construction has new directives 648/2021 for registration of construction professionals, contractors, consultants and other special contractors (Ministry of Urban Development & Construction, 2021).

In the case of new construction professional's registration, there are three Category of professionals and Technicians with different level of titles that are Technician, Associate Engineer and Professional. In addition, upgrading certificate is based on years of experience only and somehow needs qualification exams is mandatory. In the case of category of consultant registration, there are three categories; Building consultant, consultant architects, Engineering consultants are structural, highway and bridge, geotechnical engineering, electrical and electromechanical and sanitary engineering consulting firms, Construction Management Consultant, Urban Planning Works Consultant, Special consultants are Asset Valuation, Interior

Design and Decoration, Landscaping, Construction Audit. In the case of category of consultant registration, there are three categories General Contractor, Building Contractor, Road Contractor and Special Contractors likes Landscaping, foundation work, construction completion, site maintenance, road safety signs, aluminum door and window assembly, painting and decoration work, wood and metal work, plumbing and sanitation work in the buildings are categorized in contractors registrations practices.

In additions of contactors and consultant registrations there is new registration practices is incorporate the new 648/2021 directives are register Building works include small, medium 'high and very high construction works, Road works include gravel, asphalt, asphalt concrete and reed roads and bridges and others construction projects (Ministry of Urban Development & Construction, 2021).

Professional Registration is a key milestone in your career and is open to all engineers and technicians. Professional Registration demonstrates that you have reached an internationally recognized standard of competence and acknowledges your commitment to maintaining that competence in the future.

#### **2.1.1.1. Equipment Registration System**

Before contractors undertake any construction work, they need to be licensed and registered. The requirement for licensing and registration may vary from country or from one legal system to other (Ministry of Urban Development & Construction, 2021).

The present rational for licensing of contractors in Ethiopia is to ensure that applicants for a project have the necessary capacity and capability. For contract works in other countries and for multilateral donor projects, this requirement is meet through the prequalification process for each tender. This requires information on the current status and past performance of contractors. The current procedure of registration and issuance of grade licenses rely on ownership of relevant equipment and number of staff.

All contractors desiring to carry out construction work are required to register with ministry of works and urban development in accordance with guidelines for the registration of construction professionals and contractors. Part three of this guideline also states that the contractors are required to register first with the ministry of trade in accordance with commercial code of Ethiopia and related directives of ministry of works and urban development.

Depending on the category and grade of construction, ministry of construction set the minimum amount of construction equipment requirement based on their grade. Therefore the contractors must meet the following requirements to register as contractor and execute the construction work based on their grade (Ministry of Urban Development & Construction, 2021).

### **2.1.1.2. Man Power Registration System**

Registration is common in most countries and it may include registration of construction companies, professionals, suppliers, machinery, workers, etc. Registration provides information to facilitate regulation /management of the industry, generate revenue for capacity development programs, and facilitates procurement as a general prequalification criterion. Registration also helps to set targets for firms and professionals to grow.

In Ethiopia, New Professional Licensing Service is provided for those who have graduated from an accredited educational institution and/or for the expert of experience who has Certification of Occupational Competency (COC). To register as a new professional, one must have received no professional licenses from this Authority before. New professional licensing registration services will be provided by design or construction as appropriate. Design professional licenses are issued, for professionals who are employed in the consulting sector, for professionals who are organized or run a consulting firm; on other hand, construction professional licenses are issued for professionals who are employed in the construction sector, for professionals who are organized or run a construction firm. Contractors wishing to work in Ethiopia must first register with the Ministry of Trade following the commercial code of Ethiopia and related directives of the Ministry.

**Professional Engineer:** Professional is a person of high educational background and or has the ability and explores and masters the application of knowledge, science, technology, art and or specific areas. In the field of construction services expertise is in the field of construction workers who have a certificate for construction planners, construction supervisors and the contractor as proof of professional competence and ability of working expertise in the field of construction services according to scientific disciplines and / or kefungian and / or specific expertise.

The title Professional Engineer implies that one holds paramount the safety, health, and welfare of the public. The process of certification is the decisive career step that raises a technically trained person to the status of professional engineer with all of the implicit responsibilities that go with the authority to make critical decisions affecting the public. Every state has its own specific requirements for certification as a professional engineer (Widiasanti & Z., 2015).

**Professional Certification:** Efforts to improve the quality of competence and professionalism of experts can be done through certification serves as a quality assurance system. Professionalism of Indonesian experts stipulated in the Law of the Republic of Indonesia Number 11 of 2014 concerning engineering. Engineering created with the aim to prevent errors and omissions engineering practices that can be harmful to society, addressing technology and technologists work, securing investment and development budget, develop engineering. In addition, engineering law will also regulate the professional engineer certification, the organization of the working license to service standards (Widiasanti & Z., 2015).

### **2.1.2 Registration Process and Certification**

Registration process and certification of construction services are effort to have construction service business class based on classification is classify the business based on area and sub area of works, and qualification is classification of business based on grade of competence and capability. Basically, certification is a proof of acknowledgement in determining classification and qualification of competence and capability in construction service sector. In personal form or in the form of company a proof of acknowledgement of personal competence and capability of professional skills in construction services sector according to specific field of study and skill as well as expertise (Widiasanti & Z., 2015).

#### **2.1.2.1 Renewal of Registration**

Registration of construction professionals may be valid for a period of two calendar years beginning from the date and year of such registration and may be renewed every two years. For renewal of registration an applicant should bear a letter (authenticated by the relevant Association). Similarly, practicing profession licenses are renewed annually (Institute of Technology BhU, 2021).

Registration of Contractors shall be valid from the date of such registration till end of October that comes after the date of registration. No registration may be renewed unless the person seeking renewal has complied, with the requirements for registration set out by registration directives.

Contractors applying for renewal within one year after the expiry date of their certificate of registration may renew their certificate upon payment of the arrear plus 100 birr penalty for the period not renewed. Professionals applying for renewal within two years (one term) after the expiry date of their certificate of registration may renew their certificate upon payment indicated in table 2.1 of this directive. Professionals applying for renewal within four years (two terms) after the expiry date of their Certificate of registration may renew their certificate upon payment of the arrears plus Birr 100.00 (hundred) penalty for each renewal period. Any registration that is not renewed within four years (two terms) of its expiry date, the previous registration shall be deemed to be canceled automatically. If the professional wants to be registered, he should start it as new registration.

For renewal the professional himself should apply or the employer should write a letter that request renewal and thus of who wants to take part in any construction activity should have a valid or renewed professional registration certificate (Ministry of Urban Development & Construction, 2021).

### **2.1.2.2 Upgrading of Registration**

Professional license upgrading service for existing professionals is provided: - with a proven and continuous experience that a professional could register.

Professional license upgrading service for existing professionals is provided: - in the specialty area of expertise, within the design field. To get to this stage, first of all the practitioner should have professional license issued by the Authority and then must meet the minimum qualification required for this stage. Regarding requirement of new Professional license is obtained.

### **2.1.2.3 Suspension of Registration**

A certificate of competence may be suspended and cancelled where it is obtained fraudulently or through forged documents or the holder is charged and convicted for violation of laws contrary to this proclamation.

### **2.1.3. Monitoring and Evaluation of Registration Practice**

The purpose of monitoring and evaluation is to track progress on the implementation of the strategy and improve planning, targeting, and timely decision-making through feedback from relevant stakeholders.

Monitoring systems provide authorities, managers, and other stakeholders with regular information on progress relative to targets and outcomes. This enables the early identification of problems so that solutions can be proposed. It is considered to be a critical part of good management.

Periodic evaluation is also considered to be good practice and can be used to investigate and analyze why targets are or are not being achieved. It looks at the cause and effect of situations and trends that are recorded within monitoring.

The main objectives of monitoring and evaluation of registration practice are to control professionals and contractors and to improve the effectiveness of guidelines and regulations for professionals and contractors' firms by improving the efficiency of implementation and management of the strategy to promote transparency and accountability between participants in registration practice. Determine the impact of contractors and professionals on the construction industry 1 production and processing systems and ancillary corporate responsibility activities.

**Frequency of Monitoring and Evaluation:** Monitoring of implementation of the Strategy will be an on-going process in order to periodically assess progress towards set targets and provide feedback to inform decision making. Data will primarily be collected by the ministry of construction in collaboration with the other stakeholder.

### **2.1.4 Requirement of Registration Practice**

Before contractors, architects, and engineers undertake any construction work, they need to be licensed and registered. The requirements for licensing and registration may vary from country to country or from one legal system to the other. The parameters listed in the directives are the requirements for licensing and registration of the above-mentioned individuals in the context of Ethiopian laws (Institute of Technology BhU, 2021).

Based on the current and old directives provide a mandatory registration requirement for any person or entity to engage in the construction sector in the country. Any natural or juridical person who fulfills the requirements specified under the respective directives may file an application with the Ministry of Urban Development and Construction to be registered and to

have their name entered in the register. Specifically, all design professionals and consultants, and all construction professionals and contractors desiring to carry out activities related to construction work are required to register with the Ministry. Furthermore, no company or professional can carry out any design or supervision without getting a certificate of competence from the Ministry. The registration requirement also applies to foreign companies and their professionals. However, all foreign consultants and contractors who want to take part in national competitive bidding are required to be registered as a consulting firm of class I and a contractor of class I for all categories, and they should not participate in national competitive bid below class I (Institute of Technology BhU, 2021).

#### **2.1.4.1 Basic Requirements**

The basic requirements for any person or group of persons applying for registration as a contractor, consultant, project manager, construction material supplier, or manufacturer are as follows (National Construction Industry Council of Malawi, 2015). Such a person has a Certificate of Registration from the Registrar of Companies either as a Limited Company, partnership, or sole proprietorship and a Tax Registration Certificate from the Malawi Revenue Authority. In the case of a limited liability company, the certificate must be accompanied by a certified copy of the memorandum and articles of association. Partnership and sole proprietorship firms must submit a certified copy of the certificate from the Registrar of Companies and at least one of the shareholders or partners must have the minimum technical qualifications stipulated in the Criteria for Registration. Such a person possesses the necessary knowledge, skills (managerial/professional), and/or experience in construction, erection, installation, alteration, or any activity related to these. This person can also demonstrate proof of ownership or lease of office facilities, equipment, plants, tools, instruments, workshops, yards, capital, and other financial resources. Each shareholder's or partner's curriculum vitae will be reviewed by the NCIC to ensure that they are people of good profession and general conduct. Where deemed necessary, the Council may require the attendance of such a person before it presents documentary evidence in support of the registration. Where any person whose presence is required is not present, or any document demanded is not produced, the registration process may be postponed to give a reasonable opportunity for the appearance of such person or the production of such document (National Construction Industry Council of Malawi, 2015).

### **2.1.4.2 Architects and Engineers**

Architects and engineers may be registered as professional architects and engineers, graduate architects and associate engineers, engineering aides, and associate engineering aides after having fulfilled the registration requirements set forth in Part II of the Guidelines. Moreover, the applicants must also pay the registration fees specified under the Guidelines.

For registration as professional architects and engineers, applicants must hold at least a B.Sc degree or the equivalent in architecture or engineering from a recognized university or similar institution. The applicant must also submit satisfactory evidence of at least four years of relevant and progressive design and supervision experience acquired after graduation. Moreover, the applicant may be engaged in the preparation of design documents and in the supervision of construction work for projects sponsored by his/her employer. For registration as graduate architects and engineers, the applicants must hold at least a B.Sc degree or the equivalent in architecture or engineering from a recognized university or a similar institution. The applicant must also have up to four years of relevant experience in the field for which he/she is applying. Moreover, the applicant may be engaged in the preparation of design documents and in the supervision of construction work for projects sponsored by his/her employer.

For registration as associate engineers, the applicants must hold a diploma or the equivalent in an approved course in construction from a recognized university or a similar institution. The applicant must also submit satisfactory evidence of at least six years of relevant experience acquired after graduation in construction or supervision of projects. Moreover, the applicant may be engaged in construction superintendence or supervision for projects sponsored by his/her employer. Similarly, for registration as Graduate Associate Engineers, the applicants must hold a diploma in building engineering or the equivalent in an approved course in construction from a recognized university or similar institution. The applicant must also submit satisfactory evidence of at least six years of relevant experience in the fields of construction or supervision work on all projects. Moreover, the applicant may be engaged, either on a part-time basis or full time, in construction or project supervision (Ministry of Urban Development & Construction, 2021).

For registration as an engineering aide, an applicant must hold a technical school certificate or the equivalent from a recognized university or a similar institution. The applicant must also submit satisfactory evidence of at least six years of relevant experience in the fields of construction acquired after obtaining such a certificate or the equivalent qualification. Moreover, the applicant may be engaged in drafting and surveying work.

Similarly, for registration as an associate engineering aide, the applicants must hold a technical school certificate or the equivalent in an approved course in construction from a recognized university or a similar institution. The applicant may also be involved in project drafting and surveying on a part-time or full-time basis (Ministry of Urban Development & Construction, 2021).

#### **2.1.4.3. Registration of Consultants and Licensing Requirements**

Applicants may also submit applications for registering as consulting offices under consulting architects and engineers, consulting architects, general consulting engineers, or specialized consulting engineers. Consultants registering in office for consulting architects and engineers may participate in the preparation of total design documents for building and civil projects befitting their categories. Those consultants registered in the Office for Consulting Architects may participate in the preparation and design of building projects befitting their categories. Those consultants registered in the Office for General Consulting Engineers may participate in the preparation of all engineering design works befitting their category. On the other hand, applications for registration in the Office of Specialized Consulting Engineers may be submitted in the specific fields of engineering like structural, road, sanitary and mechanical, foundational, electrical, quantity surveying, and surveying. Consultants registered in any of the above specialized fields may participate in the preparation of design projects befitting their categories.

All applicants wishing to register in any of the consulting offices have to submit satisfactory evidence that the owner or manager at the consulting office being applied for is a registered practicing architect or engineer along with satisfactory evidence that

Practicing architects and engineers are those applicants who have satisfactory and progressive evidence in design and supervision in relation to their educational background as well as 8 years of work experience (the experience required may be the firm or organization has the finance, equipment, and office and office facilities required for the consulting office applied for. Moreover, the applying offices are required to submit satisfactory evidence showing that the firm or organization has the minimum number of registered staff set out by the Guidelines as well as a certificate of registration from the Ministry of Domestic Trade in accordance with the Commercial Code of Ethiopia (Teclé Hagos LL., 2009).

Although each categories of service have their own requirements that need to be fulfilled for licensing, some common requirements for all groups state that the manager or owner has to be a registered practicing professional in the specific sector the license is being requested.

The applicant also needs evidence of satisfactory finance, equipment, office and office facilities required for the office being applied for and minimum number of registered staff set out by the guidelines. In addition, a certificate of registration from the Ministry of Domestic Trade in accordance with the Commercial Code of Ethiopia is required upon application for registration as a consulting firm.

Any prospective consulting firm, under this directive, must fill the corresponding application form, submit all supporting documents and provide satisfactory evidence relating to the manager, facilities and minimum staff requirements, financial standing (turnover details as specified, if any), equipment and office facilities for classification befitting the category of consulting office applied for. There are incentives to encourage female applicants. For example, where the applicants are female or the company has a majority of female members the turnover requirement is reduced by 5 percent. The ministry has the mandate to suspend or cancel licenses if it deems a party has failed to comply with requirements (Nuhamin, 2019).

#### **2.1.4.4. Contractor Registration Requirements**

Contractors must be licensed and registered before they begin any building work. The contractor's registration requirements for licensing and registration parameters may vary from country to country or from one legal system to the other. In this section, we will look at the requirements for licensing and registration of contractors in the context of the Ethiopian laws (Tecele Hagos LL., 2009).

The present rationale for licensing of contractors in Ethiopia is to ensure that applicants for a project have the necessary capacity and capability. For contracts works in other countries and for multilateral donor projects, this requirement is met through the prequalification process for each tender. This requires information on the current status and past performances of the contractor. The current procedure of registration and issuance of graded licenses rely on ownership of relevant equipment and number of staff. These criteria for licensing and registration relate neither to past performance nor to the contractors (architect's, engineer's or consultant's) ability to lease or hire equipment; thus making it difficult for contractors, with sound technical and financial performance in other fields, to enter new markets.

All contractors desiring to carry out construction works are required to register with the Ministry of Works and Urban Development (MoWUD) in accordance with the Guidelines for the Registration of Construction Professionals and Contractors According to Part 3 of the guidelines, all contractors registering under the guidelines are required to register first with the Ministry of

Trade in accordance with the Commercial Code of Ethiopia and related directives of the MoWUD. It is after securing a registration certificate from the Ministry of Trade that an application for registration with the MoWUD can be entertained. Accordingly, every contractor has to submit a photocopy of such a certificate to the MoWUD before being licensed as a contractor (Teclé Hagos LL., 2009).

Every contractor has the option of submitting an application for registration as a contractor in any one of the following categories:

**General Contractors:** These are contractors who are qualified to undertake a variety of construction works such as buildings, roads, railways, bridges, etc.

**Building Contractors:** These are contractors who are qualified to undertake building construction and related works.

**Road Contractors:** These are contractors who are qualified to undertake construction of roads and other related civil engineering works.

**Specialized Contractors:** These are contractors who are qualified to undertake construction activities in specialized trades such as electro mechanical installation works, painting and decorations, sanitary installation works, wood and metal works and landscaping and other related activities.

The criteria for registration of a contractor in any of the categories listed above differ based on the grade to which the contractor is applying. There are 10 grades, which are categorized accordingly based on the construction cost of the project that the contractor is seeking to undertake. General Contractors, Building Contractors, and Road Contractors can register in the ten grades based on the following criteria.

Once a contractor who wishes to register in any of the ten grades fulfills the criteria of the cost required, he/she has to have certain experience and qualifications as well as staff requirements that he/she needs to fulfill. While a contractor is registered, the work permit license is issued under the name of the Technical Manager (the names of both the owner and the Technical Manager will be listed on the identification to be issued). For Grades 1 and 2, the general or technical manager must be a registered Professional Engineer IV; for Grades 3 and 4, the general or technical manager must be a registered Associate Engineer IV or Professional Engineer III; for Grade 5, the general or technical manager must be a registered Professional Engineer or Associate Engineer III; and for Grade 6, he/she must be a registered Associate Engineer or Professional Engineer I.

After fulfilling the experience and qualification requirements, a contractor has to fulfill staff requirements before he/she can be registered as a contractor. The staff requirements vary from grade to grade and sometimes from category to category.

Once a contractor fulfills the above-mentioned requirements and pays the registration fee set by the guidelines, he/she is expected to submit a record of past performances and an audited statement of accounts along with the number, type, and capacity of the equipment he/she intends to use. There are various equipment requirements set by the guidelines for the registration of different categories of contractors in different grades. The categories and grades in which a contractor is registered may be changed based on the contractor's application and the decision of the Registration Committee after an examination of the contractor's financial, experience, staffing, and other resources, as well as the quality of performance. This decision of the Committee, however, is subject to the approval of the Minister of Works and Urban Development. Contractors may apply for grade and category changes only once per fiscal year if they can meet all of the requirements outlined in the Guidelines (Teclé Hagos LL., 2009).

Once a contractor is registered, the registration is valid for one calendar year beginning on the date of such registration. At the end of the one-year period, each contractor is expected to be renewed every calendar year thereafter. The renewal of registration is only being effected after the person seeking the renewal complies with the requirements for registration set forth by the Guidelines. If the renewal year has lapsed, the contractor has the option of having the registration renewed within three years of the expiry date upon payment of the arrears plus fifty percent of the renewal fee for the period within which the registration has not been renewed. Any registration that is not renewed within three years of its expiry date is automatically cancelled.

### **2.1.5 Ethical Consideration of Registration Practice**

**Ethical and professional conduct:** In addition to competence, ethical and professional conducts are essential components of any professional practice. Possession and application of reasonable job skills (ordinary skills of an average competent person in the profession) and duty of care and diligence (for a client, society, environment, etc.) are the defining characteristics of any professional practice. Therefore, while possession of competence can be demonstrated through competence assessment, demonstration of the application of skill and duty of care and diligence should be ascertained through ethical and professional conduct. On the other hand, the stakeholder discussion in Ethiopian professional practice critically highlighted the importance of emphasizing ethical and professional conduct.

Therefore, while international practices implicitly accept the importance of ethical and professional conduct, this proposal, in addition to being part of renewal requirements, makes ethical and professional conduct an explicit assessment criterion for each level of registration. At each level, this should be achieved through Professional associations developing and promulgating codes of professional ethics for their professions. Professionals' associations monitor the professional ethics and conduct of their members through, but not limited to, public complaint monitoring means; Professional associations establish a system that evaluates and ascertains the veracity of alleged misconduct; With no prejudice to other measures the professional associations may take, they deny the issuance of clearance for professional conduct, which is a mandatory requirement for registration or renewal; Clearances for zero-experience candidates (graduate engineers that register directly from graduation) could be issued with no prior record and monitoring so long as there is no known and recorded history as a student of any criminal or misconduct act that is stipulated in the association's code of conduct (Project & Institute, 2021).

**Code of Ethics:** The norm system governing and regulating engineering professional behavior is professional ethics. Certain common principles underlie professional codes and bodies, e.g. the Medical and Dental Council, the Police Service Code of Conduct, and the Estate Agents' Code of Conduct. Codes may not be exhaustive and may not include all the rules and regulations that apply to every situation. The contents, therefore, have to be viewed within the framework of company policies, procedures, and the requirements of the law.

In our society, ethical concerns have escalated in the past few years and have been raised at the government level. Organizations have hotlines for employees to anonymously report unethical behavior. In our field of engineering, issues of fairness have been legislated and we have a Code of Conduct in place. The question of ethical practice, however, covers broad ground and encompasses everything we do as professionals and the way we behave towards each other and our clients (Project & Institute, 2021).

## **2.2 The Overview of Construction Project Registration Practice**

A project is a series of related tasks that, when they are carried out in the correct order, will lead to the completion of the project. Projects are temporary, generally resulting in the creation of a tangible product or outcome. This is as opposed to a programmer, which is a series of interrelated projects that may be carried out repeatedly or continuously in order to support an ongoing process.

A construction project, sometimes just referred to as a "project", is the organized process of constructing, renovating, refurbishing, etc. a building, structure, or infrastructure. The project process typically starts with an overarching requirement which is developed through the creation of a brief, feasibility studies, option studies, design, financing, and construction.

Construction projects are typically one-offs. That is, a project team, brief, and financing are put together to produce a unique design that delivers a single project. Once the project is completed, the team is disbanded and sometimes will not work together again. This can make it difficult to develop ideas or relationships, and so lessons learned are often not carried forward to the next project. The exceptions to this are repeat developers, such as supermarket chains, house builders, and so on.

Typically, a construction project comprises many smaller projects, which require a wide range of different disciplines working in collaboration. Large numbers of people are involved in a typical construction project, with the structure and composition of the project team usually changing throughout its duration. Projects may be coordinated by a project manager (or by a lead consultant) who is supported by professionals such as an architect, engineer, cost consultant, and so on. For more information, see Project team.

This separation of project roles into different disciplines and contractual arrangements that further separate the client, consultants, contractors, and subcontractors can make construction projects adversarial. This can result in conflict, opposition, confrontation, dispute, and even hostility.

Partnering and collaborative contracts; Alternative dispute resolution; Careful examination of selection criteria; integrated supply teams; Fair payment methods; and other collaborative practices have been proposed as solutions to address the adversarial nature of building projects. For more information, see Adversarial behavior in the UK construction industry.

**Projects may be public, or private:** A "public project" is one that is financed by the government and is typically owned and may be operated by the government. This can include major infrastructure projects such as roads, bridges, dams, railways, tunnels, and so on, or public facilities such as hospitals, schools, prisons, libraries, leisure centers, and so on. See "Public project definition" for more information.

On the other hand, a "private project" is one that is financed, controlled, or commissioned by a private party, i.e., one that is not a government. Private parties can include individuals, corporations, charities, privately-funded institutions, schools, hospitals, and so on.

Some projects involve both public and private entities. Public-Private Partnerships (PPPs) are a very broad range of partnerships in which the public and private sectors collaborate for some mutual benefit, which can include the completion of a construction project.

The project register is aimed at providing relevant and reliable information on the construction industry to enable the Board to effectively achieve its registration, regulation, and development functions and ensure compliance of developers and contractors with provisions of the Contractors Registration Act. Under the law, all projects must be registered and be issued with a Project Registration Sticker.

### **2.2.1 Requirement of Project Registration**

The following are the key characteristics of the project registration requirement and eligibility: Project registration is a legal obligation enforced by the contractor registrations required by law. All projects with public or private funding must be registered (Ministry of Urban Development & Construction, 2021).

### **2.2.2 Period of Registration Practice**

According to the current registration procedure, all work on a private project must be notified to regional or federal construction authorities before it can begin. Public projects, on the other hand, must be notified twice in one budget year: during the design phase and before construction begins (Ministry of Urban Development & Construction, 2021).

### **2.2.3 Who is the Registration Person**

Most of the time, the client's responsibility is to notify the local or federal construction authorities. The responsibility of a private project is that the contractor or subcontractor (both nominated and domestic) who has been awarded the project has the main responsibility of notifying the local or federal construction authorities (Ministry of Urban Development & Construction, 2021).

### **2.2.4 Information Communication Technology Support for Registration**

Registration of documents through an electronic mode is known as e-Registration. The main objectives of e-Registration are to maintain uniformity in the registration to expedite the registration process within the stipulated time limit and preserve the record electronically for future reference in order to analyze an error-free registration process, also to check for fraud and unfair registration, and finally to ensure efficient, hassle-free, and timely delivery of registration services (Tanzania, 2019).

### **2.2.5 Importance of Project Registrations Practice**

The registration board also registers engineering projects and construction projects in order to allow effective monitoring and evaluation of the performance of engineering activities and the conduct of engineers and engineering consulting firms and contractors during implementation. It is the responsibility of the respective engineers and engineering consulting firms and contractors to report to the local and federal registration boards on all engineering projects they are involved in prior to commencement. The registration of such private and public engineering projects and contractor services shall indicate and abide by other requirements as may be provided by the registration board (Tanzania, 2019). The type of project, name of the project owner or employer, and status of the contractor carrying out the project, which also includes the name and status of the project consultant, must be notified. The time and date of the project completion period, as well as the total contract value of the project, must include the number and diversity of manpower involved in the project (by profession and gender). The projects must be checked by professionals who have passed the professional evaluation of the project, and finally, the location of the project region, zone, woreda, city, and other information deemed necessary by the institution shall be provided upon request.

One of the advantages of engineering registration is that properly registering any construction project entitles the country to collect the appropriate income tax. A proper record of any construction project would also make it more important to execute the planned budget and schedule. Finally, unregistered building projects make it impossible to audit, monitor, control, and assess the competence of specialists, as well as the entire development process.

### **2.3 Importance Frame Work of Registration Practice**

Record management as a sensitive field in any organization needs a lot of attention. Records ensure that evidence and other information needed to support transactions pertaining to individuals and organizations are available (Mnjama & Wamukoya, 2007). Hold that government records provide evidence of past decisions and transactions and ensure the rights of both governors and the governed are protected (Ndenje-sichalwe, 2010) in (Maseh, E. & Mutula, 2015) added that record management is a corporate function like others, such as finance management and human resource management (Maseh, E. & Mutula, 2015). Stipulated that, like other fields, record management needs to be guided by legal frameworks, including policies, acts, regulations, and guidelines, to ensure effectiveness.

Legal frameworks regulate actions and procedures followed by record management professionals and ensure effective record management. Therefore, the availability and implementation of record management policies, acts, regulations, and guidelines are core determinants of record management. It is to this fact that the initiative by various governments worldwide to develop record management policies and legislation to guide practices in their governance can be attributed. Such initiatives have been made globally, in Africa, and Tanzania in particular, to ensure that there are legal frameworks to guide record management practices. In 2001, the International Standard Organization (ISO) developed ISO 15489-Information and Documentation-Record Management as an international standard for good record management practices in both private and public organizations. This revealed that public authorities in the United Kingdom developed policy statements that guide the implementation of the Code of Practice on the management of records under the Freedom of Information (FOI) Act 2000. The code of practice is aimed at providing a framework to support standards and providing guidance on documenting record practitioners' actions and keeping and disposing of records by complying with laws. Other legislation developed by the UK includes the Public Records Act 1958, which guided and insisted on preserving records of continuing value in the National Archives for access. The FOI Act of 2000 aims at disclosing information pertaining to public actions to promote transparency and accountability in government agencies. Likewise, the federal government of Canada formulated different legislation, such as the National Archives Act of 2004, Personal Information Protection and Electronic Documents Act of 2000, Access to Information Act of 2000, and Privacy Act of 2004 for better management of records and archives. The legislation aimed to protect individuals' personal records and privacy, legalize the use of electronic records as evidence, and ensure public access to information (Kashaija, 2019).

### **2.3.1 Document Collection Method and Holding System**

The basic objective of registering a document is to notify the world and any users that a certain property document has been executed. Record keeping is another important function of registration offices, and these records are permanent for all practical purposes. For most of our country's registration practices, manual face-to-face document collection methods are applied to all professional registrations, consulting firms, and contractor registrations.

After documents are collected, they are held manually on the archive shelf by using alphabetical order of different categories of professional levels, different consulting firms, and different contractor categories.

### **2.3.2 Document Interpretation**

The basic goal of document interpretation is to detect if a document is forged or original by comparing the original to the duplicated one. Most of our country's registration systems are not digital, making it difficult to communicate with stakeholders such as universities, colleges, contractors, and consultants. This is the fundamental problem in cross-checking job experience credentials, university and college certifications.

### **2.3.3 Digitalization Aspects**

The e-Registration system will be significant to the construction industry as all relevant stakeholders will be able to review each contractor's current capabilities, e.g. workloads, financial situation, and technical experience, rather than relying on data obtained during the pre-selection stage (which may be out-dated by months to years). Instead, the most up-to-date performance of contractors will be available to the clients and project teams through the web-based system. This concurs with the current trends toward e-procurement, as the centralized contractor registration system will become a screening and quality-checking mechanism for e-Procurement.

### **2.3.4 Governmental and Stakeholders Role**

Governments are major employers, policymakers, and regulators and have a leadership role in preventing work-related death, injury, and disease by promoting, legislating, and enforcing H&S requirements and regulating the registration of professionals and contractors. The starting points for the government's activities are policy outcomes. Governments can also help promote better health and safety by requiring projects to include a variety of safety measures, such as specifying the safety budget, building layout, or the use of specific construction materials, as well as the participation of professional and eligible contractors (Aboagye-Nimo, 2016).

#### **2.3.4.1 Civil Engineering and Architectural Associations**

The Ethiopian Association of Civil Engineers was officially established on February 10, 1996, with the goal of serving as a hub for civil engineers to create a more interactive professional development. The association has played a grand role in the country's construction development constituency of influential professionals both in academic and practice careers.

The Association has accomplished some commendable work in terms of the exchange of experience, creating awareness of new developments in the field, research papers, and discussion forums.

In addition, it has also been actively taking part in technical visits and conducting training workshops in collaboration with other relevant institutions. In the all-rounded struggle to make a real difference in the construction industry, the Ethiopian Association of Civil Engineers is an important partner in the realization of the desired change and development in the sector and country at large (Ethiopian of Civil Engineers Association, 2022).

The Association's accomplishments are the following but not limited to: representing the members' interests; working closely with the Ministerial offices that are in line with the profession; biannual publications of peer reviewed journals and bulletins; participation and contribution of professional comments during the country's construction industry policy and laws discussion forums; organizing professional conferences, workshops, and seminars; creating international cooperation with similar international associations; providing professional service to public and private institutions appointing its members; participation in the profession's related meetings both nationally and internationally; working closely with institutions of common interest to its mission; and strengthening its office for its day to-day activities.

It is my hope that each person reading this essay will consider his or her position on the matter. In order to provide the full value of the benefits that we can bring to society, in order to discharge our debt to all who have built this profession and handed it to us, we must be, each in our own way, active community leaders. To choose to be a bystander is to condemn future generations to a life that is less than it could have been. If you are a member of ASCE, let me again remind you that we have agreed to conduct our lives and complete our work within the guidelines of the Code of Ethics as follows:

Engineers shall hold paramount the safety, health, and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties. Engineers shall perform services only in areas of their competence and engineers shall issue public statements only in an objective and truthful manner.

Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.

Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession.

Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision (Ozcan, 2018).

The main objectives of the association of architectural associations are to co-ordinate the activities of professionals concerned with the built and natural environment in Ethiopia and promote professionals' integrity and to direct the members of the association in all matters of professional practice and the advancement of science and art of planning and building by developing the standards of professional education, training, and practice; and facilitate matters of mutual interest of the member professions to create public awareness by marketing the services of member professions and provide professional opinions on matters pertaining to violations of the statutes provided for good maintenance of the built and natural environment. Establish and accredit continuing professional development programs for Association members, as well as encourage collaboration of professionals and societies engaged in the built and natural environment by using them to offer community services and participate in the enhancement of the built and natural environment, maintain building information services, and monitor quality assurance on materials.

The objective of the architectural associations is to liaise with the government and regulatory agencies on the matters affecting registration and licensing of the professionals engaged in the built and natural environment.

The association's primary goals are to promote national, regional, and international collaboration in the building and natural environment professions, as well as to facilitate research and information dissemination for the advancement of professional education, training, and practice. The other duty of architectural associations is to publish papers and publications on the built and natural environment for the benefit of the association's members and the general public (Ozcan, 2018).

### **2.3.5 Organization of (E.C.A) Document Encoding System**

The Construction Work Authority is established to gratify the construction industry's infrastructural expansion missions that are crucial in nurturing the country's social and economic development; it is capable of generating strong bonds with the production and service-providing sectors; and it is competent in the global market.

The Federal Construction Projects Authority provides the service of registration and certification of construction projects. After checking the fulfillment of service requirements, the authority conducts registration of construction projects and provides certification of the projects.

In most of our country's regional level registration, document encoding systems, document holding and document analysis systems are manually applied, and at the federal level some parts of the document are encoded by a computerized system.

### **2.3.6 Document Monitoring and Evaluation Method**

The majority of monitoring operations are performed by hand, and the document encoding system is not recommended. The construction regulatory authority shall coordinate the overall registration process and specifically carry out the following activities: receiving and recording the applications from the applicants; performing inspection and preliminary evaluation of all application documents to clarify and/or confirm the completeness of the applications and to check the validity of the submitted documents; fulfillment of the basic requirements in terms of academic engineering qualification and professional experience for the category of registration being applied for; and payment of the requisite application fee, in addition to communicating the appointments of independent evaluators may be and terms of reference; submitting to them the relevant application documents for evaluation and obtaining the necessary feedback in line with the guidelines of the directives; and communicating to the construction regulatory authority, as the case may be, the observations and recommendations of independent evaluators on the assessed applications for consideration, in line with the guidelines of the directives. The establishment of monitoring administrative chains from federal to Woreda level through assigning strong, well-equipped professionals to monitor the legality of the license and be capable of taking remedial actions is one mechanism of monitoring activity.

## **2.4. Registration Experience of Some Selected Countries**

### **2.4.1 Construction Registration Practice in Singapore**

#### **The Professionals' Registration in Singapore Context**

The Professional Engineers Board registers professional engineers in the branches of civil, electrical, mechanical, and chemical engineering. A person applying for registration as a professional engineer with the Professional Engineers Board is required to hold an approved degree or qualifications listed in the Professional Engineers (Approved Qualifications)

Notification/Amendment Notification 2016 and have acquired relevant practical experience (Ofori, 2014).

### **Professional Registration Requirements**

The applicants are also required to sit and pass examinations prescribed by the board and practice for the professional engineering examination or the oral examination (for a person previously registered as a professional engineer or who is an experienced applicant). In addition, the applicant is required to attend a professional interview. After obtaining the approved qualifications, the applicant has acquired at least four years of practical experience. There are no restrictions based on age, citizenship or residency status, and there is no requirement for membership of any professional body. A person who meets the above requirements may apply for registration as a professional engineer board (Ofori, 2014).

**Fee for Registration:** Every application for registration under the Act must be accompanied by the registration fee of \$300 (as per the 2012 Professional Engineers Board Singapore Guidelines), which is non-refundable.

### **The Registration of Construction Contractors**

The Building and Construction Authority (BCA) registers construction contractors in Singapore. Central registration was instituted in 1985 after the amalgamation of the registers maintained by the Housing and Development Board, Jurong Town Corporation, and the then Public Works Department. The register's goal was to "have a common prequalification for public sector construction work that could be tapped into by public sector agencies." In Singapore, registration is not mandatory; only firms wishing to undertake public-sector projects must register. However, almost no significant contractor remains unregistered, and most private-sector developers use the register. Construction firms are placed under relevant "heads" according to the nature of the projects they can undertake. The various heads are: construction; construction-related; mechanical and electrical; maintenance; and supply (Ofori, 2014).

The registration of contractors is usually valid for one year in Ethiopia's context. However, in Singapore, this has been extended to three years. The registering agencies usually undertake periodic audits of the firms on their books. Following such an assessment, a company may be downgraded, have its registration suspended, or be de-listed in Singapore. In some countries, such as Singapore, public sector clients are required to provide the registering agency with reports on the contractors' performance. Contractors are placed in seven "grades" based on the

following criteria: net worth and pay-up capital; management and development (mainly technical personnel and management systems to which the firm is accredited). Firms in each category must have stated minimum numbers of professional and technical personnel and a track record in the past three years in terms of the project value. In the higher categories, certain stated minimum proportions of this completed work must be public-sector work, and additional requirements such as those for firms in the top three grades to submit their accounts annually and other registration requirements in Singapore, one-third of professional and technical personnel must possess relevant qualifications from universities recognized by the Professional Engineers Board of Singapore or Board of Architects. For renewal cases, projects completed satisfactorily in the past 5 years, including ongoing projects and recently awarded projects, will be considered as a track record (Ofori, 2014).

#### **2.4.2 Construction Registration Practice in Tanzania**

In Tanzania, the Construction Registration Board (hereinafter to be referred to as ERB or the Board) is a statutory body established by Act No. 15 of 1997 as amended by Act No. 24 of 2007 with the responsibility of regulating the activities and conduct of engineers and engineering consulting firms in Tanzania. Among other provisions, the Act requires all persons practicing engineering to register with the Board, and all employers of engineers and engineering services must engage only registered persons. Thus, one of the major involvements of the Board in regulating engineering practice is to oversee the registration of engineers, engineering technicians, and engineering consulting firms in the country (Republic of Tanzania, 2019).

#### **Categories of Registration, Basic Requirements and Roles**

In order to allow vertical and horizontal progression in the engineering profession, the Board has introduced various categories of registration based on one's academic qualification, professional competence and experience, as well as the manner in which engineering is practiced by registrants.

#### **Clusters of Registration Categories**

The prevailing legislation provides for the Board to register different categories of individuals and entities. While individuals are registered as persons based on their respective capabilities, an engineering entity is registered based on its capability (quality of persons) and capacity to deliver the required engineering services (Republic of Tanzania, 2019).

**Table 2.1: Category of Registration in Tanzania**

S/N	Category of Registration	Tools	Application and Limitations of Use
1	Engineering Technician	Certificate of registration	Engagement
2	Graduate Engineer	Certificate of registration	Engagement
3	Professional Engineer (PE/TPE)	Certificate of registration	Engagement
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	For certifying accountability in engineering works and services in the respective areas of practice and documents in their respective institutions.
4	Consulting Engineer (CE/TCE)	Certificate of registration	Engagement
		Registration of engineering consulting firm	
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	Certifying design calculations, drawings and test results interpretation for, issuance to the public and project implementation.
5	Independent Consulting Engineer	Certificate of registration	Engagement
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	Limited to engineering services as provided for in the scope of work of independent consulting engineer. It excludes engineering design and construction supervision.
6	Engineering Consulting Engineering Consulting Firm	Certificate of registration	Engagement
		Practicing Certificate	For Professional engagement and identification.
		Rubber Stamp	Certifying design calculations, drawings and test results interpretation.
7	Engineering Materials Testing Laboratory	Certificate of registration	Engagement
		Practicing Certificate	For Professional engagement and identification.
		Rubber Stamp	Certifying test results

**Sources: Tanzania journal (Engineers Registration Board Act No. 15 of 2007)**

### **Contractor Registration in Tanzania**

The Contractors Registration Board (CRB) was established under the Contractors Registration Act No. 17 of 1997 to register, regulate, and promote contractors in Tanzania after the dissolution of the board that registered architects, quantity surveyors, and contractors.

The functions of the CRB are as follows (United Republic of Tanzania, 1997: section 4): to consider and decide on applications for registration; to effect registration of contractors; to maintain a register of contractors; to enter and inspect construction, installation, or erection sites for the purpose of verifying and ensuring that the works comply with all governing regulations and laws of the country; to promote and provide opportunities and facilities for the study of an engineering discipline; to enter and inspect construction, installation, or erection sites.

The Act has mandated the ERB with the following specific functions, amongst others: to maintain and keep a register of engineers, engineering technicians, and engineering consulting firms; to consider and decide on applications for registration; to certify academic awards given by training institutions for consideration in an application for registration; to conduct examinations for purposes of registration and grant certificates, diplomas, and other awards of the Board to successful candidates; to provide facilities and opportunities for learning and professional exposure and skills acquisition; to cause to be held professional training for graduate engineers and continuing development programmers for engineers and engineering technicians, towards promotion of their registration; to take legal action against persons, employers of engineers, and engineering consulting firms found guilty of professional misconduct for contravening any provisions of the Act (Republic of Tanzania, 2019).

### **2.4.3 Construction Registration Practice in Kenya**

The National Construction Authority Project Registration Guidelines Contractors operating or willing to undertake construction operations in Kenya are required by law to register through the National Construction Authority, which is constituted under Act No. 41 of 2011 Laws of Kenya.

The National Construction Authority is mandated to clean up builders and contractors as a way of eliminating rogue contractors in Kenya and malpractices in building and construction. The authority, which has recently started inspecting construction and building projects around the country to ensure high quality of work and close projects posing health risks and collapse hazards, is expected to provide the regulatory framework for registration and renewal of contractors (Gacheru & Diang', 2015).

#### **Qualification as a Contractor in Kenya**

Register with the Registrar of Companies: Each contractor is required to hold a certificate of incorporation from the Registrar of Companies in Kenya. This will mean they register as a legal company in the country as a limited liability, sole proprietorship, or as a partnership company.

In this respect, the National Construction Authority will also require that one of the technical directors of the registered company have minimal technical qualifications, have skills, or possess experience in a field related to construction. All the directors must also forward their CVs to the National Construction Authority (Gacheru & Diang', 2015).

In order to operate in Kenya, the contractor must also demonstrate tax compliance by submitting these documents to the National Construction Authority. Evidence of the bank account should be opened under the name of the contractor company, and evidence of the bank account is required. Foreign contractors are issued with permission to operate for a specific period of time and will be required to prove that they are in the country for that period of time given to undertake a project. They should not undertake another project after the one specified or targeted is completed, and they will be required to sign an affidavit with the authority that this will not happen (Gacheru & Diang', 2015).

The National Construction Authority from time to time determines whether foreign contractors willing to operate in Kenya are also required to submit a commitment to transfer skills to locals. A Certificate of Registration is issued on registration as a contractor in Kenya.

**Contractor Classification/Grades:** NCA regulations allow a contractor to register in one or more categories according to the class of construction work to be undertaken.

**Table 2.2: Class and Construction Work Category in Kenya**

<b>CLASS</b>	<b>CONSTRUCTION WORKS</b>
NCA 1	Unlimited contract value
NCA 2	Contract value up to 500,000,000 (contractors –buildings), up to 250,000,000 contact value (specialist contractors), up to 750,000,000 (roads and other civil works).
NCA 3	Contract value limited to 300,000,000 (contractors –buildings), up to 500,000,000 (roads and other civil works)
NCA 4	Contract value limited to 200,000,000 (contractors –buildings), up to 100,000,000 (specialist contractors) up to 300,000,000 (roads and other civil works)
NCA 5	Contract value limited to 100,000,000 (contractors- buildings), up to 50,000,000 (special contractors) up to 200,000,000 (roads and other civil works)
NCA 6	Contract value limited to 50,000,000 (contractors – buildings) up to 20,000,000 (special –contracts) up to 100,000,000 (roads and other civil works)

CLASS	CONSTRUCTION WORKS
NCA 7	Contract value limited to 20,000,000 (contractors – buildings), up to 50,000,000 (roads and other civil works).

**Sources: Kenya journal (Construction Annual Report 2016, Kenya Mombasa).**

**Registration Fees:** Local contractors in Kenya will be required to pay a fee of Ksh. 10, 000–50, 000 depending on category in order to register. License renewal costs are valued at between Ksh. 5, 000 and Ksh. 10, 000. Between Ksh. 5, 000 and 10,000 will be required for the annual renewal of the license.

Foreign contractors willing to register with the National Construction Authority to operate in Kenya are required to pay a registration fee of Ksh. 100, 000 and must undertake only tenders they win. Those registering under a temporary registration will need to commit to sub-contracting "not less than 30% of the value" of their contract to local contractors (Gacheru & Diang', 2015).

## 2.5 Literature Summary

From the different works of literature reviewed above, it can be concluded that many studies do not have any relevant information about the challenges and prospects of the construction certification and registration process, and that there is also insufficient data or information about the impact of construction project registration on the development of the construction industry. Although the contribution of contractors' and consultants' registration and certification in Ethiopia and their practice in the construction industry are assessed, the specific challenges at the time of registration and certification are studied. Therefore, from the literature reviews, it can be deduced that many challenges tend to be obstacles to the registration and certification of contractors, consultants, and professionals.

In addition to the fact that the registration process in developed countries is not considered a major problem, it is often carried out with the help of a well-organized structure and human resources experts. Regarding the registration of professionals and contractors, they are registered through organized processes. Continuous quality assessment and monitoring practices foster open environments for professional and company registration systems.

In developed countries, if the assessment is properly implemented, a series of trained and competent human resources can be produced in the field, and it has produced consistent professional work in the sector.

The professional registration procedure demonstrated in the construction sector is seen as a key source of inconsistency in the developing world. The lack of a series of professional evaluation and monitoring methods, as well as a sequence of professional assessments and follow-up from one professional level to the next, indicates that professional assessment is inconsistent. Furthermore, many issues concerning the registration of a construction contractor have difficult and complex registration procedures that are symptomatic of evaluations. Another challenge in the developing world is that for those who are expected to be an extension of the registration process, establishing a modern computerized web-based technology method might be regarded as a major challenge.

The registration of the construction project, which is included in the new professional and project registration process, is considered to be one promise. One of these is the need to register with the appropriate agency under the guidance of the local construction authority, and any contractor, consultant, and client of private and government-owned projects must be registered according to the registration practice.

## **2.6. Research Gap Identification**

The identification of the major challenging factors that affect professional, company, and project registration practices helps to improve the effectiveness and implementation of current registration practices in the construction industry. Also, the determination of the major challenging factors will assist in considering the improvement mechanisms necessary to mitigate the problem. However, various aspects of the challenges and prospects of construction registration practices have not been identified by researchers in the Ethiopian construction industry. Most of the researchers in the Ethiopian construction industry are not concerned about this problem and challenge regarding professional, company, and project registration practices, which have serious impacts on quality manpower development, continued professional development, and international competitiveness. Their mitigation measures have not been identified. As a result, to improve the effectiveness of current registration practice, this basic knowledge needs to be identified and documented so that practitioners can use it.

## **CHAPTER THREE**

### **MATERIALS AND METHODS**

#### **3. Introduction**

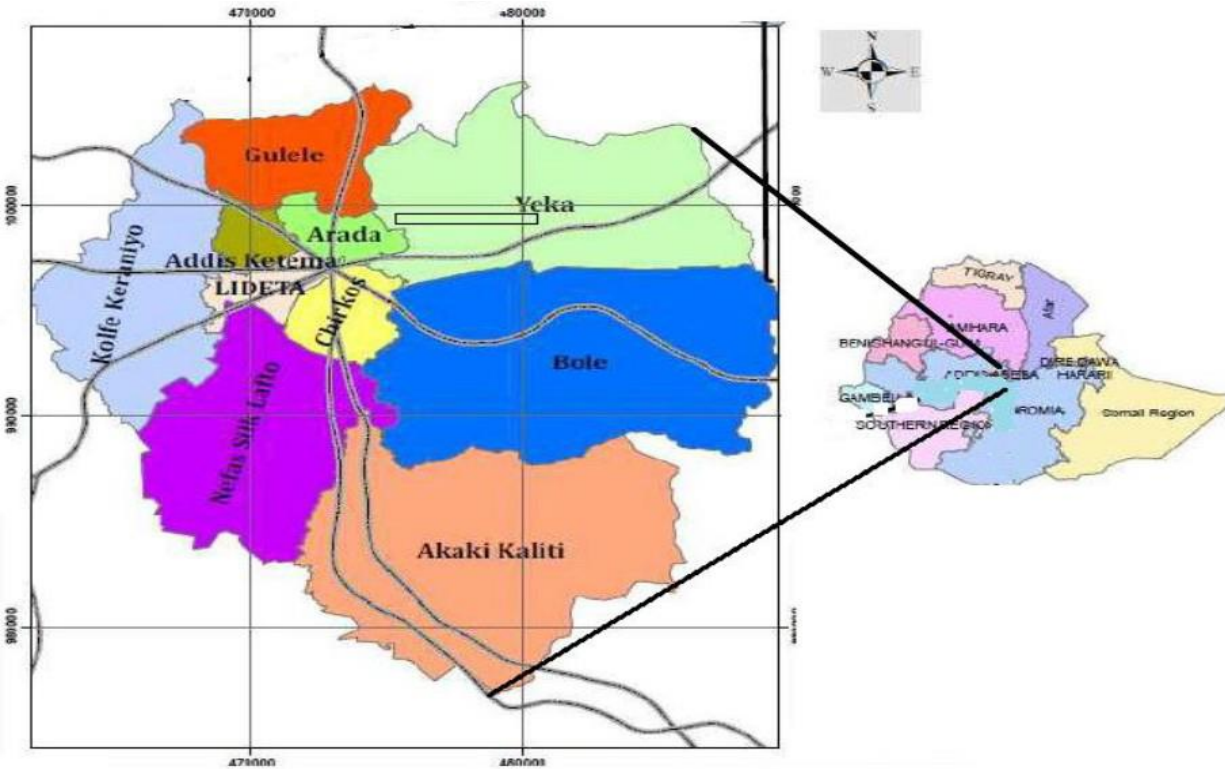
The main purpose of the research methodology was to explain how the research has been accomplished, what knowledge is required, what information is needed, and how information is collected. It specifically presents the research approaches and techniques, operationalizes variables and indicators, presents sampling techniques in terms of sample size and selection, the validity and reliability of the research, and data collection and analysis methods.

#### **3.1 Description of the Study Area**

The study area of this research was in Addis Ababa, the capital city of Ethiopia, and the seat of the African Union (AU) and the United Nations Economic Commission for Africa (UNECA). It is situated between 8055 'and 9005' North Latitude and 380 40' and 380 50' East Longitude in the central plateau of Ethiopia. It covers an area of 540 sq. km. The city is divided into 11 sub-cities ("kifle Ketama") and 99 wards ("kebele"). Addis Ababa was founded by the 19th-century Ethiopian king, Emperor Menelik II, and his wife, Empress Taitu, in 1887 (Chen & Hawaz, 2020).

Due to its average elevation of 2,500 meters above sea level, Addis Ababa has a suitable climate and moderate weather conditions. Besides, for political and administrative reasons, the city is designed to be structured into 10 sub-cities (Milkias & Toru, 2018).

The researcher was interested in Addis Ababa since it accounts for a substantial share of the construction project activities in the area when compared to other cities. It is a rather large city, and it is where around 70% of construction activities, operations, and innovative technology are initially deployed. Because the city is still growing, appropriate building, bridge, and road project sites are available, and various grades of contractors, consultants, professionals, civil and architectural associations, and ministers of construction authority bodies are also available.



**Figure 3.1:** Map of Addis Ababa City Master Plan.

(Source: Office for the Revision of the Addis Ababa Master Plan, 2012)

### 3.2 Research Strategy and Type

The research strategy employed in this study was descriptive and explanatory survey designs to collect, analyze, and present the data (Gay et al., 2012). A descriptive and explanatory survey research design (qualitative & quantitative) was employed for conducting study. It is implemented mainly preferred to investigate various data about the challenging factors that affects the registration practice and the prospects of registration in Ethiopia. Such a study is helpful in obtaining pertinent and precise information as well as to draw valid conclusion about the target population. This study aims to finding out the prevalence of a situation or problem by taking a cross-sectional data of the population.

### 3.3 Research Approach and Techniques

Research approach (method) is about how the research was conducted; in other words, the actual steps followed to collect, organize, and analyze data. There are two types of research approaches, namely quantitative research and qualitative research (Kothari, 2004). In this research, combinations of quantitative and qualitative approaches are used to achieve the aim of the research. This mixed research approach is sometimes called triangulation or the "multi method."

The reason behind the use of a mixed approach (triangulation) was to fill in the limitations of each approach so that triangulation would fill the gap. As triangulated studies employ two or more research techniques, qualitative and quantitative approaches may be employed to reduce or eliminate the disadvantages of each individual approach while gaining the advantages of each, resulting in a multi-dimensional view of the subject gained through synergy and assisting in making inferences and drawing conclusions (Fellows & Liu, 2015).

Quantitative methods have the advantage of higher internal validity, as the experiment may be repeated with similar results, whereas qualitative methods involve the analysis of complex descriptive data, in which the researcher may increase his or her involvement and probe to gain additional information (Naoum & Egbu, 2015). As the data in the quantitative approach are numerical, the numbers are readily collected, coded, summarized, and analyzed.

On the other hand, when the data are concerned with a qualitative phenomenon, the data analysis may involve qualitative analysis. Qualitative data are not numerical, nor are they usually subjected to statistical methods of analysis. It involves the analysis of complex descriptive data, in which the researcher may increase his or her involvement and probe to obtain additional information (Kothari, 2004).

In general, in this section, the step-by-step methodological techniques that are used in order to answer the research questions are shown. First, define the problem and set the objectives and scope; then, formulate the research questions based on the practice observed in the construction industry's registration practice. Following the research question, an appropriate research design was selected. Then, a literature review was performed in parallel with the data collection in order to develop a theoretical background related to the study subject. Finally, the data was analyzed, discussed, and conclusions and recommendations were drawn. Figure 3.2 shows the research process followed from the start to the end.

## RESEARCH METHODOLOGY FLOW CHART

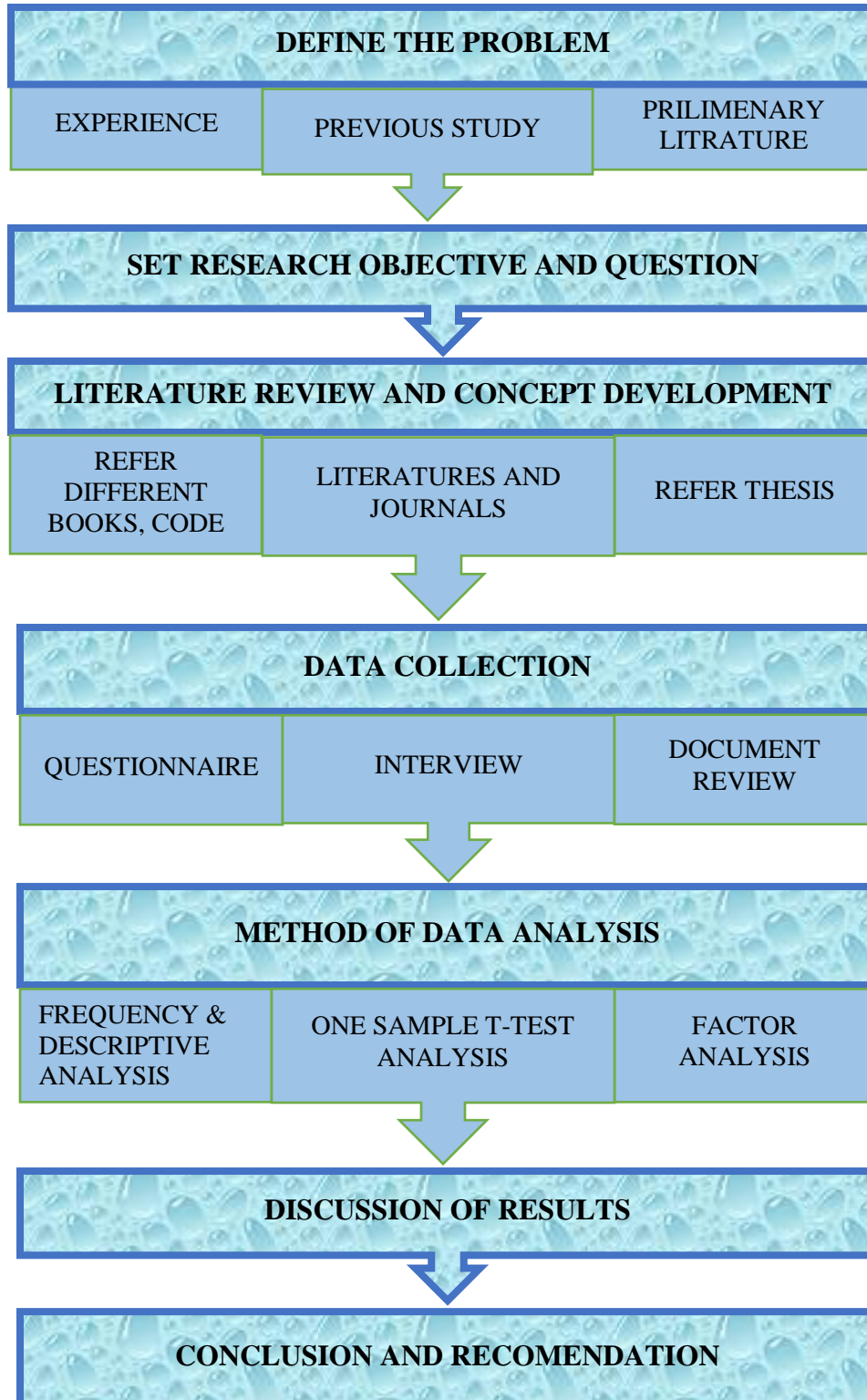


Figure 3.2: Research Methodology Flow Chart

### **3.4 Methods of Data Collection**

Accurate and systematic data collection was critical for conducting scientific research. Data collection allows us to collect information that researchers want to collect about a given study's objective. Depending on the type of research, methods of data collection would be primary or secondary. This study used both primary and secondary data.

#### **3.4.1 Primary Data**

The main source of primary data for this research was questionnaires. The type of questionnaire used is a structured questionnaire. Primary data were gathered by distributing questionnaires and conducting interviews with various professionals involved in building and construction projects.

#### **3.4.2 Secondary Data**

The secondary sources of data used in this study include published or unpublished documents such as registration codes, books, references, journals, websites, magazines, and papers related to the research subject. It helps provide context for research and illustrates how the subject has been studied previously. It also helps the researcher learn from previous studies, outline gaps in those studies, and justify the research.

### **3.5 Target Population, Sampling Technique and Sample size**

#### **3.5.1 Target Population**

The first step in developing any sample design is to clearly define the set of objects, technically called the universe (population), to be studied (Fellows & Liu, 2015). The population of this research could be individual's professionals who have direct involvement, such as the Ministry of Construction Authority, contractors, consulting firms, and civil and architectural engineers' associations, and professionals are also selected from contractor and consultant projects in Addis Ababa.

#### **3.5.2 Sampling Technique**

A sample is a smaller group of subjects drawn from the population on which a given study is based in order to reach the population's conclusion. In this study, a probability simple random sampling technique would be adopted for selecting the sample population of the study because it allows a researcher to get data from a sample of the population that knows about the subject.

Simple Random sampling is a probability sampling method, and it occurs when "elements selected for the samples has an equal chance of getting selected to be the part sample. Researchers often believe that they can obtain a representative sample by using sound judgment, which results in saving time and money.

### 3.5.3 Sample Size

The larger the sample size is, the more representative it can be, and thus, the more reliable the result is (Saunders M, Lewis P, 2009). Nevertheless, the sample size depends on researchers' available resources, including time, finance, and human (Saunders M, Lewis P, 2009). Therefore, 185 questionnaires are given to individual professionals in the hope of receiving more than 150 responses. In addition to the above evidence, the researcher adopted the following formula to estimate the sample size from other researchers' works used by (Kareem et al., 2015) was adopted.

In order to assess the current situation of challenging factors that affects the registration practice and to overview the prospects of construction certification and registrations, a wide range of construction parties involved in the construction of projects were targeted. Due to time and financial restrictions, it would have been impossible to collect data from all of the professionals in the research population. As a result, sampling was utilized to ensure that the sample size was representative of the population being investigated. Individual construction professionals served as the sample frame for the quantitative data.

$$SS = \frac{Z^2 * P * (1-P)}{C^2} \quad \text{-----} \quad \{\text{Equation 3.1}\}$$

Where SS = Sample size

Z is confidence level of our confidence level corresponds to a Z-score. This is a constant value needed for this equation. Here are the z-scores for the most common confidence levels: - Z = Z value (e.g. 1.645 for 90% confidence level with 10% marginal error and +/- confidence interval.)  
 90% – Z score = 1.645, 95% – Z score = 1.96 and 99% – Z score = 2.326

P = is an estimate of the proportion of people falling in the desired group taken as (10%)

C = is the proportion of error taken as (5%)

$$SS = \frac{(1.96)^2 * 0.1(1-0.1)}{(0.05)^2} = 138.29 = 139$$

Thus, by considering the non-response rate of 10%, the calculated sample size that would be  
 $(139 * 10 / 100) = 13.9 = 14$

**So, 139+14=153 totals individual professionals were surveyed.**

### **3.6 Data Collection Instruments**

In this study, a questionnaire, an interview, and document analysis would be used as data-gathering instruments or tools for the assessment of the challenges and prospects of construction registration practice in Addis Ababa and to point out the key challenges and prospects in the construction industry registration system.

#### **3.6.1 Questionnaire**

To collect primary data, a well-designed questionnaire was employed to gather both quantitative and qualitative data in a form containing a series of questions, particularly one addressed to a statistically significant number of subjects, as a means of gathering data for a survey. A written or printed form used in gathering information on some subject or subjects, consisting of a set of questions to be submitted to one or more people (See Appendix C).

#### **3.6.2 Interview**

To meet the objectives of the study, both closed-ended and open-ended questions could be used for the interview, which is related to construction registration practices in the region. The questions are well-thought out to reflect the assessment of the challenge and prospect of a contractor's registration practice. This helped gather data on the practice of contractors' and consultants' problems (See Appendix D).

#### **3.6.3 Document Analysis**

In this study, the researcher would use document analysis to assess existing data on the level of stakeholders from professional registration practice documents. The researcher viewed in detail the directives that are currently implemented to compare them with the old directives. A desk study is a research strategy and an empirical inquiry that investigates a phenomenon within a backlisted organization and reports it. A desk study is a descriptive and exploratory analysis of a person, group, or event, and it helps obtain secondary data.

**Table 3.1: Overall Summary of Data Collection, Target Group, and Analysis of Methodology.**

No .	Specific Objectives	Target Group	Data Collection Methodology	Method of data analysis
1	To assess the challenge of professional and Company registration practices.	Individual Professional from ( Contractors, Consultants, Ministry of Construction Authority, and clients)	❖ Questionnaire ❖ Interview ❖ Document Analysis	❖ One Sample T-test Analysis ❖ Factor Analysis ❖ SPSS version 26 ❖ Triangulation Methods
2	To oversee the prospects of construction project registration practice.		❖ Questionnaire ❖ Interview	❖ One Sample T-test Analysis ❖ Factor Analysis ❖ SPSS version 26 ❖ Triangulation Methods
3	To assess the improvement mechanism of registration practice.		❖ Questionnaire ❖ Interview	❖ One Sample T-test Analysis ❖ Factor Analysis ❖ SPSS version 26 ❖ Triangulation Methods

**(Data Source: Researcher’s own list, 2022.)**

### 3.7 Methods of Data Analysis

Depending on the main objective of the study, the researcher undertakes the data analysis process in order to transform the raw data into a relevant, valid, and meaningful summary. Following this, raw data was collected and cleaned properly for further analysis. The analysis of data was carried out by using quantitative methods with the help of inferential statistical techniques and descriptive analysis. A descriptive analysis (frequency and frequency distribution, percentage, mean, and standard deviation) was used to analysis the general information of the respondents. Inferential statistics with a computer program called the Statistical Package for Social Science (SPSS) version 26 were implemented.

One-sample t-test was used to compare a sample mean to a specific value. The study has also conducted Factor Analysis in order to determine groups among the inter-correlations of a set of variables in order to reduce or summarize the data using a smaller set of factors or components. Interview result was also summarized to incorporate the qualitative data of the management view.

### **3.7.1 Descriptive Analysis**

The SPSS (Statistical Package for the Social Sciences) program was used to analyze the questionnaire responses. All questionnaire data and information were coded and entered into the SPSS software for statistical analysis to obtain variable frequency, percentage, mean, and standard deviation. In such cases, different statistical techniques such as the one-sample t-test were used to determine the statistical significance (Tripathi & Jha, 2018), which is used to determine the difference between the sample mean and the population means (Qin & Ofori, 2000).

### **3.7.2 One Sample T-test Analysis**

The one-sample t-test was used to compare a sample mean to a specific value. A researcher can use a one-sample t-test to compare the mean of a sample with a hypothesized population mean to see if the sample is significantly different. A one-sample t-test was used to compare the sample mean and the sample midpoint of the test variable and also to determine whether a sample of observations could have been generated by a process with a specific mean. As a result, the required improvement practice's significance level was determined using a one-sample t-test with a 95 percent confidence interval. As indicated in the scale, 3.5 indicate improvement is required in the current practice; therefore, 3.5 were considered the hypothetical mean in testing for significance to conclude that registration practice improved. A test of normality was approximately checked by Skewness and Kurtosis to fulfill the requirement and be valid for all variables. One sample t-test can be calculated using the formula in the Statistical Package for Social Science (SPSS) version 26.

### **3.7.3 Factor Analysis**

After analyzing the one sample t-test and determining whether the sample mean differed statistically from the population mean, the survey data was subjected to factor analysis to identify groups among the inter-correlations of a set of variables in order to reduce or summarize the data using a smaller set of factors or components (Pallant, 2016).

According to Asvat et al., (2018) exploratory factor analysis looks for components that are significantly connected. Then it assigns them to a factor and searches for the next strongest batch of correlated items, which it assigns to another factor. By examining these items, a collective name was able to be assigned to represent these items or factors. Statistical Package for Social Science (SPSS) software was able to tell how many factors there are and how many items fall into each component/group (Pallant, 2007).

The Eigenvalue in the scree plot determines the principal components, which are rotated orthogonally by varimax to obtain more evenly distributed factor loadings within the components. According to (Pallant, 2007) three steps were adopted in conducting the factor analysis:

**Step 1:** Assessment of suitability of the data for factor analysis: When determining whether a data set is suitable for factor analysis, two major issues are taken into account. The Bartlett's Test of Sphericity should be statistically significant at  $p < 0.05$ , and the Kaiser- Meyer-Olkin Measure of Sampling Adequacy (KMO index) should be greater than 0.5 for a good factor analysis.

**Step 2:** Factor extraction: It involves determining the smallest number of factors that can be used to best represent the interrelation among the set of variables. A principal component analysis approach has been demonstrated in this research. A screen test technique can also be used, which involves plotting the eigenvalues of each factor and inspecting the plots to find a point at which the shape of the curve changes direction and becomes horizontal.

**Step 3:** Factor rotation and interpretation: The rotated factor matrix shows how the factors are related to each factor. The extracted factors were then rotated based on their factor loadings in a manner that is easier to interpret and to report. The most common orthogonal rotational approach particularly Varimax method is used in this research.

**Exploratory Factor Analysis** was a statistical method that increases the reliability of the scale by identifying inappropriate items that can then be removed. It also identifies the dimensionality of constructs by examining relations between items and factors when the information of the dimensionality is limited. For this reason, EFA is performed in the early stages of developing a new or revised instrument (Wetzel, 2012). Before performing it, measurement appropriateness for the survey items was evaluated through use of descriptive statistics. To accomplish this, both the mean of all responses and the standard deviations per item were calculated. If the mean of an item was found to be close to either 1 or 5, eliminating it as inappropriate should be considered because it may decrease the standard of correlation among the rest of the items. Following this step, the normality in distribution was tested by examining **skewedness and kurtosis** before conducting an exploratory factor analysis (**See in Appendix A**).

Since the normality of the distribution was confirmed, the exploratory factor analysis was conducted through the use of the Statistical Package for the Social Sciences (SPSS, version 26).

**KMO and Bartlett Test:** In exploratory factor analysis, before going to the results, there are prerequisites to be gained; one of these prerequisite tests is the Kaiser–Meyer–Olkin (KMO), which justifies the appropriateness of exploratory factor analysis.

The Kaiser–Meyer–Olkin value of the complete questionnaire is in table and the Kaiser–Meyer–Olkin value of all is greater than or equal to 0.5, which shows that the sample is sufficient. The other prerequisite test is the Bartlett test. The chi-square value of this study is also in table 3.2 with a degree of freedom, and the p-value of the total questionnaire is 0.000, which is zero probability. Generally, based on this KMO value and all other measurements, the sampling size acceptability was ranged as satisfactory and appropriate for factor analysis.

**Table 3.2: The Result of KMO and Bartlett’s Test of the Data**

Description	KMO Value	Bartlett's Test of Sphericity (Approx. Chi-Square)	Degree of freedom
General Registration Practice	0.692	161.113	15
Professionals' Registration requirements	0.593	280.389	55
Companies’ Registration requirements	0.668	451.491	21
Project Registration requirements	0.704	147.448	21
Challenges of Professionals’ Registration	0.756	398.909	36
Challenges of companies’ registration	0.685	551.158	55
Challenges of projects registration practice	0.600	169.378	36
Prospects of professional registration practice	0.732	131.911	15
Prospects of Company registration practice	0.589	117.827	6
Prospects of projects registration practice	0.637	207.829	21
Mechanisms to improve registration practice	0.769	408.884	55
<b>Source:</b> Primary data SPSS			

**Communality:** The measure of the percentage of variables variation that is explained by the factors is called communality. It is the amount of variance an original variable share with all other variables included in the analysis. If a variable has much in common with other variables take as a group then there is high communality.

Further, the communality measures the presence of variance in a given variable explained by all the factors jointly and may be interpreted as the reliability of the indicator. Through the common source with others, the communality estimates a part of the variance in a variable.

Low communality (below .5) may lead to its variable being omitted. Principal component analysis starts with certain variables and common factors. Initially, it assumes that all variances are common. Hence, the communalities equal 1 before extraction. This means that there are common factors which, after extraction, represent the common variance in the data structure. The communalities after extraction represented the amount of variance in each variable which could be explained by the retained factors. All the variables of in the data were above 0.5 indicating high communality.

**Scree Test:** Another popular used method for determining the number of factors to retain is Cattell's Scree test (Cattell, 1966) which involves the visual exploration of a graphical representation of the eigenvalues for breaks or discontinuities. The number of data points above the break (not including the point at which the break occurs) is the number of factors to retain. The logic behind this method is that this point divides the important or major factors from the minor or trivial factors (Ledesma & Valero-Mora, 2007).

**Un-rotated Component Matrix:** A symmetrical revolution has been utilized trying to accomplish basic structure, permitting the elements to be associated. The factor structure has been checked and the variables are determined a name where the proposed factors are not proper. According to (Bryant, F.B., Yarnold, 1995), exploratory factor examination allows the PC to discover straight factors which explain the hypothetical most extreme estimation of normal difference in a connection grid which would characterize the hidden factor model that best fits the information. The segment network table shows the factor loadings for every factor on the un-pivoted segments. In nature, SPSS displays all loadings in the component matrix table; but, in this study all factor loading results less than 0.5 are italicized in the output. (Field A., 2005), states that this un-rotated component matrix is not mainly significant for interpretation but it makes it easy. However these correlations can help to make an interpretation of the factors. And the un-rotated factors may contain many variables with large loadings, which can make interpretation difficult. Loading result of this item on the two factors is very near to each other and makes the interpretation complex. To solve this difficulty, it requires further analysis of a rotated component matrix.

### 3.8 Reliability

A **reliability test** was conducted to check the stability and consistency of the data by using the Cronbach alpha method. Research questions are prepared in a way that is closely related to the research question, and an appropriate and careful data collection method would be used. Cronbach's alpha is the most widely used and popular method of determining true reliability.

This study incorporated Cronbach's alpha coefficient in SPSS, Version 26, which provides the extent of the internal consistency between the items. To develop the Cronbach's Alpha, connections among the things has been planned. A decent relationship among things gives a higher estimation of Cronbach's Alpha. Thus, the higher Cronbach's Alpha worth shows a higher legitimacy. In light of the general guideline, the quantity of perceptions must be more than 50 however 100 or more are suggested. A Cronbach's Alpha with a correlation under 0.5 is insupportable factor analysis that will be omitted from the list of observation and preserved as not valid data for additional analysis (Koonce & Kelly, 2014).

**Reliability Analysis** was present to ensure the accuracy of the data collected. The reliability scale is known by the value of Cronbach's alpha. This study's Cronbach's alpha value is in Table 3.3, which is considered acceptable and appears to be a middling value. Normally, if the value of Cronbach's alpha is greater than 0.60, it is taken as reliable (Ursachi et al., 2015).

**Table 3.3: Reliability Statistics of Collected Data**

Description and No of variables	Mean	Std. Deviation	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items
General Registration Practice (6 item)	17.94	2.152	0.678	0.650
Professionals' Registration requirements (11 item)	34.82	3.099	0.659	0.650
Companies' Registration requirements (7 item)	23.62	3.023	0.711	0.724
Project Registration requirements (7 item)	22.86	2.611	0.635	0.636
Challenges of Professionals' Registration (9 item)	24.44	3.238	0.756	0.744
Challenges of companies' registration (11 item)	38.81	3.201	0.657	0.625
Challenges of projects registration practice (9 item)	31.69	3.019	0.611	0.608
Prospects of professional registration practice (6 item )	22.13	2.814	0.658	0.660

Description and No of variables	Mean	Std. Deviation	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items
Prospects of Company registration practice (4 item )	14.01	2.079	0.651	0.673
Prospects of projects registration practice (7 item)	26.49	2.692	0.672	0.671
Mechanisms to improve registration practice (11 item)	43.03	4.119	0.784	0.784
Source: Primary data SPSS				

### 3.9 Validity

Validity concerns the extent to which a measurement actually measures those features the investigator wishes to measure and provides information that is relevant to the question being asked. Validity is ensured by making sure the sampling techniques are free from bias by giving each subject an equal opportunity to score. The questionnaires are comprehensive enough to cover all the variables being measured.

### 3.10 Ethical Considerations

The respondents in the study were assured of the confidentiality of the information they provided. The respondents are required to write their names on the questionnaires. All participants are asked to voluntarily participate in the data collection by collaborating in filling out the questionnaire and responding. By doing so, the respondents are free of any harm, and more importantly, their views are very confidential and anonymous. Moreover, the questionnaires do not have any connection with the respondents since the research is done for academic purposes.

## **CHAPTER FOUR**

### **RESULT AND DISCUSSION**

#### **4. Introduction**

This part of the research deals with the analysis, interpretation, and discussion of the data gathered from questionnaires, interviews, and document analysis. The results and discussion sections of the research were considered in three main parts, in line with the objectives of the research and also the sections of the questionnaire.

The first part was about the findings for the first objective of the research, which is to assess the challenging factors that affect professional and company registration practices in Ethiopia. The second part contains the findings of the second objective, which was intended to oversee the prospects of construction project registration practice. The third part of the analysis assesses the improvement mechanism of registration practice. Finally, interviews were conducted with eight professionals who have the experience to answer the designed interview questions prepared to answer the research objectives, and supplementary data was sought from key sources to deepen the findings of this study.

#### **4.1 General Background of the Respondent Profile**

Any research conducted using a questionnaire needs to be tested for non-response bias. Most research texts list these rules: e.g., a response rate below 60% is a disaster, and even a 70% response rate is not much more than minimally acceptable (Presser et al., 2004). For this study, a total of 185 respondents receive the questionnaires, which were randomly distributed to individuals' professional those who from contractors, consultants, regulatory experts and clients involved in the construction industry. A total of 154 usable responses were collected, and there was no problem with biasness because the response rate was higher.

According to this research, the general information of the respondents was described by the employees' educational status, working position, working company, and experience. This section of research shows the quality of personnel information that is working on different building, road, and construction regulatory authority construction projects in Addis Ababa.

**Table 4.1: Demographic Profiles of Respondents**

<b>Respondent Backgrounds</b>	<b>Description</b>	<b>Frequency</b>	<b>Percent</b>
<b>Level of Education</b>	College Diploma	24	15.6
	BSc Degree	99	64.3
	MSc Degree	31	20.1
<b>Employees Working Position</b>	Project Manager	39	25.3
	Project Engineer	21	13.6
	Site Engineer	25	16.2
	Office Engineer	33	21.4
	Site Supervisor	11	7.1
	Other Engineer Filed	25	16.2
<b>Establishment of the Company</b>	Building Contractor	24	15.6
	Road contractor	19	12.3
	General Contractor	47	30.5
	Consulting Firms	32	20.8
	Regulatory Authority	20	13
	Other Engineer Filed	12	7.8
<b>Working Experience</b>	Less than two year	3	1.9
	2-5 Years	31	20.1
	6-10 Years	68	44.2
	11-15 Years	40	26
	16-20 Years	12	7.8

(Source: Researcher's Survey questionnaire, 2022)

Based on the above table 4.1 from all participants on the questionnaire, 99 respondents (64.4%) have a first degree (BSc), the other 31 respondents (20.1%) have a second degree (MSc), and the remaining 24 respondents (15.6%) have a college diploma. According to the response, the respondents provide relevant and reliable information needed for the study, and their responses are in line with the responses on the questionnaire.

The positions of individual respondents' working employees show the level of position order, such as project manager, project engineer, site engineer, office engineer, site supervisor, and other positions in the working construction sector were properly filled and submitted to the researcher. Based on table 4.1 description, the above majority of the respondents, with 46.75%, were project managers and office engineers of construction projects. The project engineer and other positions also encompass 29.87% of the respondents, and the site engineer, 16.23% of the respondents. Hence, most of the first-rank responses have been returned to the project manager and office engineer in the construction project.

Based on the above table 4.1 descriptions, 30.52% were general contractors for construction projects; the consulting firms and building contractors also encompassed 36.6% of the respondents; and the road contractors comprised 12.34% of the respondents. Hence, most of the first-rank responses have been returned to the general contractor and the consulting firms and building contractors in the construction project, respectively.

The respondents' experience in construction projects reveals whether they have enough experience to properly operate the business and execute the construction work. They also reflect the well-judged responses and the reliability of the questionnaire completed by those relatively experienced respondents to the construction project.

From the analysis of the above table 4.1, the experience of the respondents is shown as follows. Based on the respondents' data that are presented in the above table 4.1, 3 respondents (1.9%) of them stay 1-2 years on contractors' projects; 31 respondents (20.1%) of them stay 2-5 years; similarly, 68 respondents (44.2%) of them stay 6-10 years; also, 40 respondents (26%) of them stay 11-15 years; and finally, 12 respondents (7.8%) of them stay 16-20 years. As indicated in table 4.1, the questionnaire was responded to by 44.2% in the category of years 5–10. This was shown as 70.17% of the questionnaires were filled out and returned by those with an experience of 5–20 years.

## **4.2 Construction Registration Practice**

### **4.2.1 Perception of the Stakeholders towards Registration Practice**

One of the research questions was to assess professional respondent attitudes toward the overall general perception of construction registration practice. For this purpose, sample respondents were asked to provide six statements to indicate their agreement level with each statement.

Then a statistical technique, a one-sample t-test, was used to test the significance level of their agreement. In this test, the level of agreement is said to have a significant difference, if the p-value is less than 0.05 (the conventional statistically significant level of error). This gives the interpretation that the sample mean is significantly different from the average test value (3.5). Table 4.2 indicates the result of the one-sample t-test with regard to the perception of registration practice, the respondent's overall attitude towards the general perception of registration practice in Ethiopia.

**Table 4.2: The Overall Perception of The Current Registration Practice**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	S.d	t-value	Sig. (2-tailed)	Rank According to the Mean
1	Effectiveness of the current registration practice in Ethiopia.	2.87	.533	-14.676	.000	5
2	Suitability of the current registration directives for construction industry development.	2.77	.589	-15.328	.000	6
3	Suitability of the current registration directives for professional and company development.	3.05	.619	-9.108	.000	3
4	The potential benefits of the current professional registration practice on manpower development planning in the construction industry.	3.21	.591	-6.141	.000	1
5	Perceived benefit of project registration to develop project management capacity development programs.	3.08	.600	-8.731	.000	2
6	The potential benefits of the current registration practice on the management of construction industry development.	2.97	.541	-12.206	.000	4

Data Source: Researcher’s own list, 2022.

From table 4.2, it can be seen that the general registration practice agreement level of all the questions is below the hypothetical mean value of 3.5, and the p-value is less than 0.05 in all questions.

To conclude the hypothesis, this indicates that the result is statistically significant, and we reject the null hypothesis and accept the alternative hypothesis for further evaluation of the results. These representative values of the respondent's perception of general registration practice in Ethiopia are relatively poor practice areas that need significant improvement despite their different ranks according to the mean. On the other hand, considering to the mean value of the top five ranks, "Suitability of the current registration directives for construction industry development with  $M = 2.77$ ," "Effectiveness of the current registration practice in Ethiopia; achieving the intended purpose of registration with  $M = 2.87$ ," "the potential benefits of the current registration practice on the management of construction industry development with  $M = 2.97$ ," "Suitability of the current registration directives for professional and company development with  $M = 3.05$ ," "Rate your perceived benefit of project registration to develop project management capacity development programs with  $M = 3.08$ ". Thus, the researcher found this finding similar to the literature presented in chapter two, under section 2.2, which is the project registration aim to provide relevant and reliable information on the construction industry to enable the Board to effectively achieve its registration, regulation, and development functions and ensure compliance of developers and contractors with provisions of the Contractors Registration Act.

According to Mengistu & Mahesh (2022), their study indicated that the role of the government in manpower development is enhanced by measuring the competence of professionals for licensing, improving the registration system, and promoting competent experienced professionals through continual professional development practice, which supports similar ideas with "potential benefits of the current professional registration practice on manpower development planning in the construction industry."

According to the interview results conducted, in general, the current registration directive has some good points, which give more attention to professionals, but on the contractor side, there are some weak points regarding the annual turnover requirement. Overall, the current registration directive has a good side when compared to the previous registration directive. It can be used as a contribution to the growth of the professional, the contractor, and the construction industry.

**Factor Analysis for General Registration Practice:** Based on the assumptions of EFA discussed in chapter three, approximately all the test mentioned tools, such as skewness and kurtosis, normality, and Cronbach's alpha, validity, reliability, Kaiser–Meyer–Olkin (KMO), and Bartlett test, are conducted before factor analysis is used. The researcher also used the principal component method to extract factors from the univariate analysis results and performed factor interpretation using Varimax rotation.

Based on the eigenvalues, total variances explained for the final two-factor structure: The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, two factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 1.918, and 1.664, which explains 31.964%, and 27.726% of the variances, respectively. These two clusters of factors represent 59.691% of the total variance, which highlights the importance of all six variables measured (See in appendix: B1).

**Table 4.3: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
F1	The potential benefits of the current registration practice on the management of construction industry development.	.810	0.701	1.918	31.964
	Suitability of the current registration directives for professional and company development.	.784			
	Effectiveness of the current registration practice in Ethiopia	.733			
F2	Perceived benefit of project registration to develop project management capacity development programs.	.808	0.584	1.664	27.726
	Potential benefits of the current professional registration practice on manpower development planning in the construction industry.	.705			
	Suitability of the current registration directives for construction industry development.	.660			
Cumulative percentage of Variance (%)		59.691			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

The factor analysis results shown in table 4.3 above reveal that "General registration requirement factors" is the most important practice of requirement, having the highest eigenvalue of 1.918 and accounting for 31.964% of the variance in the data set.

This is followed by "factor two" with an eigenvalue of 1.664, which explains 27.726 percent of the total variance. The two factors extracted indicate different dimensions of general registration practice that have an impact on the construction industry's development and other construction professional, company, and project registration requirements that are practiced and which affect the current registration directives' success.

#### **Interpretation of Output from the Principal Component Analysis Extraction Method:**

The current registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the current registration requirement. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "factors one and two." The findings so obtained provide evidence of the fact that the different scale factor is appropriate for determination of the current registration requirement practice. A brief description of the general registration requirement and current registration requirement practice is given below.

**Factor one, Success of current registration practices:** These factors, as shown in Table 4.3, are the most important compared to the other factors of general registration requirements and current registration practice. The highest loading in this component is "the potential benefits of the current registration practice on the management of construction industry development," with a loading of 0.810. This indicates that the current registration practice on the management of construction industry development is strongly influenced by these factors and construction industry development. These factors are followed by the "Suitability of the current registration directives for professional and company development" with a loading value of 0.784. These also have strong relationships and influence the component factors. Other variables, "Effectiveness of the current registration practice in Ethiopia" with a loading value of 0.733, are less about these factors and need additional attention from different stakeholders.

**Factor two, the current registration practice is critical to the growth planning of the construction industry:** These factors are ranked as the second factors, "Benefit of project registration to develop project management capacity development programs" with a loading value of 0.808 and "Potential benefits of the current professional registration practice on manpower development planning in the construction industry," with a loading value of 0.705,

have strong relationships and influence these component factors. The last factor component, "Suitability of the current registration directives for construction industry development", with a loading value of 0.660, is less related to these factors.

#### **4.2.2 Document Analysis for Current Registration Requirements**

In this part, the researcher was to investigate the gaps, contradictions, inconsistencies, and drafting issues surrounding the registration of construction professionals, design professionals, consultants, and contractors under directives No. 648/2021.

**Registration:** Construction companies, specialists, suppliers, machinery, and professionals are all subject to register in most nations. Registration offers data that can help with industry regulation and administration, produce income for capacity development initiatives, and serve as a general prequalification criterion in procurement. Registration also aids in the establishment of growth objectives for companies and professionals.

In Ethiopia, the new professional licensing service is provided for those who have graduated from an accredited educational institution and/or for the expert of experience who has a Certification of Occupational Competency (COC). New professional licensing registration services will be provided by design or construction, as appropriate. Contractors and consultants wishing to work in Ethiopia must first register with the Ministry of Trade, following the commercial code of Ethiopia and related directives of the Ministry.

**Perception of the stakeholders towards the registration practice:** one of the frequently observed problems in the construction sector is the lack of contribution of the legal framework to the construction sector in creating coordination between the stakeholders of the construction industry.

- As the legal framework doesn't make the stakeholders equally accountable with respect to their responsibility, coordination among them.
- All stakeholders have to be encouraged to participate and their concern has to be given proper emphasis while the law is drafted.

**Significance of the current registration parameters/ requirements:** the significance of current registration requirement is to conduct professional competence assessment to qualify applicants for registration and to establish and maintain standards of professional conduct and ethics of the professional engineer, construction architecture, and related professions.

Additionally, significance of current registration requirement is to promote professionalism in the practice of professional engineer, construction architecture, and related professions; promote continuous professional development in professional engineering; Conduct research to highlight areas for improvement, and provision of solutions thereof.

**Comparison of old directives with No. 648/2021 registration directives:** one major difference from the approach used in the old directives is that a Certificate of Competency Assessment (COC) from the relevant body is required for the registration and certification of small and medium-sized professionals. Under "Article 19," application for professional certification and registration of competency examinations are not made compulsory for senior professionals.

On the other hand, Directive No. 648/2021 indicates that such an examination may be introduced in the future, and when it is introduced, it will be made mandatory for registration and certification. Under "Article 6: Issuance of a certification and registration certificate,"

In addition to the requirements for the promotion of any professional, he or she wishes to be promoted if: must provide a competency assessment to determine if he or she qualifies. "And certification and registration of small professional qualifications."

But, other contrary experiences in places like Singapore, Malaysia, and Ireland indicate that competency assessment is applicable to senior level professionals. Competency examinations are used as a requirement for certification of senior construction professionals.

#### **4.2.2.1 Professional Registration Requirements or Parameters in the Current Registration Practice**

Before undertaking any building and construction activity, contractors, architects, and engineers must be licensed and registered. The licensing and registration requirements may range from one country to the other or from one legal system to the other. The limitations of both directives are discussed here based on the criteria of former directives No. 19/2013 and No. 22/2013. The benefits of the present directives No. 648/2021 registration requirement are also discussed.

**The Weaknesses of Old Directives No. 19 and 22 for Professional Registration:** both Directives No. 22/2013 and No. 19/2013 contain many drafting constraints that prevent readers from easily learning and digesting the text. Both directives' fundamental drafting and conceptual concerns are addressed here.

The other difficulty is that neither directive goes into detail about the similarities and differences between a certificate of registration and a certificate of competence.

According to the directives, a certificate of registration is granted once the applicant has met all of the conditions of the relevant directive and has been registered. It is also clear that the directives have not established distinct standards for certification of competence.

As a result, a certificate of registration also functions as a certificate of competence. However, both directions utilize both words without explaining how they are linked, causing confusion.

There are some issues about the cancellation or revocation of a certificate of registration on directives No.22/2013 article 9, First, the caption of Article 9 of Directive No.22/2013 reads “Cancellation or Renovation of Certificate” while the frame talks about cancelation or revocation. Besides the frame of Article 9 and Article 10(1) also uses the term revocation, based on the term ‘renovation’ in the caption is incorrect; it should have been revocation.

Other difficulty of this Article 7(2) of Directive No.19/2013 and Article 7(4) of directive 22/2013 also states that “renewal of registration an applicant should bear a letter (authenticated by the relevant Association).” The issue here is how common and accessible are such associations in the remote area out of the capital city, if such associations are not common and accessible what is the wisdom in making a letter from such associations a mandatory requirement for renewal, and based on Article 7(5) this directives “No registration may be renewal unless the person seeking renewal has been complying with the requirements for registration set out herein”. This requirement may create bureaucratic hurdles and may become a source of maladministration.

According to Articles 8(3) and 9(1) of Directive No.19/2013, failure to comply with the Directive's provisions is grounds for suspension and cancellation or revocation of a certificate of registration, respectively. However, it is unclear which sorts of failure are grounds for suspension and which are grounds for cancellation. This difference is critical since the effects of suspension and cancellation differ. Suspension, as the name implies, is only temporary and lasts until the individual corrects the flaw. Cancellation, on the other hand, is irreversible.

**The benefit of current registration directive No. 648/2021 for professionals' registration:** in relation to rejection of application for certificate of registration or competency, Article 5(2) states that an application may be rejected if the applicant “has been convicted of fraud or misrepresentation by a court or a competent authority at home or abroad and has not completed his trial.” And article 5(4) if it is determined by the professional association that a violation of professional ethics has been committed; On the other side of old directives, the problem however is that so far there is no professional ethics code to which professionals are to be legally bound in

the country. But, other contrary experiences like Malaysia and Singapore enacting such a code and enforcing it properly would contribute to solving the challenge facing the construction sector, which have adopted a professional code of conduct merged with the licensing regime.

Directive No. 648/2021 has introduced significant change in relation to renewal. According to Article 8(1), renewal of certification and registration of professional should be renewed every five years from the date of issuance of the certificate, the certification of the contractor and the consulting firm every two to three years in order. And article 8(3), the certification body may use professional and corporate on-the-job training as a requirement for renovation services.

The Directive has simplified the categorization of professionals and technicians. Accordingly Article 15(1), Category of professionals and Technicians “Professionals and professionals registered under this Regulation shall have the following categories according to their type of profession: A) Technician, B) Associate Engineer, and C) professional. On the other side of old directives Article 12(1-3), simply explained by Education, experience and Professional Engagement is not explained in details sub section.

The benefit of implementing directive No. 648/2021 Article 20(4) Construction Professionals and Technicians Qualification and Registration is that "a professional who requires a certificate of competency or registration certificate in accordance with this regulation may engage in design or construction work without creating a conflict of interest." This suggests that professionals have a tremendous possibility to engage in either building or design with a single professional license.

#### **4.2.2.2 Company Registration Requirement or Parameters in the Current Registration Practice**

**Good side of directive No. 648/2021 regarding to company registration:** the Directive brought important changes in relation to the management of construction companies. The first is that the manager of a construction company is required to have a practicing professional certificate. This is the highest qualification in the field and requiring construction companies to be led by such professionals would contribute in improving performance and quality in the construction sector.

The second one is that the manager of a construction company either must be the owner or if he is an employer must hold practicing professional certificate, based on Article 25(3). In addition, the manager of the company may be an employee or an owner. If the person to be the manager is not the owner of the company, he or she must have a 20% share in the company.

However, the required share of the manager in the case of consulting firms must at least be 30 %, based on Article 29(3).

In addition, the manager of the company may be an employee or an owner. The manager must be at least 30% of the company's assets if he or she is not the sole owner of the company.

According to Appendix (1 to 3) of Directive No. 648/2021, which outline the contractor level or grade, project size, equipment, and staffing requirements, the contractor level or grade is reduced from ten to seven levels or grades. The remaining levels, or grades 8, 9, and 10, are classified as small and micro enterprises.

**Weak side of directive No. 648/2021 regarding to company registration:** Based on directive No. 648/2021 Article 26, the maximum bid price for contractors “The maximum construction cost for construction by contractors at different sectors and levels shall be as specified in Appendix (15 to 16).” These imply that the maximum cost indicated to contractors’ turnover is not consider to the current inflation of construction material cost, labor cost and depreciation of local money.

#### **4.2.2.3 Project Registration Requirements or Parameters in the Current Registration Practice**

**Good side of directive No. 648/2021 regarding to project registrations:** Under directive No.648/2021, projects registrations are newly incorporate article on these directives and to be discussed under the current directive. Under Part VII, the Directive provides for the registration of projects. Accordingly, all construction projects must be registered within the Authority by the constrictor and the consultant, Article-32(1, 2) Registration of projects, all construction projects must be registered in accordance with this regulation and any contractor and consultant must register construction projects with the Authority.

In addition, any project to be constructed on federal budget has to be registered by the Authority upon the application of the employer, Article-32(4, 5); the employer shall notify the Authority at the beginning of each fiscal year of any construction projects to be constructed on a federal budget, and any project funded by the Federal Government shall be subject to approval by the Authority, starting with the design and approval of the Authority.

According to directive No. 648/2021, Article 32(1), (2) and (3), Registration of projects “all construction projects must be registered in accordance with this regulation,” ”any contractor and consultant must register construction projects with the Authority” and “Require information

regarding any construction project to be registered in accordance with this regulation.” In addition to these, under Article 32(4), “The employer shall notify the Authority at the beginning of each fiscal year of any construction projects to be constructed on a federal budget.”

Based on Article 32(5) “Any project funded by the Federal Government shall be subject to approval by the Authority, starting with the design and approval of the Authority.”

One of the major benefits of these directives under Article 32(6) and sub articles “The employer shall notify the Authority every six months regarding any project implemented by the Federal Government.”

**Weak side of old directive No. 19 and 22 regarding to Project Registration:** this directive is simply intended only for professionals, contractors, and consultants for different levels of category, and these directives do not incorporate project registration, competency assessments of higher-level professionals, etc.

In general, the new directive No. 648/2021 is different from other directives because it includes project registration directives. In addition, contractors, consultants, and professional registration are all included in one guide, making it easy to operate. Also, this guide supports and encourages the majority of professionals, contractors, and consultants. This directive can change the construction industry if it is done well and the relevant stakeholders pay attention to it.

#### 4.2.3 Significance of Current Professional Registration Parameters/Requirement

In a similar way to above, the professional registration requirement view toward the existing parameters of the registration requirement is shown below using inferential statistics and a one-sample t-test.

**Table 4.4: The Overall Perception of the Professional Registration Requirement Practice**

One-Sample Test				Test Value = 3.5		
				t-value	Sig. (2-tailed)	Rank According to the Mean
No	Statements	M	Sd.			
1	Professional Competence Exam	3.04	.570	-10.032	.000	8
2	Adequacy in professional experience for registration	3.29	.545	-4.880	.000	4
3	The requisite of application fee.	3.32	.625	-3.481	.001	3

One-Sample Test				Test Value = 3.5		
				t-value	Sig. (2-tailed)	Rank According to the Mean
No	Statements	M	Sd.			
4	Timely providing	3.09	.516	-9.840	.000	7
5	Have an understanding of local practices and conditions.	2.93	.677	-10.468	.000	10
6	Be of good characteristics and professional stand	3.21	.579	-6.259	.000	6
7	Understanding of professional practice and professional ethics issues.	2.92	.626	-11.591	.000	11
8	Possibility to get a certificate in two or more professions	3.27	.549	-5.286	.000	5
9	Document requirement	3.32	.685	-3.177	.002	2
10	Certificate of Competency Assessment (COC) from the relevant body for small and medium-sized professional.	3.42	.558	-1.734	.085	1
11	Previously involved work experience in number and project size	3.01	.548	-11.025	.000	9

Data Source: Researcher's own list, 2022.

From the above table 4.4, the perception of professional registration practice, we see that the agreement level of all the questions except the "Certificate of Competency Assessment (COC) from the relevant body for small and medium-sized professionals" is below the hypothetical mean value of 3.5, and the P-value (Sig < 0.05) in all the questions. Depending on the mean value results, it is statistically significant and we reject the null hypothesis with a 95% Confidence Interval of the difference and we accept the alternative hypothesis. This implies that by comparing the respondent mean value to the hypothetical mean value of professional construction registration practice area need significant improvement. From the above table 4.4, the overall perception of professional registration practice "certificate of Competency Assessment (COC) from the relevant body for small and medium-sized professionals" is computed to the level  $M = 3.42$  and the  $p = 0.085 > 0.05$  indicates that the respondent agreement level isn't significantly different from the hypothetical mean value of 3.5. According to the respondent, the certificate of competency assessment practice of the professional registration is mandatory practice and it is moderately appreciated, with no significant difference from the test value. Thus, the researcher found this result finding similarity with the literature presented in

chapter two, under section 2.1.1.2. Man power registration system in Ethiopia, new professional licensing service is provided for those who have graduated from an accredited educational institution and/or for the expert of experience who has Certification of Occupational Competency (COC). According to Ministry of Urban Development & Construction (2021), directive No. 648/2021 Article, 15(2.3,4,5) support this statement.

Overall, the professional registration practice is not appreciated highly except for the "certificate of competency assessment." Other practices need to improve their level of appreciation and professional registration practice needs improvement.

**Factor Analysis for Professional Registration Requirements:** The data were factor analysis using the principal component method for factor extraction with the results of the univariate analysis and carried out factor interpretation using Variamax rotatio on the basis of the assumptions of explanatory factor analysis. The results are summarized in table 4.5.

**Based on the eigenvalues, Total Variances explained for the final three-factor structure:** The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, three factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.190, 1.783, and 1.644, which explain 19.907%, 16.211%, and 14.944% of the variances, respectively. These three clusters of factors represent 51.066% of the total variance, which highlights the importance of all eleven variables measured (See Appendix B2).

**Table 4.5: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s . alpha)	Eigen value	Variance explained (%)
F1	Have an understanding of local practices and conditions.	.726	0.676	2.190	19.901
	Document requirement	.724			
	Understanding of professional practice and professional ethics issues.	.656			
	Possibility to get a certificate in two or more professions	.594			
	The requisite of application fee.	.542			
	Certificate of Competency Assessment (COC) from the relevant body for small	.729	0.547	1.783	16.211

Factors	Items	Factor Loading	Reliability (Cronbach's . alpha)	Eigen value	Variance explained (%)
F2	and medium-sized professional.				
	Professional Competence Exam	.658			
	Previously involved work experience in number and project size	.533			
	Adequacy in professional experience for registration	.529			
F3	Timely providing	.691	.534	1.644	14.944
	Be of good characteristics and professional stand	.524			
Cumulative percentage of Variance (%)			51.066		
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

The factor analysis results shown in table 4.5 above reveal that "professional registration requirement factors" is the most important requirement, having the highest eigenvalue of 2.190 and accounting for 19.91% of the variance in the data set. This is followed by "factor two" with an eigenvalue of 1.783, which explains 16.221% of the total variance. The third most important critical registration requirement practice factor is found to be "in the thread factors" with an eigenvalue of 1.644 and explaining 14.944% of the variance. Thus, three factors extracted indicate different dimensions of professional registration practice that have an impact on the construction industry's development and other professional registration requirements that are practiced and which are affecting the current registration directives' success.

#### **Interpretation of Output from the Principal Component Analysis Extraction Method:**

The current professional registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the current registration requirement. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to three". The findings so obtained provide evidence of the fact that the different scale factor is appropriate for the determination of the

current registration requirement practice. A brief description of the general registration requirement and current registration requirement practice is given below.

**Factor one, controlling mechanisms of registration practices:** As shown in Table 4.5, the first component had five variables loaded into the component: "Have an understanding of local practices and conditions", with a loading value of 0.726; "Document requirement", with a loading value of 0.724; and "Understanding of professional practice and professional ethics issues", with a loading value of 0.756; "Possibility to get a certificate in two or more professions" with a loading value of 0.594; and "The requisite of application fee" with a loading value of 0.542. Thus, this cluster gathered 19.901% of the total variance.

The factors loaded in the first component emphasized the adequacy of professional experience for registration, document requirements, and project size as the factors which directly impact the overall professional registration practice. This makes the factors listed in the first component important in determining a successful professional's registration requirements.

**Factor two, evaluation mechanisms of registration practices:** As shown in Table 4.5, the second cluster had four variables loaded into the component: "Certificate of Competency Assessment" with a loading value of 0.729, "Professional Competence Exam" with a loading value of 0.658, "Previously involved work experience" with a loading value of 0.529, and "Adequacy in professional experience for registration" with a loading value of 0.529. Thus, this cluster gathered 16.211% of the total variance. These factors address the most important points that are controlled all over registration in the construction industry.

**Factor three, entry mechanisms registrations practices:** As shown in Table 4.5, the third cluster had two variables loaded into the component, and also this factor, in general, had a weak influence on the variables, "The requisite of application fee," with a loading value of 0.691 and "Be of good characteristics and professional standing," with a loading value of 0.534. This cluster gathered 14.944% of the total variance.

#### **4.2.4 Significance of Current Company Registration Parameters/Requirement**

In a similar way to above, the Company registration requirement view toward the existing parameters of the registration requirement is depicted below using inferential statistics and a one-sample t-test.

**Table 4.6: The Overall Perception of the Company Registration Requirement Practice**

No	One-Sample Test Statements	M		Test Value = 3.5		
				t-value	Sig. (2-tailed)	Rank According to the Mean
1	Staff Requirements.	3.40	.661	-1.951	.053	1
2	Plant & Equipment Requirements	3.10	.569	-8.780	.000	4
3	Offices/ Workshop Conditions Requirements	3.29	.693	-3.839	.000	2
4	Experience	3.00	.594	-10.444	.000	7
5	Financial Capacity Requirements	3.07	.584	-9.104	.000	6
6	Tax registration certificate Requirements	3.12	.598	-7.820	.000	3
7	The manager of the company must have a practicing professional certificate	3.08	.578	-9.066	.000	5

Data Source: Researcher's own list, 2022.

The average level of agreement for each question is taken as moderate or 3.5 (test value). The below interpretation will further explain some of the results for easy reference and understanding so that all the other results that are indicated in the table can be interpreted similarly.

From the above table 4.6, the perception of company registration practice, we see that the agreement level of all the questions except "Staff Requirements for the company" is below the hypothetical mean value of 3.5, and the P-value (Sig < 0.05) in all the questions. Depending on the mean value result, it is statistically significant, and we reject the null hypothesis with a 95% Confidence Interval of the difference and we accept the alternative hypothesis. This implies that comparing the respondent mean value to the test mean value of company registration practice is relatively poor area needs significant improvement. From the above table 4.6, the "Staff Requirements for Company" are computed to the level  $M = 3.40$  and tested against the hypothetical mean value of 3.5 and the  $p = 0.053 > 0.05$  indicates that the respondent agreement level isn't significantly different from the moderate level of 3.5. According to the respondent, the "Staff Requirements" practice of company registration is moderately appreciated with no significant difference from the mean test value. Thus, the researcher found this result finding

similarity with the literature presented in chapter two. Under section 2.1.4.4, Contractor Registration Requirements, after fulfilling the experience and qualification requirements, a contractor has to fulfill staff requirements before he/she can be registered as a contractor.

The staff requirements vary from grade to grade and sometimes from category to category, which is mandatory. According to Ministry of Urban Development & Construction (2021), directive No. 648/2021, Article 24(1, B) supports this statement.

According to the mean value rank of the respondent agreement level for "company experience" (M = 3.00), "financial capacity requirements" (M = 3.07), and "manager of the company must have a practicing professional" (M = 3.08), these company registration requirement practices imply that they require more attention and series improvement practice.

Factor Analysis for Company Registration Requirements: The researcher used the principal component techniques for factor extraction, utilizing the results of the univariate analysis and factor interpretation using Varimax rotation on the assumptions of the exploratory factor analysis. The results are summarized in table 4.7.

**Eigenvalues, Total Variances Explained for the Final Two-Factor Structure:**

The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, two factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.780, and 1.387, which explains 39.708%, and 19.815% of the variances, respectively. These two clusters of factors represent 59.523% of the total variance, which highlights the importance of all seven variables measured (See in appendix: B3).

**Table 4.7: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s alpha)	Eigen value	Variance explained (%)
F1	Plant & Equipment Requirements	.915	.803	2.780	39.708
	The manager of the company must have a practicing professional certificate Requirements	.909			
	Staff Requirements.	.677			
	Tax registration certificate Requirements	.616			

F2	Offices/ Workshop Conditions Requirements	.810	.429	1.387	19.815
	Financial Capacity Requirements	.598			
	Experience	.534			
Cumulative percentage of Variance (%)		59.523			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

The factor analysis results shown in table 4.7 above reveal that "company registration requirement factors" is the most important requirement, having the highest eigenvalue of 2.780 and accounting for 39.708 percent of the variance in the data set. This is followed by "factor two" with an eigenvalue of 1.387, which explains 19.815% of the total variance. Thus, two factors extracted indicate different dimensions of company registration parameters and requirements that have an impact on the construction registration practice, which is affecting the current company registration directives' success.

#### **Interpretation of Output from the Principal Component Analysis Extraction Method:**

The present company registration practice, as established by the Principal Component Analysis Extraction Method and confirmed by relevant testing, enabled us to create and validate a measuring scale to quantify the business registration need. The study reveals that the many elements that influenced the necessity for registration practice may be characterized in terms of "from factor one to factor two." The acquired data shows that the various scale factors are appropriate for determining the present company registration requirements practice. A summary of the company registration requirements and the current registration process is provided below.

**Factor one, resources requirement registration:** As shown in Table 4.7, the first component had four variables loaded into the component: "Plant & Equipment Requirements", with a loading value of .915, "The Manager of the Company Must Have a Practicing Professional Certificate Requirements", with a loading value of .909, "Staff Requirements.", with a loading value of .677, and "Tax Registration Certificate Requirements", with a loading value of .616. Thus, this cluster gathered 39.708% of the total variance. The factors loaded in the first component emphasized the criticality of "Plant & Equipment Requirements" and "the manager of the company must have a practicing professional certificate requirement" for company

registration are strongly influenced on the variable, and tax registration certificate and staff requirements are also the factors that are less likely to have a strong influence on the overall company registration practice. This makes the factors listed in the first component important in determining the parameters of company registration requirements.

**Factor two, financial requirement registrations:** As shown in Table 4.7, the second cluster had three variables loaded into the component: "Offices/Workshop Conditions Requirements" with a loading value of .810; "Financial Capacity Requirements" with a loading value of .598; and "Experience" with a loading value of .534.

Thus, this cluster gathered 19.815% of the total variance. These factors address the most important points that control company registration requirements, with less likely influence in the sector of construction industry company registration requirements.

#### 4.2.5 Significance of Current Project Registration Parameters/Requirement

In a similar way to above, the project registration requirement view toward the existing parameters of the registration requirement is shown below using inferential statistics and a one-sample t-test.

**Table 4.8: The Overall Perception of The Project Registration Requirement Practice**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	All Category of Construction Projects must be registered	3.29	.545	-4.880	.000	3
2	Any contractor and consultant must register construction projects with the Authority	3.25	.586	-5.359	.000	4
3	The employer must notify to the Authority at the beginning of each fiscal year.	3.42	.815	-1.187	.237	1
4	Federal Government funded project shall be subject to approval by the Authority, starting with the design and approval	3.41	.633	-1.783	.077	2
5	Federal Government funded project must notify the	3.24	.759	-4.247	.000	5

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
	Authority every six months.					
6	The employer is obliged to notify the Authority of any related changes to the construction.	3.01	.583	-10.369	.000	7
7	Require information regarding any construction project contract time, cost, payment, design change , fees of the contractor and the consultant, termination or cancellation and progress must be notify	3.24	.696	-4.631	.000	6

Data Source: Researcher's own list, 2022.

From the above table 4.8, the project registration practice, we see that the agreement level of the questions "The employer is obliged to notify the Authority of any related changes to the construction," "Federally funded project must notify the Authority every six months" and "Any contractor and consultant must register construction projects with the Authority" is below the hypothetical mean value of 3.5 and the P-value (Sig < 0.05) in all the questions. Despite the different mean values, the result is statistically significant, and we reject the null hypothesis with a 95% confidence interval of the difference and we accept the alternative hypothesis. This implies that by comparing the respondent mean value to the hypothetical mean value of project registration practice, which is a relatively unorganized implemented practice. From the above table 4.8, the "Federally funded project shall be subject to approval by the Authority, starting with the design and approval" is computed to the level  $M = 3.41$  and the test of  $p = 0.077 > 0.05$ , and "the employer must notify the Authority at the beginning of each fiscal year" is computed to the level  $M = 3.42$  and the test  $p = 0.237 > 0.05$  tested against the hypothetical mean value of 3.5. This indicates that the respondent agreement level isn't significantly different from the moderate test value of 3.5. Thus, the researcher found this result finding similarity with the literature presented in chapter two. Under section 2.2 requirement of project registration, the project register is aimed at providing relevant and reliable information on the construction industry to enable the Board to effectively achieve its registration, regulation, and development functions

and ensure compliance of developers and contractors with provisions of the Contractors Registration Act.

According to the interview results conducted, the current project registration directive has some good arguments for the contributions of construction industry.

A majority of the respondents agree that project registration practices are not fully applicable to the ground, and these newly derived directives need more advertising and training.

**Factor Analysis for Project Registration Requirements:** Before the factor analysis, specified techniques are applied the principal components method to identify factors from the univariate analysis results and conducted factor interpretation using Varimax rotation. The results are summarized in table 4.9.

**Eigenvalues, Total Variances Explained for the Final Two-Factor Structure.** The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, two factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.077, and 1.540, which explains 29.668 %, and 21.997 % of the variances, respectively. These two clusters of factors represent 51.665 % of the total variance, which highlights the importance of all seven variables measured (See in appendix: B4).

**Table 4.9: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s alpha)	Eigen value	Variance explained (%)
F1	Require information regarding any construction project contract time, cost, payment, design change , fees of the contractor and the consultant, termination or cancellation and progress must be notify	.733	.693	2.077	29.668
	Federal Government funded project must notify the Authority every six months.	.720			
	All Category of Construction Projects must be registered	.707			
	Federal Government funded project shall be subject to approval by the Authority, starting with the design and approval	.692			
F2	The employer is obliged to notify the Authority of any related changes to the	.793	.545	1.540	21.997

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
	construction.				
	The employer must notify to the Authority at the beginning of each fiscal year.	.610			
	Any contractor and consultant must register construction projects with the Authority	.610			
Cumulative percentage of Variance (%)		51.665			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

The factor analysis results shown in table 4.9 above reveal that "project registration requirement factors" is the most important requirement, having the highest eigenvalue of 2.077 and accounting for 29.668 percent of the variance in the data set. This is followed by "factor two" with an eigenvalue of 1.540, which explains 21.997 percent of the total variance. Thus, two factors extracted indicate different dimensions of project registration parameters and requirements that have an impact on the project registration practice, which is affecting the registration directives' success.

#### **Interpretation of Output from the Principal Component Analysis Extraction Method:**

The current project registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the project registration requirement. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to two". The findings so obtained provide evidence of the fact that the different scale factor is appropriate for the determination of the current project registration requirement practice. A brief description of the project registration requirement and current registration practice is given below.

**Factor one, federal funded project registration requirement:** As shown in Table 4.9, the first component had four variables loaded into the component: "Federal government-funded projects must notify the Authority every six months.", with a loading value of .720; "Federal government-

funded projects shall be subject to approval by the Authority, starting with the design and approval," with a loading value of.692, "Require information regarding any construction project contract time, cost, payment, design change, fees of the contractor and the consultant, termination or cancellation, and progress must be notified," with a loading value of.730; and "All categories of construction projects must be registered," with a loading value of.707.

Thus, this cluster gathered 29.668 % of the total variance. The factors loaded in the first component highlighted their criticality and strongly influenced the variables. Federal government-funded projects must notify the Authority every six months of the factors which strongly influence the impact of project registration practice. Other federally funded projects must be approved by the Authority, beginning with the design and approval phases. This makes the factors listed in the first component important in determining the parameters of project registration requirements.

**Factor two, company responsibility registrations requirement:** As shown in Table 4.9, the second cluster had three variables loaded into the component: "The employer is obliged to notify the Authority of any related changes to the construction" with a loading value of.795, "Any contractor and consultant must register construction projects with the Authority" with a loading value of.610, and "the employer must notify the Authority at the beginning of each fiscal year" with a loading value of.610. Thus, this cluster gathered 21.997 % of the total variance. These factors address the most important point that the employer must be notified and register with the authorities before the beginning of projects. This project registration requirement had an influence on the variable and the sector of the construction industry's registration requirement.

### **4.3 Challenges of Construction Registration Practice**

In this study, there are various challenging factors that affect the construction registration requirements in the current registration directives. The professional, company, and project registration challenges described in the questionnaires were identified, and respondents responded using different response scales described in the details of each section of the professionals' registration challenge, the company registration challenge, and the project registration challenge described below.

### 4.3.1 Challenges of Professional Registration

In a similar way to above, the challenge of professional registration view toward the existing parameters of the professional registration challenge is shown below using inferential statistics and a one-sample t-test.

**Table 4.10: The Overall Perception of Challenge of Professional Registration**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	Forged academic documents	3.62	.826	1.756	.081	4
2	Lack of entrance competency examination for new applicants	3.68	.799	2.722	.007	1
3	Lack of central data base system of graduates from different universities	3.42	.592	-1.634	.104	9
4	Forged work experience letters with (Unauthorized signing of a signature)	3.63	.870	1.852	.066	3
5	Weak capacity of the registration authority.	3.58	.782	1.237	.218	6
6	Weak involvement of associations in the registration system.	3.66	.812	2.383	.018	2
7	Poor document interpretation system; document evaluation and interpretation processed by a single officer.	3.58	.799	1.211	.228	5
8	Lack of electronic document holding and encoding system	3.52	.649	.372	.710	8
9	Poor registration communication between federal and regional; double registration	3.55	.686	.939	.349	7

Data Source: Researcher's own list, 2022.

The average level of agreement for each question is taken as hypothetical mean value of 3.5. The below interpretation will further explain some of the results for easy reference and understanding.

Based on the challenge of professional registration practice, the agreement level of questions "Lack of entrance competency examination for new applicants" and "Weak involvement of associations in the registration system" in table 4.10 is above the hypothetical mean value of 3.5 and the P-value (Sig < 0.05).

Depending on different means value, the result is statistically significant, and we reject the null hypothesis with a 95% Confidence Interval of the Difference and we accept the alternative hypothesis. This implies that professional registration has challenge practice, which indicates that it is a series of problems that needs more attention. From the above table 4.10, the overall "forged academic documents" is computed to the level  $M = 3.62$  and tested against the hypothetical mean value of 3.5 and the test of  $p = 0.081 > 0.05$ , indicates that the respondent agreement level isn't significantly different from the moderate level or test value. Thus, the researcher found this result finding similarity with the literature presented in chapter two. Under section 2.3.2 document interpretation, the basic goal of document interpretation is to detect if a document is forged or original by comparing the original to the duplicated one. Most of our country's registration systems are not digital, making it difficult to communicate with stakeholders such as universities, colleges, contractors, and consultants. This is the fundamental problem in cross-checking job experience credentials, university and college certifications. Overall, the challenge of professional registration practice is not statistically difference found between the mean values of challenging professional registration practice.

Referring to the interview result, the respondent strictly pointed out that forged academic documents in professional registration practice are one problem. Lack of an electronic document holding and encoding system, poor document interpretation, document evaluation, and a central database system are other serious challenges. Furthermore, the respondent agreement levels for challenge practices are high and need improvement.

**Factor Analysis for Challenge of Professional Registration:** Before the factor analysis, specified techniques are applied the principal components method to identify factors from the univariate analysis results and conducted factor interpretation using Varimax rotation. The results are summarized in table 4.11.

**Eigenvalues, Total Variances Explained for the Final Three-Factor Structure.** The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, three factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.241, 2.096, and 1.476, which explains 24.902 %, 23.283, and 16.403 % of the variances, respectively. These three clusters of factors represent 64.588 % of the total variance, which highlights the importance of all nine variables measured (See in appendix: B5).

**Table 4.11: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s alpha)	Eigen value	Variance explained (%)
F1	Lack of electronic document holding and encoding system	.739	.785	2.241	24.902
	Weak involvement of associations in the registration system.	.699			
	Poor document interpretation system; document evaluation and interpretation processed by a single officer.	.643			
	Lack of entrance competency examination for new applicants	.627			
	Poor registration communication between federal and regional; double registration	.597			
F2	Weak capacity of the registration authority.	.752	.523	2.096	23.283
	Forged academic documents	.730			
F3	Lack of central data base system of graduates from different universities	.794	.612	1.476	16.403
	Forged work experience letters with (Unauthorized signing of a signature)	.654			
Cumulative percentage of Variance (%)		64.588			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					

According to the factor analysis results shown in table 4.11 above, the most important requirement is "challenge of professional registration factors," which has the highest eigenvalue of 2.241 and accounts for 24.902 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 2.096 and explains 23.283 percent of total variance, and "factor three," which has an eigenvalue of 1.476 and explains 16.403 percent of total variance.

Thus, the three extracted factors indicate different dimensions of the challenge of professional registration parameters and requirements that have an impact on current registration practice, thereby affecting the success of registration directives.

### **Interpretation of Output from the Principal Component Analysis Extraction Method**

The challenge of professional registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the challenge of registration requirements. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to three". The findings so obtained provide evidence of the fact that the different scale factor is appropriate for the determination of the current challenge of professional registration requirement practice. A brief description of the challenge of professional registration requirements and current registration practice is given below.

**Factor one, technology aspects of registration requirement:** As shown in Table 4.11, the first component had five variables loaded into the component: "Lack of electronic document holding and encoding system", with a loading value of.739; "Weak involvement of associations in the registration system", with a loading value of.699; "Poor document interpretation system; document evaluation and interpretation processed by a single officer," with a loading value of.643; "Lack of entrance competency examination for new applicants," with a loading value of.627; and "Poor registration communication between federal and regional; double registration" with a loading value of.597. Thus, this cluster gathered 24.9024% of the total variance. The factors loaded in the first component highlighted their criticality and strongly influenced the variable. The factors that strongly influence the challenge of professional registration practice are a lack of electronic document holding and a poor document interpretation system, as well as a lack of entrance competency examination for new applicants and poor registration communication between federal and regional offices; double registration is less likely to influence the variables in this component. This makes the factors listed in the first component important in determining the parameters of the challenges of professional registration practice.

**Factor two, interpretation of application document requirements:** As shown in Table 4.11, the second cluster had two variables loaded into the component: "Weak capacity of the registration authority" with a loading value of.752, and "Forged academic documents" with a loading value of.730. Thus, this cluster gathered 23.283 % of the total variance.

These factors address the most important points: the weak capacity of the registration authority and forged academic documents. This challenge of professional registration practice had an influence on the variables and the sector of the construction industry's registration practice.

**Factor three, modernization aspects of registration requirement:** As shown in Table 4.11, the third cluster had two variables loaded into the component: "Lack of central database system of graduates from different universities" with a loading value of 0.794, and "Forged work experience letters" with a loading value of 0.654. Thus, this cluster gathered 16.40% of the total variance.

### 4.3.2 Challenges of Company Registration

This study area discusses the different issues of company registration. We were given a variety of questions about the new guidelines' challenges to professional registration practice. Questions were developed and distributed to respondents, after which they were evaluated on several scales of agreement, and the agreement of the responses was finalized using a one sample t-test and factor analysis. A detailed analysis of the challenge company registration is shown below using inferential statistics and a one-sample t-test.

**Table 4.12: The Overall Perception of Challenge of Company Registration**

No	Statements	One-Sample Test		Test Value = 3.5		
		M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	Forged documents of professionals experience letter.	3.63	.824	1.956	.052	4
2	Forged documents of machineries	3.42	.569	-1.699	.091	9
3	Weak involvement of associations in the registration system.	3.64	.721	2.346	.020	3
4	Unrealistic requirements.	3.54	.617	.783	.435	7
5	Weak enforcement of registration	3.21	.741	-4.787	.000	11
6	Challenge of document encoding system.	3.56	.571	1.412	.160	6
7	Weak document interpretation system; document evaluation and interpretation processed by a single	3.34	.629	-3.205	.002	10

No	Statements	M	Sd.	Test Value = 3.5		
				t-value	Sig. (2-tailed)	Rank According to the Mean
	officer.					
8	Poor document holding system, most of the document holds at archive shelf.	3.67	.561	3.736	.000	2
9	Challenge of annual financial turnover; not encourage a new entry lower level company	3.56	.840	.960	.339	5
10	Poor practice of continues monitoring and controlling system	3.53	.607	.664	.508	8
11	Lack of communication between federal and regional.	3.69	.708	3.415	.001	1

Data Source: Researcher's own list, 2022.

Based on the challenge of company registration practice, the agreement level of questions "Weak document interpretation system; document evaluation and interpretation processed by a single officer" and "Weak enforcement of registration" in table 4.12 is less than the hypothetical mean value of 3.5, and the P-value (Sig < 0.05). On the other hand, "Weak involvement of associations in the registration system," "Poor document holding system," and "Lack of communication between federal and regional" in table 4.12 are greater than the hypothetical mean value of 3.5, and the P-value (Sig < 0.05). Depending on different means value, the result is statistically significant, and we reject the null hypostasis with a 95% Confidence Interval of the Difference and we accept the alternative hypostasis. This implies that by comparing the respondent mean value to hypothetical mean value of the challenge of company registration practice, some of the questions are good practice because respondent mean value is less than that of the hypothetical mean value. On the other hand, there are a series of problems that need attention in company registration practice for high mean value. According to the above table 4.12, the general "Poor practice of continues monitoring and controlling system" is computed to the level M = 3.53 and tested against the hypothetical mean value of 3.5 agreement, the test p = 0.508 > 0.05, and "forged documents of machineries" is computed to the level M = 3.42 and tested against hypothetical mean value of 3.5 agreement, the test of p = 0.339 > 0.05. According to the respondent agreement level, poor practice of continuous monitoring and controlling systems and

forged documents of machineries in company registration practice are one problem, but there is no significant difference from the hypothetical mean value of 3.5.

Thus, the researcher found this result finding similarity with the literature presented in chapter two. Under section 2.3.6 monitoring and evaluation of registration practice, the main objectives of monitoring and evaluation of registration practice are to control professionals and contractors and to improve the effectiveness of guidelines and regulations for professionals and contractors' firms by improving the efficiency of implementation and management of the strategy to promote transparency and accountability between participants in registration practice.

The interview result indicates that the respondents agree that the challenges of company registration practices require a series of attention and improvements, such as forged academic credentials, machinery, unrealistic requirements, and document encoding systems.

Factor analysis for the challenge of company registration practice: Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Table 4.13 provides a summary of the analysis findings related to the contested company registration practices.

**Eigenvalues, Total Variances Explained for the Final Four-Factor Structure.** The Kaiser's criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, four factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.082, 2.066, 2.012, and 1.394, which explains 18.925 %, 18.782%, 18.293%, and 12.677 % of the variances, respectively. These four clusters of factors represent 68.676 % of the total variance, which highlights the importance of all eleven variables measured (See in appendix: B6).

**Table 4.13: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigenvalue	Variance explained (%)
F1	Unrealistic requirements	.977	.969	2.082	18.925
	Poor practice of continues monitoring and controlling system	.970			
	Forged documents of professionals experience letter	.741	.692	2.066	18.782

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigenvalue	Variance explained (%)
F2	Challenge of annual financial turnover; not encourage a new entry lower level company	.733			
	Lack of communication between federal and regional.	.692			
	Poor document holding system, most of the document holds at archive shelf.	-.620			
F3	Weak involvement of associations in the registration system.	.732	.604	2.012	18.293
	Weak enforcement of registration	.698			
	Challenge of document encoding system.	.663			
F4	Forged documents of machineries	.826	.624	1.394	12.677
	Weak document interpretation system; document evaluation and interpretation processed by a single officer	.603			
Cumulative percentage of Variance (%)		68.676			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

According to the factor analysis results shown in table 4.13 above, the most important requirement is the "challenge of company registration factors," which has the highest eigenvalue of 2.082 and accounts for 18.925 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 2.066 and explains 18.782 percent of the total variance; "factor three," which has an eigenvalue of 2.012 and explains 18.293 percent of the total variance; and the fourth factor, which has an eigenvalue of 1.395 and explains 12.677 percent of the total variance. Thus, the four extracted factors indicate different dimensions of the challenge of company registration parameters and requirements that have an impact on current registration practices, thereby affecting the success of registration practices.

## **Interpretation of Output from the Principal Component Analysis Extraction Method**

The challenge of company registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the challenge of registration requirements.

The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to four." The findings so obtained provide evidence of the fact that the different scale factors are appropriate for the determination of the current challenge of company registration requirements practice. A brief description of the challenges of company registration requirements and current registration practice is given below.

**Factor one, mechanisms for regulating the registration requirement:** As shown in Table 4.13, the first cluster had two variables loaded into the component: "Unrealistic requirements" with a loading value of.977 and "Poor practice of continuous monitoring and controlling system" with a loading value of.970. Thus, this cluster gathered 18.92% of the total variance. These factors address the most important points: the unrealistic requirements and poor practice of continuous monitoring and controlling. This challenge of company registration practice had an influence on the variables and the sector of the construction industry's development and registration practice.

**Factor two, application of the record registration requirement:** As shown in Table 4.13, the second component had four variables loaded into the component: " Forged documents of professionals," with a loading value of.741; "Weak involvement of associations in the registration system," with a loading value of.699; "Challenge of annual financial turnover; does not encourage a new entry into a lower level company," with a loading value of.733; " Lack of communication between federal and regional." with a loading value of.692; and " Poor document holding system, most of the documents held at archive shelf." with a loading value of.620. Thus, this cluster gathered 18.782% of the total variance. The factors loaded in the first component highlighted their criticality and strongly influenced the variable. The factors that strongly influence the challenge of professional registration practice are a lack of forged documents and annual financial turnover, as well as a poor document holding system and a lack of communication between federal and regional offices. These are less likely to influence the variables in this component. This makes the factors listed in the second component important in determining the parameters of the challenges of company registration practice.

**Factor three, application enforcement rule in registration requirement:** As shown in Table 4.13, the third cluster had three variables loaded into the component: "Weak involvement of associations in the registration system." with a loading value of 0.732; "Weak enforcement of registration" with a loading value of 0.698; and "Challenge of document encoding system" with a loading value of 0.66. Thus, this cluster gathered 18.293 % of the total variance.

These factors address the most important points: the weak involvement of associations; weak enforcement of registration; and the challenge of document encoding systems. This challenge of company registration practice had an influence on the variables and the sector of the construction industry's registration practice.

**Factor four, application of the document authentication method to the registration requirement:** As shown in Table 4.13, the fourth cluster had two variables loaded into the component: "Forged documents of machinery" with a loading value of 0.826, and "Weak document interpretation system; document evaluation and interpretation processed by a single officer" with a loading value of 0.603. Thus, this cluster gathered 12.677% of the total variance. These challenges to company registration practice have a significant impact on the variables and the construction industry sector.

### 4.3.3 Challenges of Project Registration

This study area discusses the different issues and challenges of project registration practice. We were given a variety of questions about the new guidelines' challenges to project registration practice. Questions were developed and distributed to respondents, after which they were evaluated on several scales of agreement, and the agreement of the responses was finalized using a one sample t-test and factor analysis, as described below.

**Table 4.14: The Overall Perception of Challenge of Project Registration**

No	Statements	One-Sample Test		t-value	Test Value = 3.5	
		M	Sd.		Sig. (2-tailed)	Rank According to the Mean
1	Poor awareness about project registration practice	3.49	.639	-.252	.801	6
2	Project information collection methods are manual	3.46	.733	-.659	.511	7
3	Weak capacity of the Regional	3.40	.762	-1.692	.093	9

No	One-Sample Test Statements	M	Sd.	t-value	Test Value = 3.5	
					Sig. (2-tailed)	Rank According to the Mean
	registration authority					
4	Irrelevant parameters	3.56	.616	1.178	.241	3
5	No clear shared responsibility among client, consultant and contractor regarding project registration	3.41	.772	-1.461	.146	8
6	Weak promotion about project registration of necessity	3.51	.669	.120	.904	5
7	Poor commitment to implement the project registration directives	3.53	.639	.505	.614	4
8	Less communication between the federal and regional project registration practice	3.60	.621	1.946	.054	2
9	Weak initiation of practicing project registration	3.75	.650	4.836	.000	1

Data Source: Researcher's own list, 2022.

According to table 4.14, the challenge of project registration practice, the agreement level of "Weak initiation of practicing project registration" is greater than the hypothetical mean value of 3.5, and  $M = 3.75$  and the test  $p = \text{Sig} < 0.05$  indicates that the respondent agreement level is statistically significant difference with a 95% CI, and we reject the null hypothesis and accept the alternative hypothesis. "Weak initiation of practicing project registration" has a high agreement level based on the mean value of the challenge of project registration practice, and it needs a series of challenges of project registration practice.

From the above table 4.14, the overall agreement level of respondents to the top three challenges of project registration practice is "Less communication between the federal and regional project registration practices" is computed to the level  $M = 3.60$ , and the test of  $p = 0.054 > 0.05$ , "irrelevant parameters" are computed to the level  $M = 3.56$ , the test of  $p = 0.241 > 0.05$ , "Poor commitment to implement the project registration directives" is computed to the level  $M = 3.53$ , and the test of  $p = 0.614 > 0.05$  indicates that the respondent agreement level isn't significantly different from the moderate level or test value of 3.5. According to the respondents, less communication between the federal and regional levels is one challenge of project registration implementation, and a poor commitment to implementing the project registration directives is

another challenge for project registration. The other project registration challenges are not highly appreciated, but it is still a challenging practice, and this needs significant improvement.

Thus, the researcher found this result finding similarity and support with the literature presented in chapter two. Under section 2.2.5, Importance of project registrations practice, one of the advantages of engineering registration is that properly registering any construction project entitles the country to collect the appropriate income tax.

A proper record of any construction project would also make it more important to execute the planned budget and schedule. Finally, unregistered building projects make it impossible to audit, monitor, control, and assess the competence of specialists, as well as the entire development process.

Factor Analysis for Project Registration Requirements: Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Table 4.15 provides a summary of the analysis findings related to the contested project registration practices.

**Eigenvalues, Total Variances Explained for the Final Three - Factor Structure.** The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, three factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 1.847, 1.685, and 1.320, which explains 20.525 %, 18.719%, and 14.663 % of the variances, respectively. These four clusters of factors represent 53.907 % of the total variance, which highlights the importance of all nine variables measured (See in appendix: B7).

**Table 4.15: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s alpha)	Eigen value	Variance explained (%)
F1	No clear shared responsibility among client, consultant and contractor regarding project registration	.751	.612	1.847	20.525
	Poor commitment to implement the project registration directives	.666			
	Weak capacity of the Regional registration authority	.638			
	Weak initiation of practicing project	.623			

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
	registration				
F2	Poor awareness about project registration practice	.698	.527	1.685	18.719
	Project information collection methods are manual	.669			
	Irrelevant parameters	.632	.		
	Less communication between the federal and regional project registration practice	.540			
F3	Weak promotion about project registration of necessity	.902	.611	1.320	14.663
Cumulative percentage of Variance (%)		53.907			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

According to the factor analysis results shown in table 4.15 above, the most important requirement is the "challenge of project registration factors," which has the highest eigenvalue of 1.847 and accounts for 20.525 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 1.685 and explains 18.719 percent of the total variance, and "factor three," which has an eigenvalue of 1.320 and explains 14.663 percent of the total variance. Thus, the three extracted factors indicate different dimensions of the challenge of project registration parameters and requirements that have an impact on current registration practice, thereby affecting the success of registration directives.

### **Interpretation of Output from the Principal Component Analysis Extraction Method**

The challenge of project registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the challenge of registration requirements. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to three." The findings so obtained provide evidence of the fact that the different scale factor is appropriate for the determination of the

current challenge of project registration requirement practice. A brief description of the challenge of project registration requirements and current registration practice is given below.

**Factor one, notification of project registration requirements:** As shown in Table 4.15, the first cluster had four variables loaded into the component: "No clear shared responsibility among client, consultant, and contractor regarding project registration" with a loading value of 0.751; "Weak initiation of practicing project registration" with a loading value of 0.623, "Poor commitment to implement the project registration directives" with a loading value of 0.666; and "Weak capacity of the regional registration authority" with a loading value of 0.638. Thus, this cluster gathered 20.525 % of the total variance. These factors address the most important points that we have: weak initiation, poor commitment, and weak capacity are the challenges of project registration practice.

**Factor two, application monitoring system in project registration:** The second component, as shown in Table 4.15, had four variables loaded into it: "Poor awareness about project registration practice," with a loading value of 0.698; "Project information collection methods are manual," with a loading value of 0.669; "Irrelevant parameters," with a loading value of 0.632; and "Loss communication between federal and regional project registration practices," with a loading value of 0.540. As a result, this cluster accounted for 18.792% of the overall variance. The variables were highly impacted by the factors noted in the first component. Poor awareness and inappropriate criteria are two variables that have a significant impact on the problems of the project registration procedure. Furthermore, poor communication has a lower likelihood of influencing the variables in this component. As a result, the elements indicated in the second component are crucial in selecting the parameters of the challenges of project registration practice.

**Factor three, application motivation system in project registration:** As indicated in Table 4.15, the third cluster had one variable loaded into the component: "Weak advertising regarding project registration of need," with a loading value of 0.902. Thus, this cluster accounted for 14.663% of the total variance. These variables address the most essential points: the absence of promotion of project registration, which is important for project registration practice, had a significant impact on the variable and sector of the construction industry's registration practice.

In general, the challenging practices in the registration system are major issues for the construction industry. Forged documents, a lack of a central database system, the weak capacity of the registration authority, and a lack of an entrance competency examination can be challenging factors that affect the registration system, and they all need serious improvement.

#### 4.4 Prospects of Construction Registration Practice

In this study, there are various prospects for construction registration under the current registration directives. It could be identified the prospects of professional, company, and project registration that are described in the questionnaires, and the respondents' responses with different scales of response are described in the details of each section. The prospects of professionals' registration, company registration, and project registration are described below.

##### 4.4.1 Prospects of Professional Registration

In the context of this study, there are various prospects for professional registration in the current registration directives. Therefore, we recognized the professional registration prospects indicated in the surveys, and the respondents' replies on various scales of response are provided in the specifics of each area. A one-sample t-test and factor analysis for the prospects of professionals' registration practice is summarized below in table 4.16.

**Table 4.16: The Overall Perception of Prospects of Professional Registration**

No	One-Sample Test Statements	M	Sd.	t-value	Test Value = 3.5	
					Sig. (2-tailed)	Rank Accordin g to the Mean
1	Good opportunity to encourage professionals to pursue their higher education	3.77	.645	5.125	.000	2
2	Good opportunities to participate professionally in the construction industry	3.71	.822	3.234	.001	3
3	Professional can participate in both the design area or/and construction area by using one professional certificate	3.87	.711	6.458	.000	1
4	Opportunities for eligible professionals to engage in the correct position in the	3.49	.834	-.193	.847	6

No	One-Sample Test Statements	M	Sd.	t-value	Test Value = 3.5	
					Sig. (2-tailed)	Rank According to the Mean
	construction industry					
5	Competency assessment requirement for professional qualification for bachelor and above professionals' competency assessment is mandatory.	3.66	.865	2.329	.021	4
6	Contractors company must participate professional at least 20% of the share in the company during registration time; If the owner is not professional	3.63	.732	2.203	.029	5

Data Source: Researcher's own list, 2022.

According to table 4.16, the overall agreement level of respondents to the top three prospects of professional registration practice "Professionals can participate in both the design area or/and construction area by using one professional certificate" is computed to the level  $M = 3.87$  and tested against the hypothetical mean value of 3.5 and test  $p = (\text{Sig} < 0.05)$ ; "Good opportunity to encourage professionals to pursue their higher education" is computed to the level  $M = 3.77$  and tested against the hypothetical mean value of 3.5 and test  $p = (\text{Sig} < 0.05)$ ; and "Good opportunities to participate professionally in the construction industry" is computed to the level  $M = 3.71$  and tested against the hypothetical mean value of 3.5 and test  $p = (\text{Sig} < 0.05)$ . Thus, all are greater than the moderate test value of 3.5. This indicates that the respondent agreement level is statistically significantly different with a 95% CI, and we reject the null hypothesis and accept the alternative hypothesis. It has a high agreement level based on the mean value of prospects of professional registration practice, but this indicates that the respondent agreed that the prospect of professional registration practice is good appreciated practice and somehow need a series of changes in professional registration practice.

From the above table 4.16, the overall agreement level of respondents to the prospects of professional registration practice is "Opportunities for eligible professionals to engage in the correct position in the construction industry" is computed to the level  $M = 3.49$  and tested against

the hypothetical mean value of 3.5 and test  $p = 0.847 > 0.05$ ), indicates that the respondent agreement level isn't significantly different from the moderate level test value of 3.5. According to the respondents, the opportunity for eligible professionals to engage in the correct position in the construction industry is one of the prospects of professional registration implementation. Other prospects of professional registration are highly appreciated, but it is still the prospects of professional practice and this needs more improvement.

Factor Analysis for Prospects of Professional Registration: Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Table 4.17 provides a summary of the analysis findings related to the contested prospects of professional registration practices.

**Eigenvalues, Total Variances Explained for the Final Two - Factor Structure.** The Kaiser's criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, two factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.092, and 1.322, which explains 34.863%, and 22.041% of the variances.

These two clusters of factors represent 56.903 % of the total variance, which highlights the importance of all nine variables measured (See in appendix: B8).

**Table 4.17: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
F1	Good opportunities to participate professionally in the construction industry	.784	.685	2.092	34.863
	Good opportunity to encourage professionals to pursue their higher education	.781			
	Competency assessment requirement for professional qualification for bachelor and above professionals' competency assessment is mandatory.	.719			
	Opportunities for eligible professionals to engage in the correct position in the construction industry	.573			

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
F2	Professional can participate in both the design area or/and construction area by using one professional certificate	.809	.557	1.322	22.041
	Contractors company must participate professional at least 20% of the share in the company during registration time; If the owner is not professional	.783			
Cumulative percentage of Variance (%)		56.903			
Source: Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

According to the factor analysis results shown in table 4.17 above, the most important requirement is the "challenge of professional registration factors," which has the highest eigenvalue of 2.092 and accounts for 34.863 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 1.322 and explains 22.041 percent of the total variance. Thus, the two extracted factors indicate different dimensions of the prospects of professional registration parameters and requirements that have an impact on current registration practice, thereby affecting the success of registration directives.

### **Interpretation of Output from the Principal Component Analysis Extraction Method**

The prospects of professional registration practice, determined through the Principal Component Analysis Extraction Method and validated through appropriate tests, enabled us to develop and validate a measurement scale to measure the prospects of registration requirements. The study demonstrates that the different factors which affected the requirement for registration practice can be described in terms of "from factor one to two". The findings so obtained provide evidence of the fact that the different scale factors are appropriate for the determination of the prospects of professional registration requirement practice. A brief description of the prospects of professional registration requirements and current registration practice is given below.

**Factor one, potential attractiveness for professional registration:** As shown in Table 4.17, the first component had four variables loaded into the component: " Good opportunity to encourage professionals to pursue their higher education," with a loading value of .757; "

Competency assessment requirement for professional qualification for bachelor and above professionals' competency assessment is mandatory," with a loading value of.736; "Good opportunities to participate professionally in the construction industry," with a loading value of.725; and "Opportunities for eligible professionals to engage in the correct position in the construction industry," with a loading value of.545. Thus, this cluster gathered 34.863% of the total variance. The factors loaded in the first component highlighted their criticality and strongly influenced on the variable. The factors that strongly influence the prospects of professional registration practice are good opportunities to encourage professionals to pursue their higher education and competency assessment requirements for professional qualification. Good opportunities to participate professionally in the construction industry are less likely to influence the variables in this component. This makes the factors listed in the first component important in determining the parameters of the prospects of professional registration practice.

**Factor two, the new future of professional registration prospects:** As shown in Table 4.17, the second cluster had two variables loaded into the component: "Professional can participate in both the design area or/and construction area by using one professional certificate" with a loading value of.704 and "Contractor company must participate professionally at least 20% of the share in the company during registration time; if the owner is not professional" with a loading value of.665. Thus, this cluster gathered 22.04% of the total variance. These factors address the most important points that the professional can participate in both the design area or/and construction area and the contractor company must participate with at least 20% of the share in the company. These prospects of professional registration practice had an influence on the variable and the sector of the construction industry's registration practice.

#### **4.4.2 Prospects of Company Registration**

This study area discusses the different prospects of company registration practice. We were given a variety of questions about the new guidelines' prospects for company registration practice. Questions were developed and distributed to respondents, after which they were evaluated on several scales of agreement, and the agreement of the responses was finalized using a one sample t-test and factor analysis are described. In a similar way to others, the prospects of company registration viewed against the existing parameters of company registration prospects are shown below using inferential statistics and a one-sample t-test.

**Table 4.18: The Overall Perception of Prospects of Company Registration**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	The prospect of this directive, if the contractor is a woman with a disability, and annual turnover is reduced by 15%.	3.42	.920	-1.139	.256	3
2	It is good to encourage and reduce irrelevant parameters for consulting firms' participation	3.64	.791	2.140	.034	2
3	Good practices without meeting any requirement in advance to become a contractor who has sufficient experience.	3.66	.609	3.175	.002	1
4	The manager of the company must have a practicing professional certificate Requirements.	3.30	.606	-4.120	.000	4

Data Source: Researcher's own list, 2022.

According to table 4.18, the overall agreement level of respondents from the top-ranked prospects of company registration practice "Good practices without meeting any requirement in advance to become a contractor who has sufficient experience" is computed to the level  $M = 3.66$ , and the test  $p = \text{Sig} < 0.05$ ; and "It is good to encourage and reduce irrelevant parameters for consulting firms' participation" is computed to the level  $M = 3.64$  and the test  $p = \text{Sig} < 0.05$ . This indicates that the respondent agreement level is above the test value and it is statistically significantly different with a 95% Confidence Interval, and we reject the null hypothesis and accept the alternative hypothesis. Based on the respondent agreement level indicates that the prospect of company registration is good practice, appreciated, and needs a little attention to enhance the construction industry.

Based on table 4.18, the overall agreement level of the respondents mean value rank prospects of company registration practice "The manager of the company must have a professional certificate requirement" is computed to the level  $M = 3.30$  and test  $p$  ( $\text{Sig} < 0.05$ ). Thus, all are less than the hypothetical mean value of 3.5. This indicates that the respondent agreement level is statistically significantly different with a 95% Confidence Interval, and we reject the null hypothesis and

accept the alternative hypothesis. According to Ministry of Urban Development & Construction (2021), directive No. 648/2021 Article, 25 (3) support this statement.

According to the above table 4.18, the overall agreement level of respondents regarding the prospects of company registration practice, "if the contractor is a woman with a disability, and annual turnover is reduced by 15%," which is computed to the level  $M = 3.42$  and test  $P = 0.256 > 0.05$ , this shows that the degree of respondent agreement is not significantly different from the hypothetical mean value of 3.5, and we accept the null hypothesis. According to the respondents, one of the prospects of company registration implementation is the potential for a woman with a disability to participate in the construction industry. According to Ministry of Urban Development & Construction (2021), directive No. 648/2021 Article, 25 (7) support this statement.

The interview result indicates that, according to the new registration directive, the prospects of company registration are promising opportunities for contractors and consulting firms to avoid complex registration requirements and create a favorable atmosphere for professionals to support employment opportunities. It also creates an opportunity for professionals to become shareholders in the organization.

Factor Analysis for Prospect of Company Registration: Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Provides a summary of the analysis findings related to the contested prospects of company registration practices.

**Eigenvalues, Total Variances Explained No Final - Factor Structure.** The Kaiser's criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, one factor with eigenvalues greater than 1 was retained. The eigenvalues of the retained factors are 2.028, which explain 50.694%, of the variances, respectively. This one cluster of factors represents 50.694 % of the total variance, which highlights the importance of all nine variables measured. For the test, before rotation, factor 1 considers 50.694 % of the change, but after the pivot, it checks just no result of the fluctuation (See in appendix: B9).

### **Factor Analysis following Varimax Rotation**

Principal component analysis (PCA) was used with varimax rotation given that the primary purpose was to identify the underlying factors. Initially, all four variables were free to load on various factors as long as their eigenvalue was greater than one. Then, using the generated scree

plot, we were able to determine that one factor was to be extracted. As a result, only one component was extracted and the solution cannot be rotated, therefore, there is no factor analysis solution.

### 4.4.3 Prospects of Project Registration

This study area discusses the different prospects of project registration practice. We were given a variety of questions about the new guidelines' prospects for project registration. Then we assessed several scales of answers and finalized the agreement of the responses using a one-sample t-test and factor analysis. The prospect of project registration with regard to the existing parameters of the project registration is shown below using inferential statistics and one-sample t-test analysis.

**Table 4.19: The Overall Perception of Prospects of Project Registration**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	Good opportunity to monitor and control participating professional	4.10	.654	11.327	.000	1
2	Good opportunities for eligible contractors to participate in the construction industry	4.01	.662	9.499	.000	2
3	Good opportunity for eligible consultants to participate in the construction industry	3.91	.630	8.058	.000	3
4	Reporting twice in one fiscal year to control time, cost, and quality of work, especially in public projects	3.43	.570	-1.555	.122	7
5	To control public projects from the early design period.	3.82	.588	6.715	.000	4
6	Good practice to control and collects income tax from individuals	3.74	.799	3.733	.000	5
7	Monitoring and controlling construction project activities like time extension, design change, and variation	3.49	.707	-.114	.909	6

Data Source: Researcher's own list, 2022.

According to table 4.19, the overall agreement level of respondents to the top three prospects of project registration practice "Good opportunity to monitor and control participating professionals" is computed to the level  $M = 4.10$  and test  $p$  ( $\text{Sig} < 0.05$ ); "Good opportunities for eligible contractors to participate in the construction industry" is computed to the level  $M = 4.01$  and test  $p$  ( $\text{Sig} < 0.05$ ); and "Good opportunity for eligible consultants to participate in the construction industry" is computed to the level  $M = 3.91$  and test  $p$  ( $\text{Sig} < 0.05$ ). Thus, all are greater than the hypothetical mean value of 3.5. This indicates that the respondent agreement level is statistically significantly different with a 95% Confidence Interval, and we reject the null hypothesis and accept the alternative hypothesis. Depending on the mean value of prospects of project registration, it indicates that the respondent's agreement level is an appreciated practice, and it also indicates that the agreement level of the respondent is good for enhancing mechanisms of construction industry developments. Thus, the researcher found this result finding similarity and support with the literature presented in chapter two. Under section 2.2.5, Importance of project registrations practice, type of project, name of the project owner or employer, and status of the contractor carrying out the project, which also includes the name and status of the project consultant, number and diversity of manpower involved in the project (by profession and gender) must be notified.

From the above table 4.19, the overall agreement level of respondents regarding the prospects of project registration practice is "Reporting twice in one fiscal year to control time, cost, and quality of work, especially in public projects" is computed to the level  $M = 3.42$  and test  $P = 0.122 > 0.05$ , and "Monitoring and controlling construction project activities like time extension, design change, and variation" is computed to the level  $M = 3.49$  and test  $P = 0.909 > 0.05$ . This indicates that the respondent agreement level isn't significantly different from the hypothetical mean value of 3.5. According to the respondents, reporting twice in one fiscal year and monitoring and controlling construction project activities is one of the prospects of project registration control and implementation mechanisms. On the other hand, the prospects of project registration are highly appreciated by the respondents, but it is still the case that project registration practice needs further improvement. According to Ministry of Urban Development & Construction (2021), directive No. 648/2021 Article, 30 (4, 5, 6) support this statement.

Factor Analysis for Prospect of Project Registration: Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Table

4.20 provides a summary of the analysis findings related to the contested prospects of project registration practices.

**Eigenvalues, Total Variances Explained for the Final Two - Factor Structure.** The Kaiser’s criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, two factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.067, and 1.709, which explains 29.536%, and 24.408% of the variances, respectively. These two clusters of factors represent 53.943 % of the total variance, which highlights the importance of all nine variables measured (See in appendix: B10).

**Table 4.20: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach’s alpha)	Eigen value	Variance explained (%)
F1	Good practice to control and collects income tax from individuals	.840	.685	2.067	29.536
	Good opportunities for eligible contractors to participate in the construction industry	.737			
	Good opportunity to monitor and control participating professional	.587			
	Monitoring and controlling construction project activities like time extension, design change, and variation	.522			
F2	Good opportunity for eligible consultants to participate in the construction industry	.767	.557	1.709	24.408
	Reporting twice in one fiscal year to control time, cost, and quality of work, especially in public projects	.664			
	To control public projects from the early design period.	.594			
Cumulative percentage of Variance (%)		53.943			
Source: Extraction Method: Principal Component Analysis					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

According to the factor analysis results shown in table 4.20 above, the most important requirement is "the prospect of project registration factors," which has the highest eigenvalue of

2.067 and accounts for 29.536 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 1.709 and explains 24.408 percent of the total variance. Thus, the two extracted factors indicate different dimensions of the prospects of project registration parameters and requirements that have an impact on current registration practice, thereby affecting the success of registration directives.

### **Interpretation of Output from the Principal Component Analysis Extraction Method**

We were able to construct and validate a measuring scale to assess the prospects of registration requirements after determining the prospects of project registration practice using the Principal Component Analysis Extraction Method and validating it with suitable tests. The study demonstrates that the various factors that influenced the requirement for registration practice can be described in terms of "from factor one to two," and the results obtained provide evidence that the different scale factors are appropriate for determining the prospects of project registration requirement practice. A quick overview of project registration requirements and current registration practice is provided below.

#### **Factor one, monitoring and controlling mechanisms of project registration requirement:**

As shown in Table 4.20, the first component had four variables loaded into the component: "Good practice to control and collect income tax from individuals", with a loading value of.840; "Good opportunities for eligible contractors to participate in the construction industry", with a loading value of.737; "Good opportunity to monitor and control participating professionals" with a loading value of.587; and "Monitoring and controlling construction project activities like time extension, design change, and variation" with a loading value of.522. Thus, this cluster gathered 29.536% of the total variance. The factors loaded in the first component emphasized their good opportunity and good practice in monitoring and controlling project prospects, which strongly influenced the variable. The factors that strongly influence the prospects of project registration practice are: good opportunities to encourage monitoring and control of participating professionals; good practice to control and collect income tax; and opportunities for eligible contractors to participate in the construction industry. This makes the factors listed in the first component important in determining the parameters of the prospects of project registration practice.

**Factor two, methods for managing the prospects of the project registration requirement:**

The second cluster had two variables loaded into the component, as shown in Table 4.20: "Good opportunity for eligible consultants to participate in the construction industry" with a loading value of 0.767; "Reporting twice in one fiscal year to control time, cost, and quality of work, especially in public projects" with a loading value of 0.664; and "To control public projects from the early design period" with a loading value of 0.594. As a result, this cluster accounted for 24.408% of the overall variance. These aspects address the most significant point: the prospect of project registration might provide a chance for qualified consultants to engage in the construction sector and oversee public projects from the beginning of the design process. These project registration practice possibilities have an impact on the variable and the construction industry's registration.

Overall, the current construction registration system is a much better guide than the old directives. This new directive is one of the guides that are expected to address challenging practices and to update the construction industry. The inclusion of project registration practices in these directives is a guide with significant and multi-faceted benefits for the construction industry. One of the benefits of project registration is that the construction industry has access to a well-organized, regulated and trained workforce.

**4.5 Improvement Mechanisms of the Registration Practice**

This study area discusses the different improvement mechanisms in registration practice. We were given a variety of questions about the new guidelines' improvement mechanisms for registration practice.

Questions were developed and distributed to respondents, after which they were evaluated on several scales of agreement, and the agreement of the responses was finalized using a one sample t-test and factor analysis, as described below.

**4.5.1 Mechanism to Improve Current Registration Practice in Construction Industry**

The improvement mechanism of the registration perspective toward the existing parameters of the current registration practice is described below in a technique similar to that discussed before using inferential statistics and a one-sample t-test analysis.

**Table 4.21: The Overall Perception of Improvement Mechanism of Registration Practice**

No	One-Sample Test			Test Value = 3.5		
	Statements	M	Sd.	t-value	Sig. (2-tailed)	Rank According to the Mean
1	ICT based or data base registration system	3.80	.690	5.375	.000	9
2	Awareness creation through training	3.99	.662	9.255	.000	4
3	Integrating company and project registration with professionals' registrations	3.71	.731	3.526	.001	10
4	Active involvement of associations in the registration; both professionals and business	3.58	.730	1.324	.187	11
5	Setting examination as a requirement for professional registration to ensure continual professional development (CPD)	3.89	.662	7.300	.000	8
6	Setting realistic requirements; (benchmark other country registration requirements).	3.91	.650	7.805	.000	7
7	Periodic updates of registration requirements depending on maturity of the industry	3.94	.702	7.693	.000	5
8	Associating project registration with construction audits practice	3.92	.636	8.108	.000	6
9	Developing central repository of graduates to reduce the problems associated with forged academic document	4.07	.627	11.304	.000	3
10	Capacity improvement of construction regulatory Authority; (adequacy of the organization structure and the enabling. system).	4.09	.630	11.640	.000	2
11	Controlling of double registration at federal and regional level	4.14	.584	13.528	.000	1

Data Source: Researcher's own list, 2022.

According to table 4.21, the overall agreement level of respondents to the top five improvement mechanisms of registration practice; "Controlling of double registration at the federal and

regional level" is computed to the level  $M = 4.14$  and test  $p$  ( $\text{Sig} < 0.05$ ); "Capacity improvement of construction regulatory authority" is computed to the level  $M = 4.09$  and test  $p$  ( $\text{Sig} < 0.05$ ); "Developing a central repository of graduates to reduce the problems associated with forged academic documents" is computed to the level  $M = 4.07$  and test  $p$  ( $\text{Sig} < 0.05$ ); "Awareness creation through training" is computed to the level  $M = 3.99$  and test  $p$  ( $\text{Sig} < 0.05$ ); and "Periodic updates of registration requirements depending on the maturity of the industry" is computed to the level  $M = 3.94$  and test  $p$  ( $\text{Sig} < 0.05$ ). Thus, all are greater than the hypothetical mean value of 3.5. This indicates that the respondent agreement level is statistically significantly different with a 95% Confidence Interval, and we reject the null hypothesis and accept the alternative hypothesis. Depending on the respondent's agreement level, indicates that the respondent totally accepted and agreed with the survey questions as the improvement mechanism of registration practice and it also indicates that the improvement mechanisms of registration practice need a series of changes to registration practice and the construction industry's development.

From the above table 4.21, the overall agreement level of respondents to the improvement mechanisms of registration practice is "Active involvement of associations in the registration; both professionals and business" is computed to the level  $M = 3.58$  and test  $P = 0.187 > 0.05$ . This indicates that the respondent agreement level isn't significantly different from the hypothetical mean value of 3.5. Thus, the researcher found this result finding similarity and support with the literature presented in chapter two. Under section 2.3.4.1, involvement of Civil engineering and Architectural associations, the Association's accomplishments are the following but not limited to: working closely with the Ministerial offices that are in line with the profession; biannual publications of peer reviewed journals and bulletins; participation and contribution of professional comments during the country's construction industry policy and laws discussion forums; organizing professional conferences, workshops, and seminars; creating international cooperation with similar international associations.

According to the findings of the interviews, the mechanisms for improving registration practice are: implementation of a centralized database registration system across the country to help improve and modernize the registration process in the construction industry as a whole; providing continuous assessment and training; providing timely training to the authorities officers; working closely with stakeholders to control forgery documents; and finally,

benchmarking other countries' registration requirements and practices are to enhance the capacity of local contractors and professionals to be internationally competitive.

**Factor Analysis for mechanism to improve current registration practice:** Before to the factor analysis, a number of techniques are used to extract factors from the results of the univariate analysis using the principal components method, and factors are then interpreted using Varimax rotation. Table 4.22 provides a summary of the analysis findings related to the contested the mechanisms for improving registration practice.

**Eigenvalues, Total Variances Explained for the Final Four - Factor Structure.** The Kaiser's criterion, which entails retaining factors with eigenvalues that are above 1.0, was employed. Hence, four factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 2.226, 1.956, 1.530, and 1.441, which explain 20.238%, 17.783%, 13.909%, and 13.100% of the variances, respectively. These four clusters of factors represent 65.030 % of the total variance, which highlights the importance of all eleven variables measured (See in appendix: B11).

**Table 4.22: Loading of Scale Items on Factors by Rotated Factor Matrix**

Factors	Items	Factor Loading	Reliability (Cronbach's alpha)	Eigen value	Variance explained (%)
F1	Setting examination as a requirement for professional registration to ensure continual professional development (CPD)	.859	.736	2.226	20.230
	Capacity improvement of construction regulatory Authority; (adequacy of the organization structure and the enabling system).	.813			
	Controlling of double registration at federal and regional level	.573			
	Awareness creation through training	.544			
F2	Associating project registration with construction audits practice	.846	.732	1.956	17.783
	Active involvement of associations in the registration; both professionals and business	.766			
	Integrating company and project	.682			

Factors	Items	Factor Loading	Reliability (Cronbach's. alpha)	Eigen value	Variance explained (%)
	registration with professionals' registrations				
F3	ICT based or data base registration system	.844	536	1.530	13.909
	Setting realistic requirements; (benchmark other country registration requirements).	.605			
F4	Developing central repository of graduates to reduce the problems associated with forged academic document	.821	576	1.441	13.100
	Periodic updates of registration requirements depending on maturity of the industry	.618			
Cumulative percentage of Variance (%)		65.030			
Source: Extraction Method: Principal Component Analysis					
Rotation Method: Varimax with Kaiser Normalization.a					
a. Rotation converged in 3 iterations. And Factor loadings < 0.50 were removed.					

According to the factor analysis results shown in table 4.22 above, the most important requirement is the "improvement mechanism of registration factors," which has the highest eigenvalue of 2.226 and accounts for 20.238 percent of the variance in the data set. This is followed by "factor two," which has an eigenvalue of 1.956 and explains 17.783 percent of the total variance, and others.

Thus, the four extracted factors indicate different dimensions of the improvement mechanism of registration practice and requirements that have an impact on current registration practice, thereby affecting the success of registration directives.

### **Interpretation of Output from the Principal Component Analysis Extraction Method**

We were able to construct and validate a measuring scale to assess the prospects of registration requirements after determining the improvement mechanism of registration practice using the Principal Component Analysis Extraction Method and validating it with suitable tests. The study demonstrates that the various factors that influenced the requirement for improvement mechanism practice can be described in terms of "from factor one to four," and the results obtained provide evidence that the different scale factors are appropriate for determining the

mechanism of registration practice. A quick overview of improvement mechanism registration requirements and current registration practice is provided below.

**Factor one, aspects of capacity development in mechanisms for improving registration practice:** As shown in Table 4.22, the first component had four variables loaded into the component: " Setting examination as a requirement for professional registration to ensure continual professional development (CPD)", with a loading value of.859; " Capacity improvement of construction regulatory authority (adequacy of the organization structure and the enabling system)", with a loading value of.813; "Controlling of double registration at the federal and regional level" with a loading value of.573; and " Awareness creation through training" with a loading value of.544. Thus, this cluster gathered 20.238% of the total variance. The factors loaded in the first component underlined the setting of the examination as a requirement for professional registration, capacity improvement of construction regulatory, control of double registration, and awareness creation through training, which strongly influenced the variable. The factors that strongly influence the improvement mechanism of registration practice are: a good opportunity to encourage monitoring and control of participating professionals; setting examination as a requirement for professional registration; and capacity improvement of construction regulatory. This makes the factors listed in the first component important in determining the parameters of the improvement mechanism of registration practice.

**Factor two, aspect of controlling mechanisms for improvement in registration practice:** The second cluster had three variables loaded into the component, as shown in Table 4.22: " Associating project registration with construction audit practice" with a loading value of 0.846; " Active involvement of associations in the registration; both professionals and business" with a loading value of 0.766; and " Integrating company and project registration with professionals' registrations" with a loading value of 0.628. As a result, this cluster accounted for 17.783% of the overall variance. These aspects address the most significant point: the improvement mechanism of registration practice might provide an associated project registration with construction audit practice and active involvement of associations in the registration of both professionals and businesses. These improvement mechanism practices have the possibility of having an impact on the variable and the construction industry's registration.

**Factor three, aspect of standardized mechanisms for improvement in registration practice:**

As shown in Table 4.22, the third component had two variables loaded into the component: "ICT-based or database registration system", with a loading value of 0.844; and "Setting realistic requirements" (benchmarking other countries' registration requirements), with a loading value of 0.604. Thus, this cluster gathered 13.909% of the total variance. The factors loaded in this component underlined ICT-based or database registration as a requirement for improvement practice, setting realistic requirements (benchmarking other countries' registration requirements), which strongly influenced on the variable. The factors that strongly influence the improvement mechanism of registration practice are ICT-based or database registration systems that encourage monitoring and control of registration practice; setting realistic requirements, and benchmarking other countries' registration requirements. This makes the factors listed in the third component important in determining the parameters of the improvement mechanism of registration practice.

**Factor four, aspect of continues development mechanisms for registration practice improvement:**

As shown in Table 4.22, the fourth component had two variables loaded into the component: "Developing a central repository of graduates to reduce the problems associated with forged academic documents", with a loading value of .821; and "Periodic updates of registration requirements depending on the maturity of the industry," with a loading value of .618. Thus, this cluster gathered 13.100% of the total variance. The factors loaded in this component emphasized the development of a central repository of graduates to reduce the problems associated with forged academic documents. Periodic updates of registration requirements depending on the maturity of the industry strongly influence this component. The factors that strongly influence the improvement mechanism of registration practice are encouraging periodic updates of registration requirements depending on the maturity of the industry and controlling the development of a central repository of graduates to reduce the problems associated with forged academic documents.

In general, implementing the improved mechanism of current registration practice in the construction industry has an important role to play in order to manage and update the registration system. Also, we are pointing out that the construction registration system should be continuously developed in accordance with the development of the construction industry, and the establishment of a modern and improved registration system as well as the relevant stakeholders should be given due attention.

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5. Introduction**

The aim of this study was to assess the challenging factors that affect registration practices and the prospects of registration practice in Addis Ababa. The objectives of the research, as stated in the first chapter, were to assess the challenge of professional and company registration practices, to oversee the prospects of construction project registration practice, and to assess the improvement mechanisms of registration practice.

This study used a mixed research approach with both quantitative and qualitative data, a questionnaire, a semi-structured interview, and document analysis as research instruments to achieve these objectives. Then, the data gathered were analyzed with appropriate descriptive and statistical methods, and the results were thoroughly discussed in the previous chapter. This chapter presents the conclusions drawn and recommendations forwarded from the results of the analysis.

#### **5.1 Conclusions of the Results**

The results of the questionnaire survey analysis were discussed and presented in detail in the previous chapter. Therefore, based on the results of the analysis, the following major conclusions have been derived and summarized:

The first objective of this study was to assess the challenges of professional and company registration practices in Addis Ababa. From the data analysis challenging requirement of professional, company, and projects registration practice:

Professional Competence Exam; an understanding of local practices and conditions; previously involved work experience in terms of number and project size; and timely providing work are below the hypothetical mean value. This indicates that professional construction registration practices need significant improvement.

Company experience, financial capacity requirements, the manager of the company must have a practicing professional certificate, and plant and equipment requirements are below the hypothetical mean value, which indicates that company registration practices need significant improvement.

Both "the employer must notify the authority at the beginning of each fiscal year" and "federally funded projects shall be subject to approval by the authority, starting with the design and approval" are good prospects for project registration practices that are appreciated by the respondent.

"The employer is required to notify the authority of any related construction changes," "require information regarding any construction project contract time, cost, payment, design change, contractor and consultant fees, termination or cancellation, and progress," and "Federal Government-funded projects must notify the authority every six months." This practice indicates that project registration practices could be greatly improved and needs systematic organizational practices.

"Lack of entrance competency examination for new applicants," "weak involvement of associations in the registration system," "forged work experience letters with unauthorized signing of a signature," "forged academic documents," and "poor document interpretation system"; "document evaluation"; and "interpretation processed by a single officer"—these practices indicate that major challenging factors that affect professionals' registration practice need serious, significant improvement.

This practice indicates that major challenging factors that affect company registration practice, such as "lack of communication between federal and regional construction authorities," "poor document holding system; most of the documents are on the archive shelf," "forged documents of professionals' experience letters," and "challenge of annual financial turnover; not encourage a new entry-level company," these challenging factors require serious significant improvement.

"Weak initiation of practicing project registration," "irrelevant parameters," and "poor commitment to implement the project registration directives"—these practices indicate that major challenging factors that affect project registration practice need serious and significant improvement.

In general, if the challenges and bottlenecks in the registration system are singled out and if appropriate adjustments and radical changes are made, the changes that the registration system will bring to the development of the construction industry are very rapid. By making the current construction registration system healthy and giving it due attention, it will play a constructive role in the development of the construction industry.

The second objective of this study was to oversee the prospects of construction project registration practice in Addis Ababa. From the data analysis prospects of professional, company, and project registration practice:

"Professionals can participate in both the design area or/and construction area by using one professional certificate." "Good opportunity to encourage professionals to pursue their higher education," "Good opportunities to participate professionally in the construction industry" and "Competency assessment requirement for professional qualification for bachelor's degree and above professionals;" The agreement level of the respondent is greater than the moderate test value, which indicates that the prospects of professionals are encouraged to practice.

"Good practices without meeting any requirement in advance to become a contractor who has sufficient experience" and "It is good to encourage and reduce irrelevant parameters for consulting firms' participation." The agreement level of the respondent is greater than the moderate test value, which indicates that the prospects of the company are encouraged practices.

"The prospect of this directive, if the contractor is a woman with a disability, and annual turnover is reduced by 15%," this indicate that the agreement level of the respondent is no significant different from the moderate test value; the prospects of the company registration need improvement and "The manager of the company must have a practicing professional certificate requirement" indicate that the agreement level of the respondent is below the moderate test value; regarding this point, it indicates that the prospects of the company registration need more significant improvement.

"Good opportunity to monitor and control participating professionals," "good opportunities for eligible contractors to participate in the construction industry," "to control public projects from the early design period" and "good practice to control and collect income tax from individuals," the agreement level of the respondent is greater than the moderate test value, which indicates that the prospects of project registration are encouraged and good practices area.

In general, one of the gaps observed in the previous guidelines in the registration practices was that the registration system did not encourage professionals. However, the new construction registration guidelines that are now in place have given professionals the right attention and encouragement, as well as inviting new contractors and consultants to join the industry.

The third objective of this study was to assess the improvement mechanism of registration practice in Addis Ababa. From the data analysis, the overall perception of improvement mechanisms in registration practices:

"Double registration control at the federal and regional levels," "Capacity Development of the Construction Regulatory Authority; Adequacy of the Organization Structure and the Enabling System"; "Awareness Creation Through Training"; "Periodic Updates of Registration Requirements Depending on Industry Mature"; and "Setting Examination as a Requirement for Professional Registration to Ensure Continual Professional Development (CPD)" The agreement level of the respondent is greater than the moderate test value, which indicates that the improvement mechanisms of registration practices are a highly appreciated area.

"ICT-based or data-base registration system," "integrating company and project registration with professionals' registrations," and "active involvement of associations in the registration system; both professionals and companies." The agreement level of the respondent is greater than the moderate test value, which indicates that these improvement mechanisms are a moderately appreciated area.

The main purpose of factor analysis was to identify the underlying challenging factor that affects professionals, companies, and projects in terms of their registration practice improvement mechanism factors in Addis Ababa construction registration practice. The identified factors are as follows: Mechanisms for regulating the registration requirement, project registration requirement notification, aspects of capacity development in mechanisms for improving registration practice, aspects of controlling mechanisms for improving registration practice, aspects of standardized mechanisms for improving registration practice, and aspects of continuing development mechanisms for improving registration practice.

In general, as the challenges in the construction registration practice are well identified, if the relevant stakeholders are given appropriate corrections and adjustments, the difficult registration system currently in operation can be changed. Also, if the improvement mechanism for the registration practice is well implemented, it will make the registration system and the construction industry more streamlined and convenient.

## **5.2 Recommendation on the Current Practice**

The following recommendations are made based on the findings in this research and are forwarded to the construction authority, stakeholders, and practitioners in the construction industry to reduce the challenging factors of registration practices and to apply the registration practices improvement mechanism.

Working with higher education institutions to avoid and regulate forged documents in the registration system, it is critical to develop a central database system to handle forged academic and educational documents.

Controlling double registration, it is critical to develop and execute an efficient system by assisting and supporting regional centers' operational deficiencies through the use of ICT or database technology.

In general, to improve construction professional and company registration practices through the involvement of relevant stakeholders at all levels, the implementation of long-term and consistent improvement approaches, and the adoption of brief and efficient practices based on international experience.

The registration system should be enhanced by providing frequent regular training and monitoring in order to handle construction professionals and company registration in a systematic manner.

Entrance competency examinations for new applicants are mandatory in order to develop internationally competent professionals, companies, and management in the construction industry and also to promote continued professional development in the construction industry.

The registration and licensing processes must include consideration of ethics and attitudes. Some overly strict restrictions must be relaxed. For example, in Appendix 15 of Directive 648/2021, the construction cost limit for different grades of GC, BC, and RC is established. This regulation is rigid and does not consider timely price inflation.

When a license is issued, the registered equipment should be monitored and validated to verify that it is available, operational, or functioning properly. It should also be examined and checked for appropriate operation when the license is renewed. This is one method of protecting forged equipment documents.

The present registration directive No. 648/2021 demands competency evaluation in the form of a COC only for lower and intermediate-level professionals, but not for middle- and senior-level professionals. As a result, we rigorously urge that competency evaluation be considered at least for degree graduates before they enter the industry and the market.

The findings of the factor analysis have implications for the government, practitioners, and stakeholders to improve the industry; additionally, they will assist academics and interested researchers in identifying focus areas of construction registration practices in the Ethiopian construction industry. It is critical to conduct additional research on challenges and improvement mechanisms for the identified challenge and improvement areas.

### **5.3 Recommendation for Further Study**

Based on current registration practice, construction professionals, companies, and project registration have been examined and explored in this research, and the challenges and opportunities of current registration practice have been discussed in detail. Furthermore, researchers are suggested to study the significance of project registration practices associated with a construction audit is recommended to study in the future. Additionally, assessing the challenges and implementation practices of construction professional entrance and upgrade exams is another recommended area of future study.

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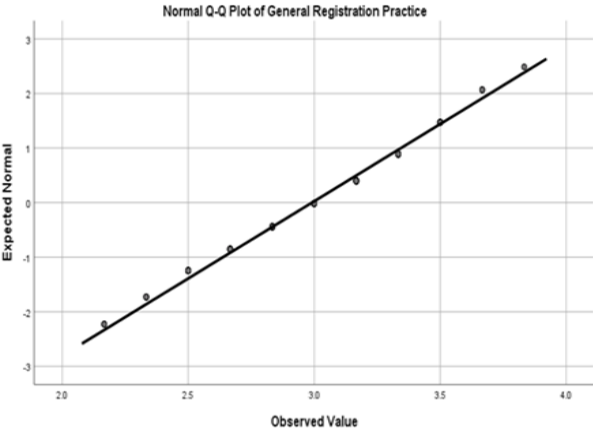
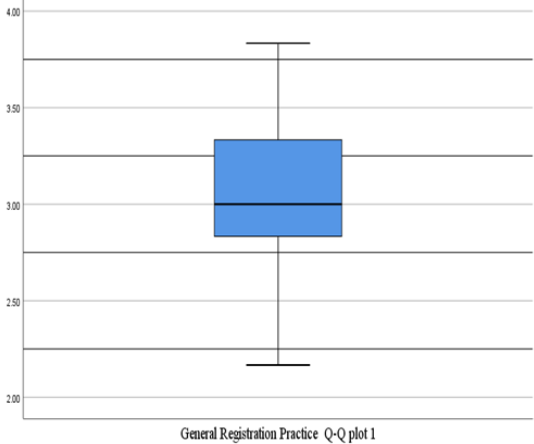
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**Appendix A: Normality Test for One Sample T-Test**

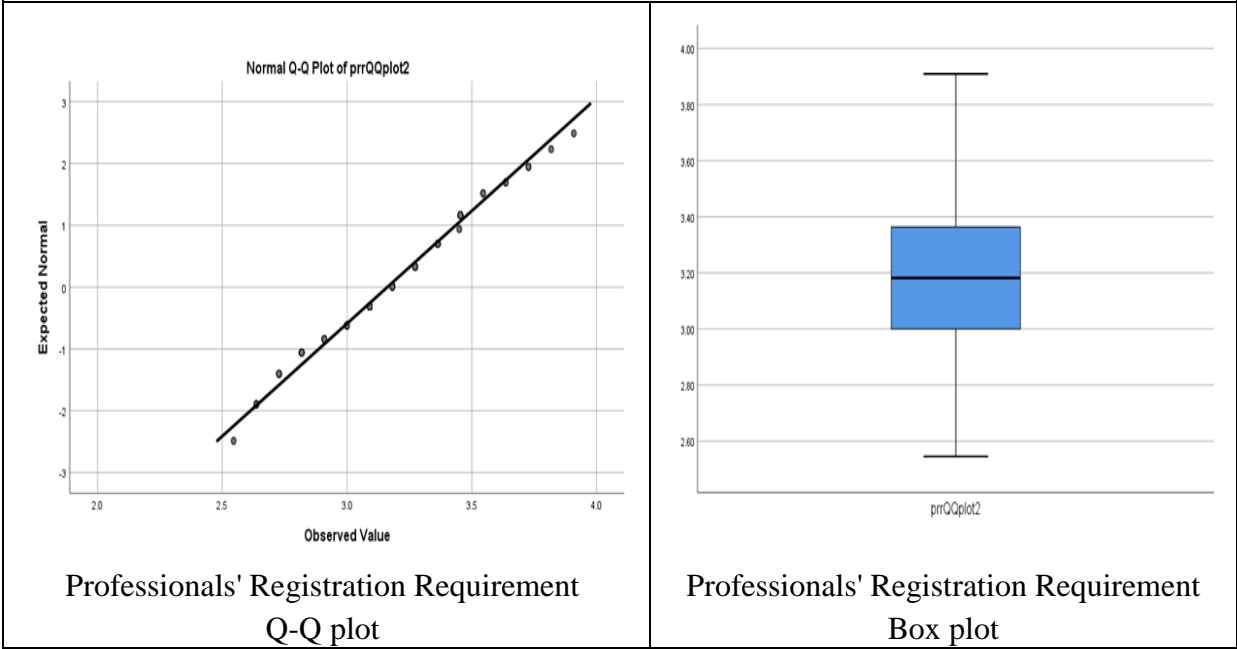
<b>Table A1: General Registration Practice</b>				
			Statistic	Std. Error
<b>GRP Q-Q plot 1</b>	Mean		2.9913	.02847
	95% Confidence Interval for Mean	Lower Bound	2.9351	
		Upper Bound	3.0476	
	5% Trimmed Mean		2.9972	
	Std. Deviation		.35332	
	Skewness		-.202	.195
	Kurtosis		-.514	.389

 <p style="text-align: center;">Normal Q-Q Plot of General Registration Practice</p> <p style="text-align: center;">Expected Normal</p> <p style="text-align: center;">Observed Value</p> <p style="text-align: center;">General Registration Practice Q-Q plot</p>	 <p style="text-align: center;">General Registration Practice Q-Q plot 1</p> <p style="text-align: center;">General Registration Practice Box plot</p>
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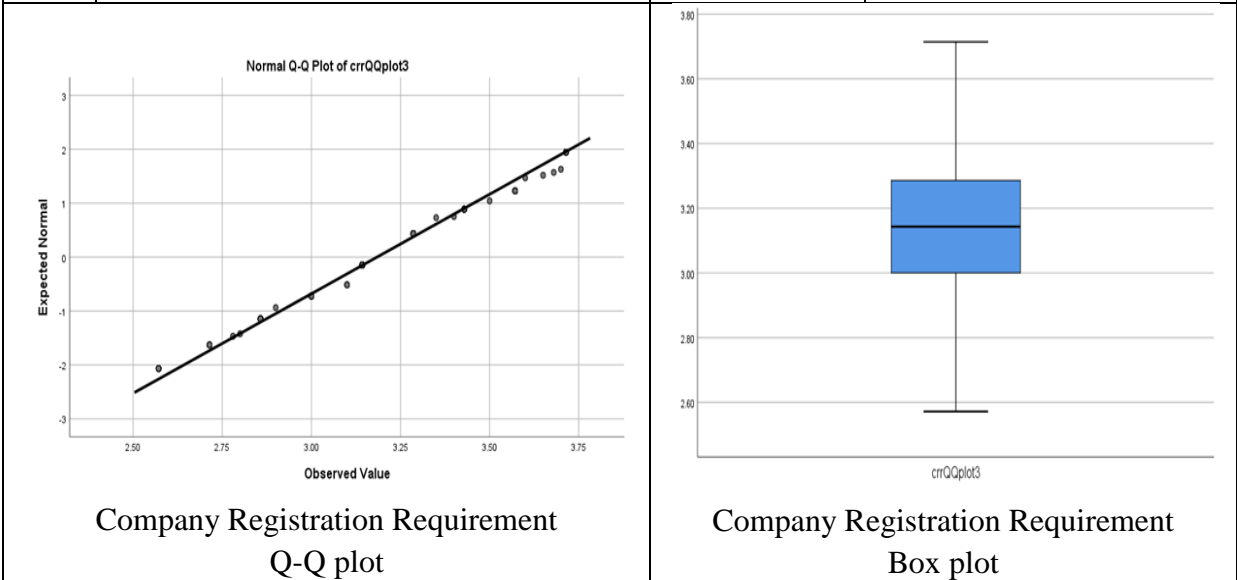
<b>Table A2: Professionals' Registration Requirement</b>				
			Statistic	Std. Error
<b>PRR Q-Q plot</b>	Mean		3.1617	.02211
	95% Confidence Interval for Mean	Lower Bound	3.1180	
		Upper Bound	3.2054	
	5% Trimmed Mean		3.1595	
	Std. Deviation		.27442	
	Skewness		-.058	.195
	Kurtosis		-.290	.389

**Table A2: Professionals' Registration Requirement**



**Table A3: Company Registration Requirement**

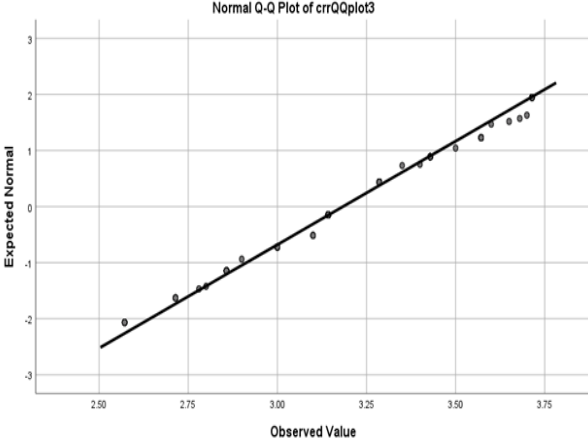
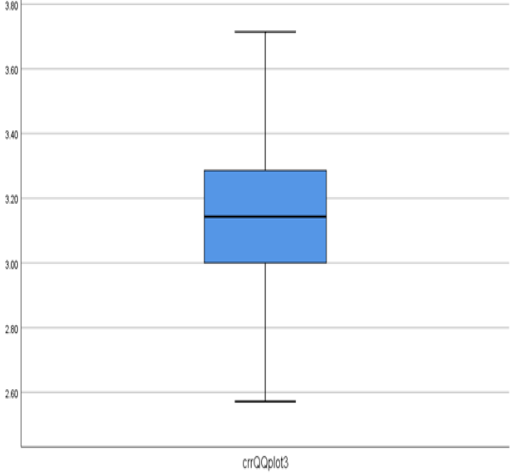
		Statistic	Std. Error	
<b>CRR Q-Q plot</b>	Mean	3.1842	.02183	
	95% Confidence Interval for Mean	Lower Bound	3.1180	
		Upper Bound	3.2054	
	5% Trimmed Mean	3.1861		
	Std. Deviation	.27091		
	Skewness	-.024	.195	
	Kurtosis	-.222	.389	



**Table A4: Project Registration Requirement**

			Statistic	Std. Error
<b>ProRR Q-Q plot</b>	Mean		3.1842	.02183
	95% Confidence Interval for Mean	Lower Bound	3.1180	
		Upper Bound	3.2054	
	5% Trimmed Mean		3.1861	
	Std. Deviation		.27091	
	Skewness		-.024	.195
	Kurtosis		-.222	.389

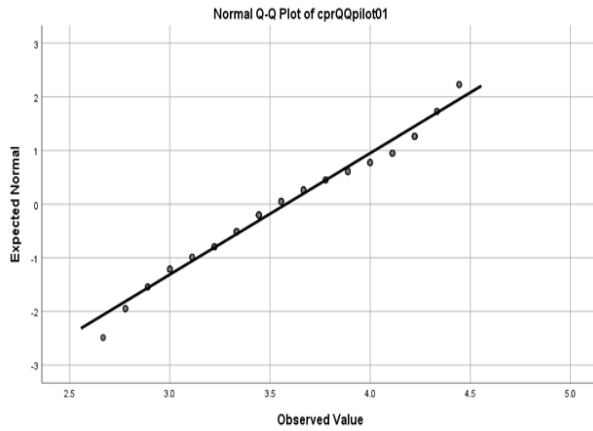
  

 <p style="text-align: center;">Project Registration Requirement Q-Q plot</p>	 <p style="text-align: center;">Project Registration Requirement Box plot</p>
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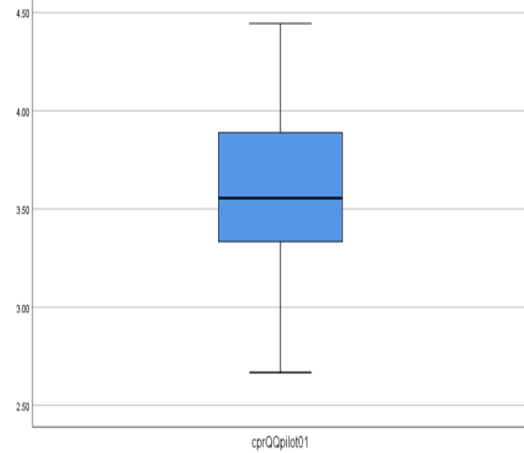
**Table A5: Challenge of Professionals' Registration Requirement**

			Statistic	Std. Error
<b>CPR Q-Q plot</b>	Mean		3.5801	.03566
	95% Confidence Interval for Mean	Lower Bound	3.5096	
		Upper Bound	3.6505	
	5% Trimmed Mean		3.5798	
	Std. Deviation		.44249	
	Skewness		.107	.195
	Kurtosis		-.839	.389

**Table A5: Challenge of Professionals' Registration Requirement**



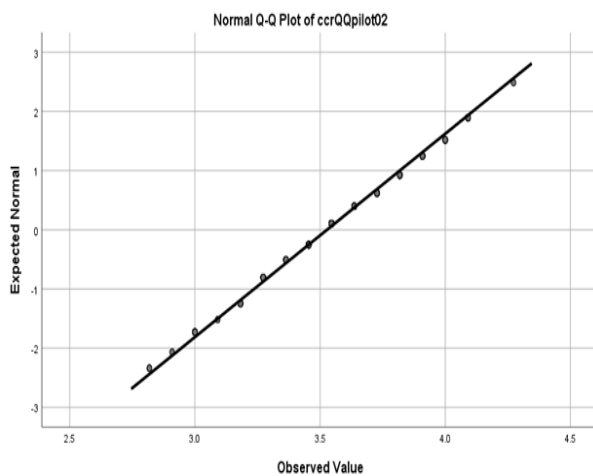
Challenge of Professionals' Registration Requirement Q-Q plot



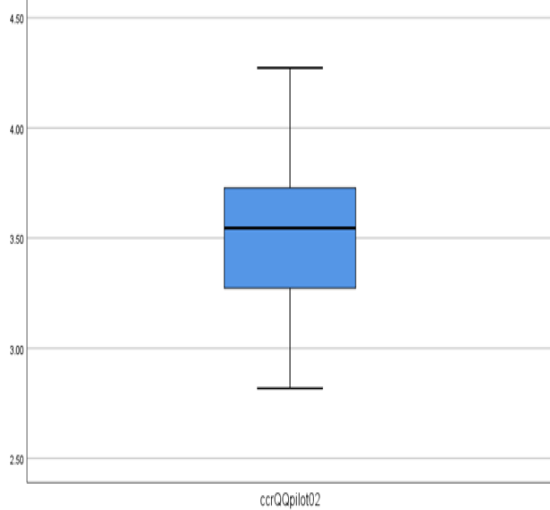
Challenge of Professionals' Registration Requirement Box plot

**Table A6: Challenge of Company Registration Requirement**

		Statistic	Std. Error	
CCR Q-Q plot	Mean	3.5277	.02345	
	95% Confidence Interval for Mean	Lower Bound	3.4814	
		Upper Bound	3.5741	
	5% Trimmed Mean	3.5282		
	Std. Deviation	.29104		
	Skewness	.034	.195	
	Kurtosis	-.339	.389	



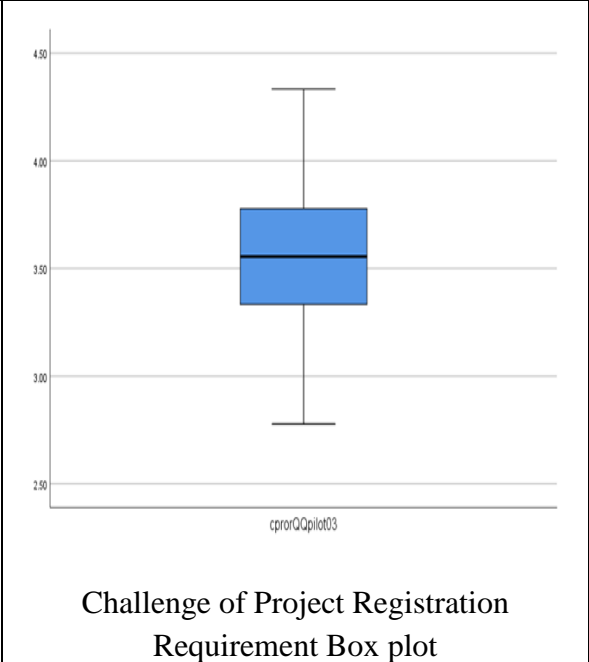
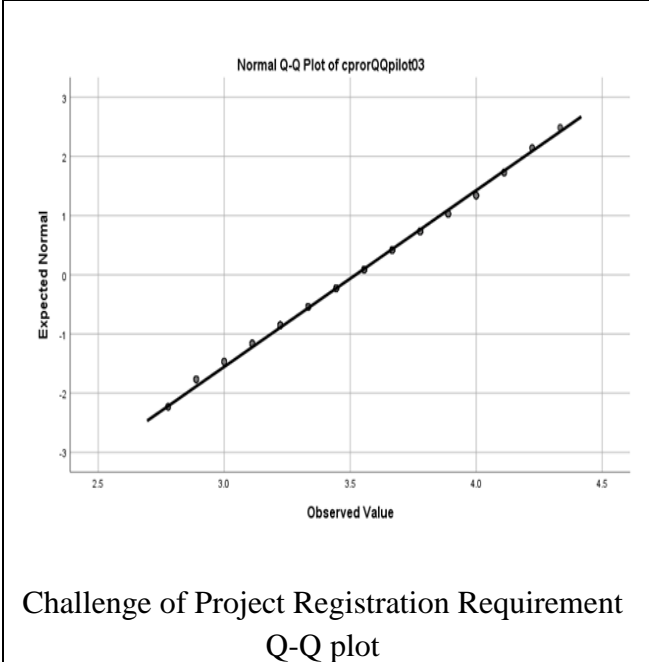
Challenge of Company Registration Requirement Q-Q plot



Challenge of Company Registration Requirement Box plot

**Table A7: Challenge of Project Registration Requirement**

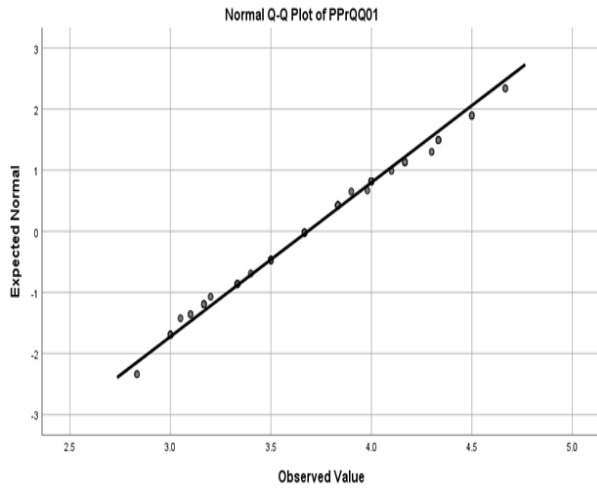
			Statistic	Std. Error
<b>CProR Q-Q plot</b>	Mean		3.5216	.02703
	95% Confidence Interval for Mean	Lower Bound	3.4682	
		Upper Bound	3.5751	
	5% Trimmed Mean		3.5232	
	Std. Deviation		.33546	
	Skewness		-.032	.195
	Kurtosis		-.436	.389



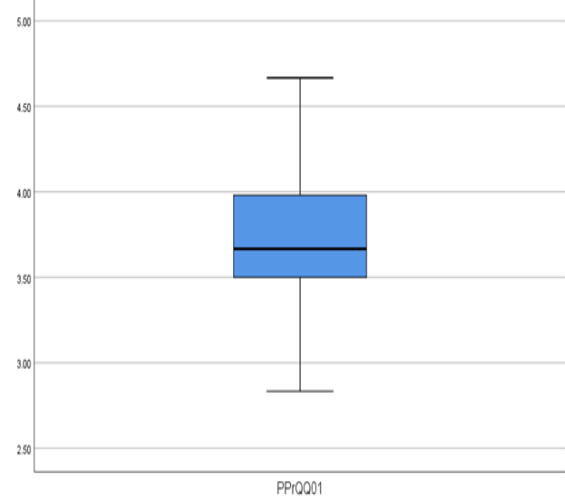
**Table A8: Prospects of Professional Registration Requirement**

			Statistic	Std. Error
<b>PPR Q-Q plot</b>	Mean		3.6837	.03198
	95% Confidence Interval for Mean	Lower Bound	3.6206	
		Upper Bound	3.7469	
	5% Trimmed Mean		3.6784	
	Std. Deviation		.39681	
	Skewness		.155	.195
	Kurtosis		-.290	.389

**Table A8: Prospects of Professional Registration Requirement**



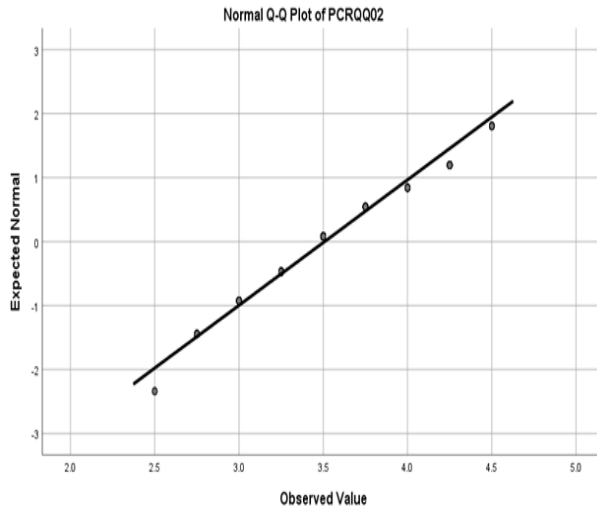
Prospects of Professional Registration Requirement Q-Q plot



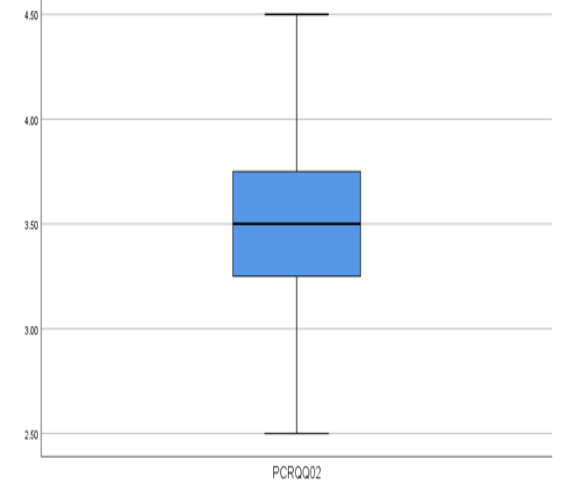
Prospects of Professional Registration Requirement Box plot

**Table A9: Prospects of Company Registration Requirement**

		Statistic	Std. Error	
<b>PCR Q-Q plot</b>	Mean	3.5081	.04110	
	95% Confidence Interval for Mean	Lower Bound	3.4269	
		Upper Bound	3.5893	
	5% Trimmed Mean	3.4987		
	Std. Deviation	.51005		
	Skewness	.260	.195	
Kurtosis	-.648	.389		



Prospects of Company Registration Requirement Q-Q plot



Prospects of Company Registration Requirement Box plot

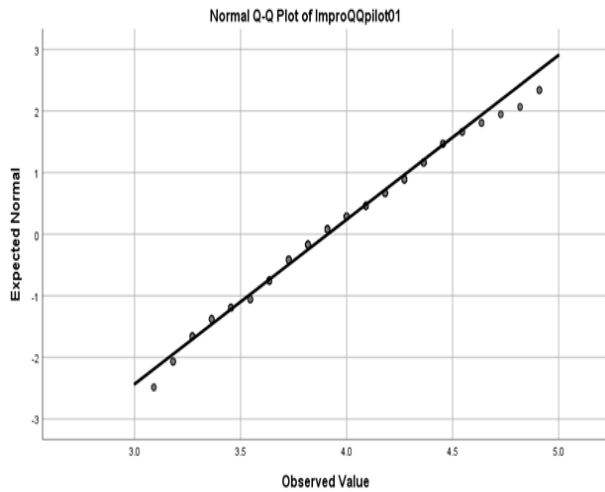
<b>Table A10: Prospects of Project Registration Requirement</b>			
		Statistic	Std. Error
<b>PProR Q-Q plot</b>	Mean	3.7848	.03099
	95% Confidence Interval for Mean	Lower Bound	3.7236
		Upper Bound	3.8460
	5% Trimmed Mean	3.7857	
	Std. Deviation	.38452	
	Skewness	.220	.195
	Kurtosis	-.743	.389

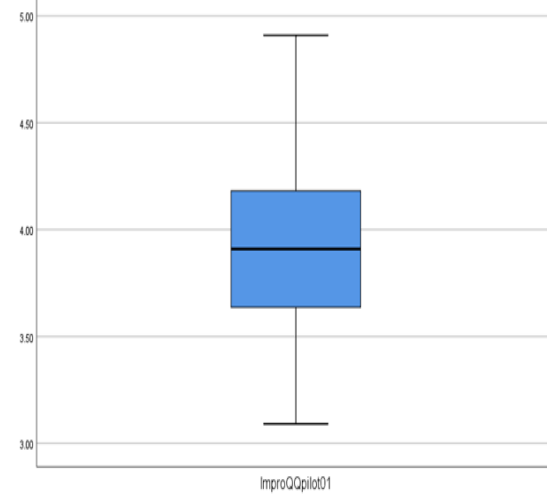
<p>Normal Q-Q Plot of PProRQQ03</p>	<p>PCRRQQ02</p>
Prospects of Project Registration Requirement Q-Q plot	Prospects of Project Registration Requirement Box plot

<b>Table A11: Mechanisms to improve registration practice</b>			
		Statistic	Std. Error
<b>Improvement Q-Q plot</b>	Mean	3.9115	.03017
	95% Confidence Interval for Mean	Lower Bound	3.8518
		Upper Bound	3.9711
	5% Trimmed Mean	3.9052	
	Std. Deviation	.37446	
	Skewness	.222	.195
	Kurtosis	-.199	.389

**Table A11: Mechanisms to improve registration practice**



Prospects of Professional Registration Requirement Q-Q plot



Prospects of Professional Registration Requirement Box plot

## Appendix B: Factor Analysis for Scree Test

Table B1: Eigenvalues, Total Variances Explained for the Final Two-Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.348	39.128	39.128	2.348	39.128	39.128	1.918	31.964	31.964
2	1.234	20.563	59.691	1.234	20.563	59.691	1.664	27.726	59.691
Extraction Method: Principal Component Analysis.									

Table B2: Eigenvalues, Total Variances Explained for the Final Three-Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative e %	Total	% of Variance	Cumulative e %	Total	% of Variance	Cumulative e %
1	2.571	23.369	23.369	2.571	23.369	23.369	2.190	19.907	19.907
2	1.629	14.813	38.182	1.629	14.813	38.182	1.783	16.211	36.117
3	1.417	12.884	51.066	1.417	12.884	51.066	1.644	14.944	51.066
Extraction Method: Principal Component Analysis.									

Table B3: Eigenvalues, Total Variances Explained for the Final Two-Factor Structure

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.920	41.713	41.713	2.920	41.713	41.713	2.780	39.708	39.708
2	1.247	17.810	59.523	1.247	17.810	59.523	1.387	19.815	59.523
Extraction Method: Principal Component Analysis.									

Table B4: Eigenvalues, Total Variances Explained for the Final Two-Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.307	32.964	32.964	2.307	32.964	32.964	2.077	29.668	29.668
2	1.309	18.702	51.665	1.309	18.702	51.665	1.540	21.997	51.665
Extraction Method: Principal Component Analysis.									

Table B5: Eigenvalues, Total Variances Explained for the Final Three -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.243	36.035	36.035	3.243	36.035	36.035	2.241	24.902	24.902
2	1.378	15.310	51.345	1.378	15.310	51.345	2.096	23.283	48.185
3	1.192	13.243	64.588	1.192	13.243	64.588	1.476	16.403	64.588
Extraction Method: Principal Component Analysis.									

Table B6: Eigenvalues, Total Variances Explained for the Final Four-Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.712	24.653	24.653	2.712	24.653	24.653	2.082	18.925	18.925
2	2.101	19.101	43.754	2.101	19.101	43.754	2.066	18.782	37.707
3	1.600	14.547	58.301	1.600	14.547	58.301	2.012	18.293	56.000
4	1.141	10.375	68.676	1.141	10.375	68.676	1.394	12.677	68.676
Extraction Method: Principal Component Analysis.									

Table B7: Eigenvalues, Total Variances Explained for the Final Three -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.294	25.494	25.494	2.294	25.494	25.494	1.847	20.525	20.525
2	1.339	14.881	40.375	1.339	14.881	40.375	1.685	18.719	39.244
3	1.218	13.532	53.907	1.218	13.532	53.907	1.320	14.663	53.907
Extraction Method: Principal Component Analysis.									

Table B8: Eigenvalues, Total Variances Explained for the Final Two -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.290	38.162	38.162	2.290	38.162	38.162	2.092	34.863	34.863
2	1.124	18.742	56.903	1.124	18.742	56.903	1.322	22.041	56.903
Extraction Method: Principal Component Analysis.									

Table B9: Eigenvalues, Total Variances Explained for the Final One -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.028	50.694	50.694	2.028	50.694	50.694	No	No	No
Extraction Method: Principal Component Analysis.									

Table B10: Eigenvalues, Total Variances Explained for the Final Two -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.497	35.665	35.665	2.497	35.665	35.665	2.067	29.536	29.536
2	1.279	18.278	53.943	1.279	18.278	53.943	1.709	24.408	53.943
Extraction Method: Principal Component Analysis.									

Table B11: Eigenvalues, Total Variances Explained for the Final Four -Factor Structure

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.596	32.694	32.694	3.596	32.694	32.694	2.226	20.230	20.238
2	1.363	12.387	45.082	1.363	12.387	45.082	1.956	17.783	38.021
3	1.142	10.384	55.466	1.142	10.384	55.466	1.530	13.909	51.930
4	1.052	9.564	65.030	1.052	9.564	65.030	1.441	13.100	65.030
Extraction Method: Principal Component Analysis.									

## **Appendix C: Questionnaires**

Dear Respondents,

I am presently engaged in a study focusing on the Assessment of challenges and prospects of construction registration practice in Addis Ababa and their current industry practices. To accomplish this, I have designed a questionnaire and I am distributing it to you seeking your earnest response. This questionnaire is prepared to obtain information from key informants with structured questions. The information is required for the academic research entitled “Assessment of challenges and prospect of construction registration practice in Addis Ababa”, which is being conducted as partial fulfillment of MSc. in construction technology and management. The questionnaire consists of four sections and general comments.

Section. I General Information (Personal Demographics of Respondent)

Section. II Assess the challenge of professional and Company registration practices.

Section. III Evaluate the prospects of construction project registration practice.

Section. IV Assess the improvement mechanism of registration practice.

Your response, in this regard, is precious and contributory to the outcome of the research. All feedback will be kept strictly confidential and utilized for this academic research only. If you have any queries or comments on the attached questionnaire, please do not hesitate to contact me through this address:

Name- Anteneh Mesele

Post Graduate Student, MSc. in construction technology and management

Hawassa University

Department of construction and technology management

Phone- 0912084185

Email- anthane85@gmail.com

Thank you in advance for your invaluable input and kind cooperation.

## INSTRUCTIONS:

This research is conducted for academic purposes, so please try to fill it out carefully and truthfully. For each of the questions, please tick [] in the provided box which you believe is the most suitable answer using the given scale. Answer the questions considering the practice of construction registration from your experience. Please also answer all the questions to enhance the objective of the research.

**Note:** Construction Registration refers to registration of professionals, registration of companies and registration of projects as per the new registration directive.

## SECTION I: GENERAL BACKGROUND OF THE RESPONDENT

- 1) Name (optional): \_\_\_\_\_
- 2) What is the highest level of education you have completed?
  - College Diploma
  - BSc Degree
  - MSc Degree
  - Other, please specify \_\_\_\_\_
- 3) Your position in the company:
  - Project Manager     Project Engineer     Site Engineer     Office Engineer
  - Site Supervisor     Other \_\_\_\_\_
- 4) Area of establishment of the company you are working for:
  - Building Contractor     Road contractor     General Contractor     Consulting Firms
  - Regulatory Authority     Other \_\_\_\_\_
- 5) Relevant working experience (Years):
  - Less than two year     2-5 Years     6-10 Years     11-15 Years
  - 16-20 Years     Above 20 Years

## Section II. Challenge of Professional and Company registration practices

2.1 From your experience, please kindly rate the overall registration practice and its contribution to construction industry development. Rate on a 5-point Liker scale from 1 = “Very Low”, 2 = “Low”, 3 = “Average”, 4 = “High” & 5 = “Very High”

No	General Registration Practice	1. Very Low	2. Low	3. Moderate	4. High	5. Very High
1	Effectiveness of the current registration practice in Ethiopia; achieving the intended purpose of registration.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Suitability of the current registration directives for construction industry development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Suitability of the current registration directives for professional and company development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Potential benefits of the current professional registration practice on manpower development planning in the construction industry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Perceived benefit of project registration to develop project management capacity development programs. i.e., identifying critical intervention area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	The potential benefits of the current registration practice on the management of construction industry development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2 The following parameters are extracted from the current registration directive. Rate significance of the parameters in ensuring the intended purpose of registration on a 5-point scale, where 1= Very Low, 2= Low, 3= Average, 4= High, and 5= Very high. And mark with “√” on your response.

No.	Registration requirements/ parameters in the current registration directive	1	2	3	4	5
	<b>I. Professionals' registration</b>					
1	Professional Competence Exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Adequacy in professional experience for registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The requisite of application fee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Timely providing (The time it take for concluding the registration process)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Have an understanding of local practices and conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Be of good characteristics and professional stand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Understanding of professional practice and professional ethics issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Possibility to get a certificate in two or more professions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Document requirement (Background of the professional academic status, Original and photocopy of renewed kebele ID/driver's license)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Certificate of Competency Assessment (COC) from the relevant body for small and medium-sized professionals;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Previously involved work experience in number and project size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>II. Companies' Registration</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
12	Staff Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Plant & Equipment Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Offices/ Workshop Conditions Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Experience (The experience of any firm applying for upgrading or registration)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Financial Capacity Requirements (Minimum financial requirements for any firm applying for upgrading annual turnover)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Tax registration certificate Requirements (It is important that Contractors should adhere to the laws governing tax compliance.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	The manager of the company must have a practicing professional certificate Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>III. Project Registration</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
19	All Category of Construction Projects must be registered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Any contractor and consultant must register construction projects with the Authority.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	The employer must notify to the Authority at the beginning of each fiscal year.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Federal Government funded project shall be subject to approval by the Authority, starting with the design and approval.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Federal Government funded project must notify the Authority every six months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	The employer is obliged to notify the Authority of any related changes to the construction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Require information regarding any construction project contract time, cost, payment, design change , fees of the contractor and the consultant, termination or cancellation and progress must be notify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**2.3** Please kindly indicate the extent to which the following points are **challenges of professional, company and project registration** practice in the construction industry on a 5-point scale, where 1= Very Low to 5= Very high. And mark with “√” on your response.

No.	<b>I. Challenges of Professionals’ Registration</b>	1	2	3	4	5
1	Forged academic documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Lack of entrance competency examination for new applicants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Lack of central data base system of graduates from different universities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Forged work experience letters with (Unauthorized signing of a signature)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Weak capacity of the registration authority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Weak involvement of associations in the registration system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Poor document interpretation system; document evaluation and interpretation processed by a single officer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Lack of electronic document holding and encoding system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Poor registration communication between federal and regional; double registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No.	<b>II. Challenges of construction companies’ registration</b>	1	2	3	4	5
1	Forged documents of professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Forged documents of machineries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Weak involvement of associations in the registration system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Unrealistic requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5	Weak enforcement of registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Challenge of document encoding system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Weak document interpretation system; document evaluation and interpretation processed by a single officer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Poor document holding system, most of the document holds at archive shelf	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Challenge of annual financial turnover; not encourage a new entry lower level company.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Poor practice of continues monitoring and controlling system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Lack of communication between federal and regional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>No.</b>	<b>III. Challenges of projects registration practice</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Poor awareness about project registration practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Project information collection methods is manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Weak capacity of the registration authority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Irrelevant parameters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	No clear shared responsibility among client, consultant and contractor regarding project registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Weak promotion about project registration of necessity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Poor commitment to implement the project registration directives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Less communication between the federal and regional project registration practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Weak initiation of practicing project registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section III: Prospects of registration practice**

**3.1** Please kindly indicate the extent to which the following points are the expected **prospects of registration practices of professional, company and project registration practice** in the construction industry on a 5-point scale, where 1= Very Low to 5= Very high. And mark with “√” on your response.

No.	<b>I. Prospects of professional registration practice</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Good opportunity to encourage professionals to pursue their higher education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Good opportunities to participate professionally in the construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Professional can participate in both the design area or/and construction area by using one professional certificate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Opportunities for eligible professionals to engage in the correct position in the construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Competency assessment requirement for professional qualification for bachelor and above professionals competency assessment is mandatory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Contractors company must participate professional at least 20% of the share in the company during registration time; If the owner is not professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No.	<b>II. Prospects of Company registration practice</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	The prospect of this directive, if the contractor is a woman with a disability, and annual turnover is reduced by 15%.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	It is good to encourage and reduce irrelevant parameters for consulting firms' participation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Good practices without meeting any requirement in advance to become a contractor who has sufficient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	experience.					
4	The manager of the company must have a practicing professional certificate Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>No.</b>	<b>III. Prospects of projects registration practice</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Good opportunity to monitor and control participating professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Good opportunities for eligible contractors to participate in the construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Good opportunity for eligible consultants to participate in the construction industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Reporting twice in one fiscal year to control time, cost, and quality of work, especially in public projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	To control public projects from the early design period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Good practice to control and collects income tax from individuals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Monitoring and controlling construction project activities like time extension, design change, and variation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Section IV: Registration Practice Improvement Mechanisms

**4.1** Please kindly indicate the extent to which the following mechanism are important to improve current registration practice in construction industry on a 5-point scale, where 1= Very Low, 2= Low, 3= Average, 4= High and 5= Very high. And mark with “√” on your response.

<b>No.</b>	<b>Mechanisms to improve registration practice</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	ICT based or data base registration system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Awareness creation through training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Integrating company and project registration with professionals' registrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No.	Mechanisms to improve registration practice	1	2	3	4	5
4	Active involvement of associations in the registration; both professionals and business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Setting examination as a requirement for professional registration to ensure continual professional development (CPD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Setting realistic requirements; (benchmark other country registration requirements)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Periodic updates of registration requirements depending on maturity of the industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Associating project registration with construction audits practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Developing central repository of graduates to reduce the problems associated with forged academic document	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Capacity improvement of construction regulatory Authority; (adequacy of the organization structure and the enabling system).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Controlling of double registration at federal and regional level.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**“The end” thank you for your kind assistance**

## **Appendix D: Interviews Questions**

### **Semi-structured Interview Questions**

1. What the key issues or weak side are of pre-registered professional and contractor registration practice?
2. What are the major procedures followed for professional and contractor registration?
3. Do you have any suggestion for improvement on the project registration process?
4. What are the prospects of new registration directives for professionals and contractors?
5. What are the roles of civil and Architectural engineering associations for the review current directives?
6. What are the measures to improve professional and contractor's registration practices?
7. What are the best improvements of data/document handling mechanism?
8. Why the construction regulatory authority is not introducing ICT base communication system for registration practice?
9. What mechanisms do you use to improve the capacity of the construction authority staff members? (Like short term trainings, short courses, regular education)
10. What are the measures to improve double registrations professional registration practices at the federal and regional level?