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COLLEGE OF DEVELOPMENT STUDIES

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ROLE OF INDUSTRIAL PARKS ON ECONOMIC COMPETITIVENESS, SOCIAL INCLUSIVENESS, AND ENVIRONMENTAL PROTECTION IN ETHIOPIA

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DECLARATION

I, Mengistu Walelegn Worku, hereby declare that this dissertation entitled, " ***Role Of Industrial Parks on Economic Competitiveness, Social Inclusiveness, and Environmental Protection in Ethiopia***" submitted College of Development Studies, Center for Regional and Local Development Studies, Addis Ababa University for the partial fulfillment of the requirement for the award of PhD degree in Urban, Regional and Local Development is my own original work carried out under the supervision and guidance of Dr. Teshome Tafesse and Dr. Firew Mengistu. This dissertation has never been submitted partially or fully for the award of any other Diploma or Degree (BA, MA, or PhD) to any University or institution. I also declare that all sources of information used in this dissertation have been duly acknowledged.

By: Mengistu Walelegn Worku

Signature______________________________

Date__________________________________

ENDORSMENT

This is to confirm that Mengistu Walelegn Worku dissertation entitled " ***Role Of Industrial Parks on Economic Competitiveness, Social Inclusiveness, and Environmental Protection in Ethiopia*** " submitted to College of Development Studies, Center for Regional and Local Development Studies, Addis Ababa University, Addis Ababa University has been managed to complete in partial fulfillment of the requirement for the award of Doctor of Philosophy in urban and regional development studies, under our guidance. We also confirm that the dissertation was not submitted either in part or in full to this University or any other University for the award of any degree.

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Co-Supervisor Signature

APPROVAL

This is to approve that Mengistu Walelegn Worku's dissertation entitled *"**Role of Industrial Parks on Economic Competitiveness, Social Inclusiveness, and Environmental Protection in Ethiopia**"* has been successfully completed in partial fulfillment of the requirements for a Doctor of Philosophy in Urban and Regional Development Studies. It is important to note that this has not been previously submitted for any degree at this University or any other academic institution.

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ABSTRACT

This dissertation investigated the Role of Industrial Parks in Advancing Economic Competitiveness, creating shared prosperity, and Safeguarding the Environment in Ethiopia based on United Nations Industrial Development Organization (UNIDO, 2019c) evaluation indicators. Utilizing cross-sectional study design, the required quantitative data were collected from 395 randomly selected management and technical staff of enterprises operating within public and private industrial parks (IPs) through self-administered questionnaire. The required qualitative data were collected from 14 key informants using in depth interview. Quantitative data was analyzed using descriptive statistics, Binary Logistic Regression models, and IPPI while qualitative data using thematic analysis. The quantitative analysis indicates that various indicators that flourished due to IPs development such as open competitive tender systems, infrastructure development, maintenance services, job creation, and exports of processed goods have significantly enhanced advancing economic competitiveness. Similarly, the study underscores the significant contributions of safety measures, faith facilities, incident response center, emergency preparedness, annual social performance reports, accessible fire services, complaint handling, salary of employees, the proportion of female in the workforce, and low employees' turnover in creating shared prosperity objective. On the other hand, the selection of environmentally suitable sites, wastewater treatment, segregated recycling reception bins, and operator's possession of ISO14001 certification in IPs also enhance environmental safeguarding significantly. However, the study identifies factors that hindered the achievement of Advancing Economic Competitiveness, Shared prosperity, and safeguarding the Environment objectives in Ethiopia for rational planning of IPs and urgent policy interventions. These include challenges related to water supply reliability, limited repair, rectification, and restoration services for utilities, access to financial support, human resources recruitment and training services, and lower foreign direct investment (FDI) to total investment ratio in IPs compared to national average level hinder economic competitiveness significantly. Moreover, the social performance objective was hampered significantly by high average higher average commute time for employees to IPs, inefficient social role management system in place, limited number of firms with ISO45001 certification, and gender-based wage differentials in IPs. Besides, it is important to highlight that factors related to occupational health and safety were the main constraints that hamper IP’s role in social inclusivity. Last but not least, challenges related to solid wastes, toxic, and hazardous wastes management system, low level solar street lighting, and not performing annual environment audit on each firm operating in IPs had statistically significant negative effect on environmental stewardship. Accordingly, despite the aforementioned challenges, this dissertation concludes the significant role of Industrial Parks (IPs) in Ethiopia in advancing economic competitiveness, shared prosperity, and safeguarding the environment. Therefore, this dissertation recommends improvement of reliability of water supply, repair services, access to financial support; and design mechanisms to attract more foreign direct investment (FDI) in IPs to boost Ethiopia’s economic competitiveness. Moreover, the government and stakeholders need also to prioritize enhancing occupational health and safety, addressing gender wage differentials, and improving health facilities in IPs to promote creating shared prosperity. Continuous monitoring and evaluation of enterprises adhering to national environmental laws and regulations as well as installing solar street lighting and improving capacity for solid waste, toxic, and hazardous waste management in IPs will also enhance environmental stewardship.

Key words: Role of industrial parks, advancing economic competitiveness, creating shared prosperity, safeguarding the environment, Ethiopia.

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ACRONYMS

ADB	Africa Development Bank
AGOA	Africa Growth and Opportunity Act
BEZ	Bahir Dar Industrial Zone
BLR	Binary Logistic Regression
CE	Comprehensive Efficiency
CETP	Central Effluent Treatment Plant
CRGE	Climate Resilience Green Economy
CRM	Customer Relationship Management
DEA	Data Envelop Analysis
DID	Difference-in-Difference
ECOSOC	Economic and Social Council
EEI	Economically enabling site &infrastructure 'hardware.'
EIN	Economically Impactful Nature
EIB	Ethiopian Investment Board
EIC	Ethiopian Investment Commission
EIPs	Eco-Industrial Parks
EIZ	Eastern Industrial Zone
EPIs	Economic Performance Indicators
EPZ	Export Processing Zones
EWM	Efficient & Clean production, Emissions & Waste Management
EVPIs	Environmental Performance Indicators
EVA	Environmentally Appropriate Site
EES	Economically Enabling Services' Software.
FIAS	Financial Advisory and Intermediary Services
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEG	Good Economic Governance
GFCF	Gross Fixed Capital Formation
GHS	Good Health and Safety

GI	Green Infrastructure
GIZ	German Corporation for International Cooperation
GS	Green Systems
GTP	Growth and Transformation Plan
IAPIPs	Integrated Agriculture Processing Industrial Parks
HIP	Hawassa Industrial Park
H&S	Health and Safety
HR	Human Resource
HSE	Health and Safety Executive
ICT IP	Information and Communication Technology Industrial Park
IPDC	Industrial Parks Development Corporation
IPs	Industrial Parks
IPD	Industrial Parks Development
IPDC	Industrial Parks Development Cooperation
IPPI	Industrial Parks Performance Index
IS	Industrial Symbiosis
ISCC	International Sustainability and Carbon Certification
ISID	Inclusive and Sustainable Industrial Development
ISO	International Standard Organization
KII	Key Interview Informants
KPIs	Key Performance Indicators
MoFED	Ministry of Finance and Economic Development
MOI	Ministry of Industry
MSMEs	Micro, Small, and Medium Enterprises
NEG	New Economic Geography
NSE	New Structural Economics
OHS	Occupational Health & Safety
QSM	Qualitysocialmanagement System and Social Services
ROC	Receiver-Operating Characteristic
RRR	Repair, Rectification & Restoration
RWS	Resource and Waste Strategy

SAI	Socially Appropriatesite & Social Infrastructure
SDG	Sustainable Development Goals
SE	Standard Errors
SOE	State-Owned Enterprises.
SEZs	Special Economic Zones
SI	Social Inclusiveness
SIMS	Social Impact Management and Monitoring System
SPIs	Social Performance Indicators
UNGC	United Nations Global Compact
UNCTAD	United Nations Conference For Trade and Development
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
VIF	Variance Inflation Factor

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CHAPTER ONE: INTRODUCTION

This chapter establishes the foundation for the study. It commences with the background of the study, offering context and setting the stage for the research problem. The statement of the problem is then articulated, pinpointing the issues the study aims to address and underscoring the gaps in existing knowledge.

Subsequently, the objectives and research questions are outlined. These guide the investigation and shape the data collection and analysis process of the study. The scope of the study is then defined, outlining the geographical area, time frame, and subjects of the study.

Finally, the significance of the study is discussed, emphasizing its potential contributions to academia, industry stakeholders, and society at large. This chapter serves as a comprehensive overview of the various elements that shape and define the research. Finally, it describes the organization of the manuscript, providing a roadmap of the structure and content of the subsequent chapters. This chapter helps readers navigate through the study, enhancing their understanding and appreciation of the research.

In essence, this introductory chapter provides a holistic view of the study, setting the stage for the detailed exploration and discussion in the following chapters. It is the gateway to the research journey, inviting readers to investigate deeper into the study of the chosen topic.

1.1. Background of the study

The United Nations' Sustainable Development Goal (SDG) underscores the importance of building strong infrastructure, endorsing Inclusive and Sustainable Industrial Development (ISID), and encouraging innovation (Cheng & Cantore, 2020). ISID aims to fuel economic growth and diversification in a manner that is socially fair and environmentally attentive, while advocating for substantial infrastructure development and sustainable industrial growth (Moyo, 2020). The ISID framework advocates for the reduction of environmental harm and social inequality in the promotion of industrialization (Iqbal et al, 2024).

In a similar vein, the growth of the industrial sector is instrumental in creating job opportunities as it takes in excess labor from the agricultural and other traditional industries, largely propelled by the urbanization trend seen in developing countries (UNIDO, 2019). The ISID framework again emphasizes the reduction of environmental harm and social inequality in the promotion of industrialization and economic growth (Lim et al, 2022).

Anwar and Elfaki (2021) argue that industrialization promotes innovation, boosts industrial output, and optimizes the use of resources. The continuous increase in output and employment due to industrial expansion has led to unprecedented economic prosperity. The manufacturing sector acts as a growth and development catalyst due to its numerous benefits (Arjun et al., 2020). Scholarly research has established a direct correlation between increased industrial production and a country’s Gross Domestic Product (GDP) growth (Opoku & Yan, 2019, Chang & Zach, 2019, Qaiser, 2020).

Industrialization is a key player in the formulation of regional growth strategies and acts as a catalyst for countries to achieve globalization (Yeung, 2014). The growth of the industrial sector is widely acknowledged as a vital element in the quest for sustainable development. However, it’s worth noting that industrial parks serve as important policy tools, acting as the main drivers of industrialization and wealth creation (UNIDO, 2018).
Industrial Parks (IPs) serve as an efficient strategy for achieving broad industrialization and urbanization (Kihiko, 2018). The development of IPs is a strategic approach to rapidly scale up industry, enhancing companies’ competitiveness by improving their productivity and efficiency. It also tackles significant economic challenges such as market inefficiency, technology and capital deficits, infrastructure shortfalls, and inappropriate policies (Weldesilassie et al, 2017). Globally, IPs have emerged as the primary method for implementing industrial development as part of local economic development initiatives (Novyidarskova, 2020).

Governments in Asia, Africa, and Latin America have been employing Special Economic Zones (SEZs) or IPs as a strategic method to promote industrialization and stimulate structural transformation. IPs, often established with the aim of attracting Foreign Direct Investment (FDI), creating job opportunities, supporting wider macroeconomic objectives, and serving as experimental platforms for the adoption of innovative policies and approaches (UNIDO, 2018), play a pivotal role in the early stages of a region's socioeconomic development. This is because they contribute to the transformation of socioeconomic conditions and the progression of individuals towards a more advanced industrial society (Song et al., 2021).

Special Economic Zones (SEZs), IPs, are designated areas where businesses gather to cater to the needs of various stakeholders in one location (Tesfachew, 2021). IPs represent the comprehensive integration of financial, environmental, and social aspects to ensure sustainable industrial development (Noufal & Ramachandran, 2016). The role of IPs on economic growth and externalities in an industrial area has been academically investigated through the Theory of Location of Industry (Kumera & Woldetensae, 2023). IPs are anticipated to boost productivity and competitiveness by facilitating clustering processes, particularly for small and medium-sized enterprises. Furthermore, IPs can fortify local industries by expanding the knowledge base within each industrial cluster (Kim et al, 2023).

However, modern SEZs or IPs have experienced a mix of positive outcomes and challenges over the past 50 years (Barrera et al., 2021). While these facilities contribute to improved economic efficiency, they also intensify resource scarcity in metropolitan areas and pose a significant risk to the local environment. This is primarily due to the high resource usage and pollutant emissions resulting from industrial processes (Narula & Zhan, 2019). Nevertheless, when properly implemented, inclusive and sustainable industrial parks can be an effective policy for promoting industrialization and the structural changes it involves (UNIDO, 2019).

Governments in numerous countries have turned to the use of Special Economic Zones (SEZs) or Industrial Parks as a strategic method to facilitate industrialization and foster structural transformation. However, modern SEZs or industrial parks have had a mixed record of successes and failures over the last five decades (Zeng, 2016). Germany, Poland, and Hungary are among the EU nations where IP has proven to be effective (Domenech et al , 2019). In Asia, several countries have structurally transformed their economy. For example, Korea, once among the world's poorest countries, has outperformed other recently developed nations in terms of its rapid economic expansion through industrial parks (Long & Nguyen, 2024). Indeed, IPs have played a significant role in the economic progress of countries like Korea. Serving as incubators for the manufacturing sector, they have been instrumental in driving growth and development (Boiko et al, 2019). The success of IPs in Korea is a testament to their potential when implemented effectively.

It's important to note that the success of IPs is not universal. In regions such as sub-Saharan Africa and Latin America, the development of IPs has not been successful (Kihiko, 2018). This highlights the fact that the effectiveness of IPs can be influenced by a variety of factors, including regional policies, infrastructure, access to resources, and more (Moghimi et al, 2023). Therefore, while IPs can be powerful tools for promoting industrialization and economic growth, their implementation and management need to be carefully considered to ensure their success.

The proliferation IPs development programs in emerging economies has led to a surge in competition for investors, driven by attractive incentives and low-cost labor (Mamade, 2022). IPs, while common policy instruments globally, often see their potential under-realized in developing nations, with benefits typically focused on short-term objectives such as attracting Foreign Direct Investment (FDI) and generating employment (Teka, 2019). It is imperative for regulators to differentiate between the immediate 'static' benefits of IPs, such as FDI attraction and job creation, and their long-term 'dynamic' benefits, which encompass industrial linkages, technology transfer, knowledge spillover, and social inclusiveness (Zhao & Farole, 2011).

In Ethiopia, mirroring global trends, IPs have been embraced as a pivotal policy tool to promote sustainable industrialization and address challenges hindering the nation's industrial development objectives (Negesa et al., 2022). The principle of equitable distribution across the country's diverse regions has primarily guided the establishment of IPs in Ethiopia. This strategy ensures that the benefits of industrial development permeate the entire nation, contributing to balanced regional development (Weldesilassie et al, 2017). Compared to its African peers, Ethiopia has shown significant success in leveraging IPs to stimulate regional economic growth and facilitate the integration of sub-regions into the national and global economy (Oqubay & Kefale, 2020).This has positioned Ethiopia as a benchmark for other developing nations aiming to utilize IPs for economic development (Kebede & Heshmati, 2023). Over the past decade, Ethiopia has been actively engaged in industrial development programs. The primary objective of these programs is to enhance the economic role of the manufacturing sector in the country's economy (Staritz et al, 2019). This includes increasing exports and foreign investment, addressing foreign exchange shortages, reducing the government's reliance on borrowing for investment, and transitioning the leadership of growth from the public to the private sector (Oqubay, 2022). Currently, Ethiopia has twenty-four Industrial Parks (IPs), seven of which are privately owned, thirteen are federally owned, and four are Integrated Agriculture Processing Industrial Parks (IAPIPs) established by regional state governments (Guteta & Worku, 2023).

The establishment of IPs in various countries has intensified, leading to increased competition for investors and a higher demand for efficient services (Wu & Gao, 2022). With the rise in urbanization and the development of residential and mixed-use areas within or near IPs, it is crucial to better integrate these parks into the broader urban framework to foster economic competitiveness, social inclusivity, and environmental stewardship (Ntasiou & Andreou, 2017). Since the establishment of the first IP in 2007/8, despite concerted efforts, the industry's contribution to the GDP has consistently remained lower than that of the agriculture and service sectors (Trend Economy, 2023). The institutional initiatives aimed at promoting IP development in Ethiopia warrant a comprehensive assessment. This dissertation focused on their contribution to advancing and creating the nation's economic, social, and environmental elements, in alignment with the objective of Inclusive and Sustainable Industrial Development (ISID). The

UNIDO's IPs Performance Evaluation framework serves as an appropriate tool for this analysis. Moreover, it is important to note that there is a scarcity of research on this specific topic, particularly in the Ethiopian context.

Industrial Park development and management are essential nowadays for a variety of reasons. First, more industrial parks are now present in many countries, increasing the rivalry for investors and the need to provide speedy services. Second, there is a need to better integrate industrial parks into the larger urban context as urbanization rises and residential and mixed-use areas are constructed inside or close to industrial parks. Thirdly, business models for the green economy need to manage corporate externalities better. Fourth, the digital revolution has created opportunities and difficulties for organizations, particularly in respect to high tech industry development; to completely transform the automation, monitoring, and analysis of supply chains and technologies (UNIDO, 2019). Hence, examining the economic, social, and environmental role of industrial development in its broader sense in line with inclusive industrial development principles is important.

1.2. Statement of the problem

In the past decade, Ethiopia has embarked on a series of industrial development initiatives with the primary objective of enhancing the economic contribution of the manufacturing sector to the national economy (GTP II 2015). This is achieved by stimulating export growth and foreign direct investment, mitigating foreign exchange shortages, reducing reliance on government borrowing for investment, and facilitating the transition of growth leadership from the public to the private sector (Oqubay, 2018).

Over the last two decades, the Ethiopian government has invested significantly in the construction of industrial parks as a strategy to foster industrial development (Kebede & Heshmati, 2023). As reported by the IPDC (2022), a total of twenty-four industrial parks have been established across various regions through the collaborative efforts of the federal government, local governments, and private investors. However, despite these initiatives, the contribution of the national value-added manufacturing sector to the Gross

Domestic Product (GDP) remains at 4% (World Bank, 2022). Furthermore, the proportion of exports from IPs relative to the total export value has remained low, around six percent in the fiscal year 2022 (Trend Economy, 2023). The export value from IPs in 2022 was significantly lower than planned, falling short of the initial projection that the Hawassa industrial park would generate annual revenue of one billion USD (IPDC, 2022).

The manufacturing sector’s contribution to economic development has been minimal, with limited impact on job creation, exports, and production (Gebremariam et al, 2021). It has also failed to effectively promote linkages within the local economy (Alemayehu et al, 2023). The textile and garment sectors, which have a significant presence in the export activities of industrial parks, was primarily relied on the African Growth and Opportunity Act (AGOA) markets. AGOA provides eligible sub-Saharan African countries, including Ethiopia, with duty-free access to the U.S. market for specified products (Coulibaly & Kassa, 2022). However, these industries heavily rely on imported inputs, with local procurement accounting for less than 5 percent of the total intermediate inputs. Consequently, their macroeconomic impact remains limited, as stated by the World Bank (2022).

Over the previous decade, Ethiopia has initiated a series of industrial development strategies with the primary aim of increasing the economic contribution of the manufacturing sector to the country’s overall economy (Wolde, 2022). This is accomplished by stimulating export growth and foreign direct investment, alleviating foreign exchange shortages, reducing dependence on government borrowing for investment, and facilitating the shift of growth leadership from the public to the private sector (Mishra, 2018).

Authors such as, Gebeyehu (2017) assessed the problems and contributions associated with industrial parks inside the Eastern industrial zone and the findings of the study indicate that industrial parks have made notable contributions to the overall economy at both the national and local levels. These contributions encompass multiple dimensions, such as the creation of employment opportunities, infusion of capital investment, and facilitation of knowledge transfer. Furthermore, the research findings indicate that firms face numerous issues, such as logistical service delays, limited availability of foreign exchange, and difficulties related to government rules and procedures. Firms often face a range of internal hurdles, such as worker inefficiencies, communication barriers, inadequate training, and organizational structure deficiencies (Gebeyehu, 2017).

The Performance of IPs in Ethiopia: The case of Bole Lemi 1, Eastern Industry Zone, and Hawassa Industrial Parks was assessed by Gebremariam and Feyisa (2019). The analysis demonstrates that during their initial phase, the parks experienced complete occupancy and generated a significant number of employment opportunities and the surrounding towns' derived benefits from the parks through the establishment of enterprises in proximity and the provision of housing rentals for park employees. However, the parks were facing significant challenges due to a shortage of well-trained and skilled workers, a lack of local raw materials for production, a scarcity of rental housing for workers near the parks, ineffective banking systems, high costs associated with shipping services, and a lack of capable and experienced institutional, regulatory, and administrative capacity to effectively govern and manage the parks. Weldesilassie et al (2017) examined the development of IPs and their significance in Ethiopia. The researchers found that IPs serve as crucial policy tools in facilitating economic transformation through various means, such as attracting investments, fostering technological learning, facilitating upgrading and innovation, and creating sustainable and adequate employment opportunities. Nevertheless, the primary obstacle lies in the fact that the development of industrial parks necessitates the establishment of attainable objectives and the formulation of viable strategies to effectively accomplish such objectives.

Tesfaw (2023) conducted a study titled "The Effects of Industrial Park Development on Manufacturing Firms' Performance in Ethiopia," which probed the influence of industrial parks on export earnings, employment generation, and Foreign Direct Investment (FDI) attraction in Ethiopia. The findings of the study indicate that industrial parks in Ethiopia have a statistically significant impact on export revenues, employment generation, and the attraction of FDI. The primary factors that impede the effectiveness of industrial parks and manufacturing firms include low worker productivity, limitations in the supply of domestic raw materials, inadequate forward and backward linkages, constraints related to transportation costs and logistics, and limitations in the capacity of government institutions. Based on these findings, three policy implications were drawn. These include the formulation and implementation of policies and strategies for the growth and utilization of the manufacturing workforce, the implementation of appropriate rules to improve connectivity across different value chain stages, and the enhancement of institutional capacity building through active engagement in practical learning experiences and fostering collaboration across public and private sectors.

"The Power of Imperfection: China-Ethiopia Industrial Parks as the Medium for Local Vitalization: The Case of Eastern Industry Zone, Dukem, Ethiopia" by Wu (2023) explored the China Eastern Industry Zone(EIZ) as a case study to explore integrated strategies to foster regional vitalization in Dukem, Ethiopia via an incremental approach. The findings reveal that the role of the Eastern Industry Zone on local urbanization and industrialization has permeated various aspects of socio-economic, spatial, and governance dimensions. The challenges and difficulties at the current stage are complex and intertwined.

An analysis of the empirical research suggests that these studies exhibit gaps in comprehensively assessing the overall role of industrial parks at a national level. These prevailing gaps are evident in terms of both the scope and dimensions of the investigations. The studies deviate from the internationally recognized approach for evaluating the role of industrial parks (IPs), particularly in relation to the unique characteristics of Ethiopia's national economic environment. This suggests a scarcity of comprehensive empirical studies conducted to examine the role of industrial parks developed by both the government and private sector around the nation in the last fifteen years. Therefore, the existence of this gap, along with other factors, has led to the undertaking of this study, which aims to analyze the role of IPs based on commonly accepted standards and the specificities of the Ethiopian context.

The literature review conducted for this study has further identified a significant gap in analyzing the overall value of industrial parks and the fundamental elements of sustainability associated with their establishment rationale and operations. Performance analysis has emerged as a crucial factor for informed decision-making in business and financial studies. Consequently, this study aims to examine the comprehensive role of established industrial parks in Ethiopia, with a focus on advancing economic competitiveness, creating shared prosperity, and safeguarding the environment. The study ensures that its analysis aligns with established international standards and contributes significantly to the existing body of knowledge on the subject of the study. The adoption of an integrated theoretical framework and the application of performance indicators developed by the United Nations Industrial Development Organization (UNIDO, 2019c) are essential to provide widely accepted outcomes. Therefore, this study seeks to bridge the existing knowledge gap by conducting a comprehensive analysis of multiple dimensions of the role of industrial parks in relation to sustainability and economic development.

1.3. Objectives of the study

1.3.1. Major Objective

The major objective of this dissertation was to analyze the role of Industrial Parks in Ethiopia in advancing economic competitiveness, creating shared prosperity, and safeguarding the environment in line with UNIDO guideline.

1.3.2. Specific objectives

The following specific objectives were investigated critically and comprehensively to realize the main objective of the study.

1. To analyze the commonness of UNIDO indicators in Ethiopian IPs on the basis of study subjects' perspectives.
2. To assess the role of industrial parks in Ethiopia in 'advancing economic competitiveness'.
3. To investigate the role of IPs in Ethiopia in 'creating shared prosperity.'

4. To examine the role of IPs in achieving the objective of ‘safeguarding the environment’.

5. To assess the overall business landscape and sustainability challenges associated to Industrial Parks in Ethiopia based on Industrial park performance index (IPPI)

1.4. Research questions

A) How far UNIDO’s performance indicators are prevalent in Ethiopian IPs?

B) What roles do industrial parks in Ethiopia play in “advancing the country’s economic competitiveness?”

C) What are the major social performance elements of Ethiopian industrial parks that contribute in “creating shared prosperity’?

D) How environmental protection endeavors of Ethiopian industrial parks do in achieving ‘safeguarding the environment’ objective?

E) What does the overall business landscape associate to Industrial Parks in Ethiopia looks like?

1.5. Scope of the study

The dissertation aimed to assess the contribution of Ethiopia’s industrial parks towards advancing economic competitiveness, creating shared prosperity, and environmental protection. This research scrutinized the role of these parks within the framework of inclusive sustainable industrial development principles in line with UNIDO’s framework.

Ethiopia is home to three distinct categories of industrial parks based on ownership: government-built, privately developed, and regionally established, totaling twenty-four. However, this study excluded the four regionally established and publicly owned agro-industrial parks for two primary reasons. Firstly, these parks were not yet fully operational on the study period. Secondly, they were primarily focused on the agricultural sector, where investment was prioritized for domestic investors under the auspices of regional states. Consequently, the remaining 20 industrial parks under federal jurisdiction were considered for this study. The spatial scope of the study encompassed the areas where these industrial parks were located, all under either the supervision or management of the federal agency known as the Industrial Parks Development Corporation (IPDC).

Regarding the thematic scope, I have utilized the UNIDO (2019c) model of industrial park performance examination indicators. These indicators are conventionally accepted for evaluating the contributions of industrial parks in economic, social, and environmental areas. These indicators were meticulously chosen to align with the existing settings in Ethiopia.

Moreover, this dissertation is a cross-sectional study that exclusively relied on primary data collected from management staff, namely general manager, finance and HR, Procurement and logistic, operation manager, sales and marketing, and technical staff. The reason aligned with the management staff are more aware of the requirements and fulfillments a firm operating in Ethiopian industrial parks in one hand and the potential of understanding industrial level issues and practices than other regular employees. Thus, no information is collected from non-management staff and used in this study. In order to achieve the objectives, this dissertation used both quantitative and qualitative analyses methods.

1.6. Significance of the study

The establishment of diverse industrial parks has emerged as a pivotal strategy for stimulating national and regional economic growth (Guteta & Worku, 2023). Consequently, the role of industrial parks has garnered significant attention. The contributions of industrial parks in bolstering their performances have been deemed crucial for informed managerial and strategic decision-making processes (Chen et al, 2022).In essence, the multi-faceted effectiveness of industrial parks in enhancing economic, social, and environmental roles is indispensable (Fan & Fang, 2020). The efficiency of industrial parks in creating impacts serves as a gauge to monitor their creation and management (Izadikhah and Saen, 2015).

In alignment with these arguments, this dissertation holds immense significance in comprehending the Ethiopian industrial parks. Firstly, this study bridges the gap in the existing literature by elucidating the motives and mechanisms of establishing and administering industrial parks for superior performance in economic, social, and environmental aspects. The quantitative and qualitative methods, key indicators of industrial parks on the desired outcomes, will guide future researchers. Moreover, this study contributes to a new body of knowledge by formulating a context-driven index. Importantly, as the first of its kind, this dissertation will serve as a baseline study for future research.

This dissertation is expected to offer valuable insights to relevant stakeholders, policymakers, planners, and administrators. It highlights the key indicators that thrive with the expansion of private and public industrial parks and their role to achieving economic, social, and environmental performances. Furthermore, it aids in designing effective practical problem-solving mechanisms or strategies for short, medium, and long-term implementation in making established and prospective IPs to be designed and operate in a well-defined requirements and standards for overall contribution. The positive contribution of industrial parks in Ethiopia, as revealed by this study, underscores the significance of these findings for the society at large. Generally, the dissertation is significant in multiple aspects including empirical, policy making, developmental and practical contributions.

1.7. Organization of the study

The dissertation is organized into five distinct chapters. The first chapter, known as the introduction, provides the background of the study, states the problem, outlines the objectives of the study, poses the research questions, defines the scope, and explains the significance of the study. It also describes the organization of the manuscript. Chapter two offers a comprehensive literature review, theoretical analysis, and the development of a conceptual framework. This chapter forms the foundation of the study by exploring existing knowledge and theories related to the research topic.

The third chapter details the research methodology. It outlines the research philosophy, chosen research design, approach and strategy, study area and population, sampling issues, methods of data collection, data collection instruments, validity and reliability tests, data analysis techniques, and finally, the ethical considerations of the research. Chapter four presents a descriptive analysis of variables, regression model, and details of diagnostic tests. It involves the examination and interpretation of data, presenting the findings derived from the study.

The fifth chapter presents the discussion section of the dissertation, aligning with the study objectives. It interprets the findings in light of the research questions and objectives and discusses their implications. Lastly, the concluding chapter encapsulates the conclusion and recommendations of the study. It summarizes the key findings, discusses their implications, and suggests areas for future research.

CHAPTER TWO: LITERATURE REVIEW

This chapter examines into a comprehensive review of both empirical and theoretical literature pertinent to the study. The theoretical literature review explores key themes such as industrialization, sustainable industrialization, industrial parks and sustainable industrialization, and theories of industrial growth and location. These themes provide a theoretical foundation for understanding the broader context of industrial growth through Industrial Parks and the implications their role for sustainable development.

Simultaneously, the empirical literature review focuses on the specific case of industrial parks in Ethiopia. This section synthesizes research findings from various studies, offering valuable insights into the real-world application and role of industrial parks in the Ethiopian context. Finally, this chapter culminates in the development of a Conceptual Framework. This framework is designed to guide the study, identifying key variables and indicators that align with the study’s objectives. It serves as a roadmap, directing the research process towards a comprehensive understanding of the study topic. In essence, this chapter serves as a bridge, connecting theoretical concepts with empirical realities, and providing a structured approach to the investigation of industrial parks and sustainable industrialization. It sets the stage for the subsequent analysis and discussion in the following chapters.

2.1. Theoretical Literature

2.1.1. The Concept of industrial park

The term "industrial park" refers to a designated area or zone that is specifically developed and designed for industrial activities and operations. It often encompasses a cluster of industrial facilities, such as factories, warehouses, and an industrial park is a designated area of land that has been developed and split into individual plots in accordance with a comprehensive plan. These plots are intended for use by a group of manufacturers and are accompanied by the necessary infrastructure, such as roads and public utilities. In certain cases, shared facilities may also be provided inside the industrial park. The word "industrial parks" encompasses various concepts, including free-trade zones, export processing zones, special economic zones, high-tech zones, free ports, and enterprise zones (UNIDO, 2019).

Industrial parks encompass areas dedicated to industrial activities, such as industrial zones, industrial investment regions, special economic zones, and industrial corridors, among other designations. They exist to facilitate industrial and related commercial, infrastructure, and service operations. Industrial parks can have both advantageous and detrimental effects (World Bank, 2021). Industrial parks (IPs) are specialized regions with a specific infrastructure, a collection of essential services, streamlined regulatory processes, and a range of investment benefits for manufacturing businesses (Halasiuk, 2018). Most industrial parks can be broadly defined as demarcated geographic zones encompassed by a country's territorial frontiers in which business regulations differ from those that prevail in the national territory (Bell, 2018). This definition holds true even though industrial parks come in a wide variety of names and designs. Policy liberalization and improved administrative efficiency in the zone's business environment in comparison to the national territory are the primary areas in which these differential regulations apply to investments, international trade and customs, taxation, and the regulatory environment (Zeng, 2021).

Throughout the entirety of this dissertation, the term "Industrial Park" is applied in the most general sense, according to Ethiopian regulations, to a designated piece of land that offers shared infrastructure to a collective of industrial enterprises (Industrial Parks Proclamation No. 886/2015). These parks are developed with the objective of fostering the development of diverse, interconnected, and specialized industries, often encompassing specific regulatory frameworks and instruments (Yimer, 2020). This definition applies to a group of industrial firms in the area established to develop comprehensive, integrated, multiple, or selected function of industries involving special regulatory areas and instruments.

2.1.1. Industrialization

In order to propel nations toward globalization, industrialization is an essential part of regional development plans (Yeung, 2014). In terms of the economy, society, and environment, industrialization has brought about the most fundamental and groundbreaking changes to society since the British industrial revolution (Stearns, 2020). Industrialization is the driving force behind a shift in a country's macroeconomic structure (Haraguchi et al, 2019). It's admired for the ways in which it stimulates the economy, creates new job opportunities, and advances technology (Romano & Traù,2017). Looking at what the industrialized world has accomplished, we can see that industrialization has greatly increased overall productivity while also altering the socioeconomic profile and economic foundation on which most of the population now relies (Van, 2019). The political clout of nations and their relative global importance are further illustrated by their levels of industrialization and growth (Hassan & Olapeju, 2023).

The process of industrialization is essential for national development (Brodny & Tutak, 2023). Export-driven industrialization is crucial for economic growth and competitiveness, as seen in the four Asian tigers. Growth in the economy, productivity, employment, wealth creation, urbanization, and higher standards of living are all results of industrialization (Opoku et al., 2019). All examples of economic growth and grab after the industrial revolution succeeded in growing and amassing wealth by investing in their respective businesses (Naudé & Szirmai, 2012). It causes an increase in the output of manufactured goods, which in turn boosts employment and general living standards (Yuni et al, 2023). Kaldor (1967) argued that manufacturing serves as the economy's "growth engine" because it has the greatest potential for productivity growth. The industrial sector can then lead the economy and transform a sluggish recovery into a renaissance if the right policies are implemented (Zhang & Dilanchiev, 2022).

Kaldor (1967) posits that the relationship between GDP per capita levels and the proportion of the manufacturing sector can be attributed to the favorable economic development promoting attributes inherent in manufacturing industries. Manufacturing has a greater likelihood of experiencing productivity gains than other industries, its performance exceeds that of agriculture (Fei and Ranis, 1964). In contrast, if numerous service activities have limited potential for productivity improvement, the structural transition may be burdened by the transfer of resources from manufacturing to services (Leon-Ledesma & Moro, 2020). The Baumol (1982) law states that as the share of services in the GDP rises, the growth of the overall GDP per capita tends to slow; market services, distribution, technology, and transportation have the potential for increased productivity. However, many service industries, such as the personal, healthcare, and government sectors, have limited room for productivity growth (Sen, 2020).

The other justification hubs are the agricultural industry correspondence (Chowhan et al, 2023). The industry is believed to provide specific opportunities for wealth creation, in comparison to widely dispersed agriculture, the industrial sector can accumulate assets more easily, and the return on capital in terms of labor effectiveness or total factor efficiency is greater than in other industries (Mesagan et al, 2023). The industrial sector will continue to grow and contribute to overall economic expansion, the growth driver assumption suggests that the manufacturing industry has higher capital intensity than other economic sectors (Naudé & Szirmai, 2012). The literature also asserts that industry offers scale advantages that are less accessible in agriculture or services, as well as opportunities for embedded and dissociated scientific progress (Cornwall, 1980). It is noticed that technological advancement focuses on the manufacturing sector, but it is now affecting other economic sectors, including the service sector. The manufacturing sector produces the capital goods used by other sectors (Bonvillian & Singer, 2018).

Ethiopia designed long-term industrial and sector roadmaps in 2013 to help it reach its aim of becoming an industrialized nation with a middle income (Gebreyesus, 2017). By 2025, the strategy called for the creation of an industrial sector with the strongest manufacturing capacity in all of Africa that is broad, highly competitive, environmentally friendly, and capable of raising Ethiopians' standard of living (Okereke et al, 2019). By increasing the proportion of industry and manufacturing as a percentage of GDP by the end of the outline period, the industrial development strategy intends to radically transform the economy (MOI, 2020).

Consequently, growth in industrial sectors in the form of industrial parks is essential for boosting industrial trade, employment opportunities, knowledge transfers, investor allure, and regional development (Pakdeenurit et al., 2014). It is common to refer to an industrial park as the commencement of a region's socioeconomic development due to its role in transforming socioeconomic conditions and advancing individuals toward a higher level of industrialization (Song and Zhou, 2021). Industrial parks are now an indispensable instrument for the global development of modern industries and play a crucial role in societal and economic development. Due to the accelerated expansion and development of industrial parks, many industrial parks have been created around the world (Barrera et al., 2021). However, the expansion and development of industrial parks are not without disadvantages. Although these facilities increase economic efficiency, they exacerbate resource scarcity in urban ecosystems and threaten the local ecology (World Bank, 2021).

2.1.2. Sustainable industrialization

Sustainability from an economic, social, and environmental point of view, deals with issues pertaining to intergenerational relationships and is tied to standards such as efficiency or equity (Toman, 2017). These days, sustainable development is a topic that is discussed in the media daily due to the fact that the globe is dealing with issues such as climate change, the loss of biodiversity, war, and a lack of resources (Yiwen et al, 2018). Therefore, sustainable development is connected not only to the three-way link that exists between the environmental, economic, and social pillars of sustainable development but also to the organizational aspect of sustainable development (Wu & Zhi, 2016). There are significant interactions taking place between the environmental and economic dimensions in terms of operability, and there are significant interactions taking place between the economic and social dimensions in terms of equity (Hariram et al, 2023). Sustainability indicators are indicators that allow for the measurement of economic, environmental, and social elements of a process, a company, the development of a product, a city, an industrial park, and other systems (Valenzuela-Venegas et al, 2016).

Sustainable industrialization plays a crucial role in facilitating the process of achieving structural economic transformation for a nation (Lin & Wang, 2017). According to the United Nations Industrial Development Organization (UNIDO, 2019c), the 2030 Agenda for Sustainable Development recognizes the significance of inclusive and sustainable industrialization due to its ability to generate economies of scale in national output, enhance household income through the provision of more stable and higher-skilled manufacturing jobs, and stimulate consumption by establishing economies on a virtuous growth cycle. Sustainable industrialization that benefits all segments of society is considered as a driver of long-term economic transformation (Stoenoiu, 2022). The available empirical research suggests that a contextual policy framework with an efficient implementation approach is a critical determinant in the outcome (Kebede et al, 2023)

In December 2013, the member nations of the United Nations Industrial Development Organization (UNIDO) collectively endorsed the Lima Declaration (Declaration, 2013). This declaration served to grant the organization a formal authorization to advance the concept of Inclusive and Sustainable Industrial Development (ISID). The establishment of this mandate was driven by the consensus among member States that the eradication of poverty necessitates robust, inclusive, sustainable, and resilient economic and industrial growth, as well as the effective integration of the economic, social, and environmental dimensions of sustainable development (Ayodele, 2020). The promotion of Inclusive and Sustainable Industrial Development (ISID) is a key objective of the United Nations Industrial Development Organization (UNIDO), which aims to enhance the industrial capabilities of its member nations via collaborative efforts with various stakeholders (UNIDO, 2019c).

What ISID Entails?

> *"Everyone reaps the benefits of economic development; no one is left behind; a framework that is environmentally sustainable supports broader economic and social development; the globalization of markets for industrial goods and services helps every nation industrialize to a higher level of economic development (Lim, 2022). ISID is relevant to all*

UNIDO Member States and enables them to pursue their own development priorities and strategies; it is a crucial component of any robust economy, and the primary means of income production for both individuals and governments; and it can help raise living standards quickly and steadily across all industries and among all people" (UNIDO, 2019).

The significance of developing a reference framework for industrial parks in determining their performance has been emphasized by the United Nations Industrial Development Organization; this framework functions as a collection of goals that can be employed to assess the efficacy of these parks (UNIDO, 2019c). Performance indicators might be defined for an entire industrial park, a particular facility, or several operations that encompass the entire park or are specialized to a facility (Lütje & Wohlgemuth, 2020). The United Nations Industrial Development Organization (UNIDO) has put up a comprehensive set of measures, including economic, social, and environmental performance, to substantiate the rationale behind the formation and productivity of industrial parks. Economic performance indicators encompass various factors, including effective economic governance, the presence of infrastructure and sites that facilitate economic activities, the availability of services that support economic development, and the importance of industrial parks in driving economic growth and enhancing competitiveness within a specific nation and society (Hou, 2019). The objective is to promote and stimulate economic progress and competitiveness. Social performance indicators encompass a range of factors that contribute to the evaluation of industrial parks (UNIDO, 2019c). These factors include the presence of socially appropriate locations and infrastructure, robust social management systems, the provision of high-quality social services, adherence to occupational health and safety standards, the establishment of successful labor relations and welfare practices, and the promotion of social inclusion. The environmental performance indicators linked with ISID (UNIDO, 2019) encompass several aspects such as the presence of industrial parks situated in ecologically sustainable areas, the implementation of green infrastructure and systems, as well as the adoption of effective measures for clean production, emission control, and waste management.

2.1.3. Sustainable industrial parks developments

Industrial parks have been utilized for business-related objectives in several locations throughout history. Notably, Gibraltar saw the establishment of an industrial park as early as 1704, followed by Singapore in 1819 and Hong Kong in 1848 (Zhang and Ilhéu, 2014). The early parks were characterized by the presence of free ports, which allowed for the transportation of commodities without being subjected to municipal laws, taxes, levies, or excises (Mendoza, 2017). According to Farole (2011), the Brooklyn Navy Yard emerged as the inaugural contemporary manufacturing zone in the United States in 1937, owing to its advanced architectural design and operational capabilities. Further, Gebreeyesus (2013), highlighted that industrial parks are developed on the basis of several principles, including the need to minimize the expense of building new infrastructure by concentrating it in one area, and the belief that attracting new investors to a country would mitigate the negative role of manufacturing on local communities and the environment.

By attracting investment, stimulating the acquisition, improvement, and growth of technology, and creating stable and respectable employment, Industrial Parks have served as and continue to function as vital policy tools for advancing the industrialization process (Arnold, 2017). In order to be successful, industrial park development (IPD) must not only establish attainable objectives, but also identify and implement viable strategies for achieving those objectives (UNIDO, 2016). Promoting sustainable industrialization can significantly boost the industrial sector's contribution to meeting the nation's sustainable development goals. The goals of social and environmental sustainability can be aided by it in a roundabout way (Wang and Huang, 2021).

Sustainable industrial park development has emerged as a promising policy instrument for promoting environmentally responsible manufacturing, especially in developing nations (Sosnovskikh, 2017). However, research and global trends show that the process has challenges that hinder it from expanding in a way that is optimal for the target country

(Pilouk and Koottatep, 2017). Successful industrial park development requires an in-depth analysis of the policy frameworks and motivations underlying the initiative (World Bank, 2021).

According to Aggarwal (2010), countries in East Asia and Latin America have demonstrated the potential effectiveness of investment promotion policies (IPs), these policies offer investors the chance to operate within an enhanced investment environment compared to the national investment climate. Additionally, IPs provide governments with the opportunity to experiment with policy and regulatory reforms that can facilitate industrialization (Ayodele, 2020). Industrial parks require a developer, manager, operator, and regulator (Van Beers et al, 2020) to get up and running. All parks in a territory, including privately built and run ones, are within the purview of the state, which is responsible for their creation, design, implementation, advocacy, governance, and execution. This is due to the fact that all significant actors will be employed by the government (Lin et al, 2021). The term "self-regulation" pertains to scenarios in which governmental entities are responsible for both the facilitation of development and the enforcement of regulations (Lin & Blumberg, 2017). The potential presence of conflicts between private sector developers and regulatory authorities could serve as a significant deterrent for the former, according to Alder (2016), the separation of regulatory obligations from those of the owner, developer, and operator of the zone allows the regulator to maintain a non-participatory role in the zone's development process.

2.1.4. Theories of industrial growth and location

Understanding the relevant theoretical frameworks is crucial for researching the development of sustainable industrial parks, which is necessary for fully explaining why nations construct industrial parks (Sosnovskikh, 2017). In this section, I describe the most extensively used theoretical frameworks to understand the role of industrial parks.

People often feel skeptical and uncertain about the role of IPs or economic zones on allocative efficiency (Ngwu et al, 2023). From the neoclassical point of view, economic zones are seen as a less optimal alternative to national trade liberalization (Wenwen, 2023). Special Economic Zones (SEZs) are seen as a temporary policy tool used by the government during the implementation of comprehensive market reforms (Hazakis, 2014). On the other hand, the heterodox perspective highlights the dynamic effects and sees SEZs as playing a key role in stimulating overall economic development (Guteta & Worku, 2023). The heterodox viewpoint attributes dynamic spillover effects to SEZs, leading to benefits that go beyond their confined boundaries (Tesfaw, 2023). These effects are shown through their role on backward linkages, human resources, technology, and institutional changes (Bulfone, 2023).

Porter underscored the significance of clusters, which are aggregations of firms in a specific field that generate a critical mass and stimulate the growth of supporting institutions for economic competitiveness (Porter, 2011). The successful development of IPs necessitates not only the formulation of achievable goals but also the identification and execution of effective strategies to realize these goals (UNIDO, 2019). Furthermore, the development of IPs demands an exhaustive analysis of the policy frameworks and motivations that drive the initiative (Sosnovskikh, 2017). According to competitive advantage industries and clusters is the basis for economic regions, as proposed by Porter's theory. He claims a country's competitiveness is determined by how innovative and dynamic its people are. According to Porter's research, companies all over the world leverage their access to varying levels of national and industrial resources to give them an edge over their immediate rivals. For international competitiveness, Porter's competitive theory provided explanations for why countries prioritize specific industries for growth and why businesses are critical to the formation of industrial clusters. In addition, this school of thought holds that a company's competitive advantages, not only IPs, should be exploited to entice investors (Porter, 2011).

Weber's theory of industrial location, developed in 1929, provided an explanation for the emergence of industrial zones based on the goal of minimizing transportation expenses; the theory proposes geographical based industrial distribution model with the goal of optimizing profits while minimizing expenses (Chao, 2018). This plan aimed to lessen the proportion of transportation expenses to overall production costs in order to raise returns to investors. Weber’s theory known for the "locational triangle," which refers to the strategic positioning of a factory between two nearby sources of raw materials and a target market. He examined various industrial placement selections, whether directed toward a raw material source or a market. Furthermore, he pioneered agglomeration concepts and the influence of specialized labor forces (Church, 2023). Weber identified three factors that exhibit regional variation: raw material, transport, and labor costs. Weber's regional components encompass expenses related to transportation and labor, which are determined by geographical factors. The third component is the non-regional or intra-regional factor, which is determined by the interaction of enterprises' locational decisions and is referred to as the agglomeration/deglomeration factor. Weber's model elucidates the positioning of manufacturing enterprises due to the interplay between three elements, namely transportation costs, labor costs, and agglomeration forces. (Kakooza et al., 2023). By viewing the process of creating IPs as an accumulation of production, this theory elucidated the justifications for IP creation and growth based on territorially centralized industrial production.

Agglomeration theory, which is another pertinent theory for understanding the significance of industrial parks, was introduced by economist Alfred Marshall in his influential book "Principles of Economics" in 1890. Marshall's agglomeration theory highlights the advantages that companies gain by being in close proximity to one another in clusters or agglomerations (Crawley, 2008). Vicente (2022) emphasized the significance of economies of scale, knowledge spillovers, labor market efficiency, and other externalities that result from the spatial concentration of economic activities.

The concept of agglomeration theory is commonly employed to elucidate the function and importance of industrial parks in the course of economic advancement (Hao et al., 2022). Agglomeration theory suggests that businesses gain advantages by being located near each other in clusters or agglomerations (McCann & Van, 2019). Applying agglomeration theory to industrial parks is useful for understanding the benefits and goals of dense industrial areas. Agglomeration theory can elucidate the function of industrial parks in diverse ways (Taddeo, 2016). Economies of scale pertain to the cost benefits that a corporation can attain by expanding its production volume. Industrial parks facilitate economies of scale by consolidating several enterprises in a centralized place. Companies might gain advantages by co-locating their offices or facilities in a shared park, where they can access and utilize shared infrastructure, services, and amenities. Industrial parks offer a range of shared resources and services, such as utilities, transportation infrastructure, security services, and waste disposal facilities. Individual enterprises would find it financially impractical to create these resources on their own (Rodríguez et al, 2014).

Agglomeration provides a significant advantage by promoting the transfer of knowledge between businesses, commonly known as knowledge spillovers (Zheng et al., 2027). Industrial parks provide the efficient and unrestricted sharing of ideas, information, and best practices among neighboring firms, resulting in the development of new and improved technologies, the acquisition of knowledge, and the promotion of innovation. Industrial parks frequently draw in a highly skilled workforce consisting of individuals with industry-specific knowledge and experience (Dong et al., 2020). The clustering of companies within the park cultivates a reservoir of highly skilled persons, facilitating firms' ability to attract and retain talented personnel. In addition, the existence of proficient laborers can amplify creativity, productivity, and competitiveness inside the industrial park (Zheng et al., 2020).

Industrial parks commonly provide cutting-edge infrastructure, convenient amenities, and comprehensive support services, all of which boost the appeal of the location for enterprises (Liu et al., 2022). This includes the existence of transportation networks, utilities, commercial services, training facilities, and recreational attractions. The existence of such infrastructure within the industrial park enhances the overall efficiency and competitiveness of the enterprises operating there (Hardjoko et al., 2021).

Agglomeration theory offers a theoretical structure for comprehending how industrial parks exploit their close proximity to offer economic benefits to businesses by utilizing economies of scale, the spread of knowledge, a specialized workforce, shared infrastructure, and opportunities for collaboration. Industrial parks are crucial for facilitating the concentration and proximity of firms, hence fostering the generation of novel concepts, competitiveness, and economic expansion in a particular region.

When viewed from the standpoint of the core characteristics of sustainable industrial development, it has been found that each of the theoretical frameworks has its own set of benefits and drawbacks. That is to say, the origins and operations of sustainable industrial parks vary from country to country. This study used three theoretical frameworks to help fill in knowledge gaps and reduce uncertainty while discussing and evaluating outcomes in pursuit of the objectives, Porter's cluster theory, Weber's theory of industrial location, and Agglomeration theory. Kieni (2021) also argued that the development of industrial parks and export processing zones has made an important contribution to fundamentally changing the appearance and structure of the economy, promoting the process of industrialization and modernization, building technical facilities, creating competitive advantages, and gradually taking the country towards a knowledge economy in many developing countries, over the past few decades.

2.2. Empirical Literature

On this section the researcher has presented various academic works in different contexts and topics related with industrial parks. In In this area, the researcher presents a number of scholarly works on a wide range of issues and settings relevant to industrial parks.

The competitiveness of industrial parks is heavily dependent on the quality and functionality of their infrastructure facilities and connectivity (Palei, 2015). Infrastructure quality, easy access to transportation, and appropriate office arrangements are critical factors that affect employees' quality of life (Zajontz & Bagwandeen, 2023). These elements are vital for attracting firms and contribute to the parks' effectiveness (Lee, 2019). Among the infrastructures, industrial parks primarily depend on a continuous and stable energy supply for efficient production without causing harm to their employees or the environment (Bailey, 2022). Consistent and reliable electric power load data at the individual building level in industrial parks is crucial as it provides valuable insights into the specific operational schedules of the building (Yoon, 2022)

Open bidding and transparent land allocation are key elements in enhancing the economic competitiveness of industrial parks (Zeng, 2015). In 2007, China initiated a market-oriented reform of industrial land to improve land distribution efficiency, as reported in a study by Zhang et al. (2024). The results highlight the effectiveness of market-oriented reform in China. State-owned firms have gradually integrated into the market-oriented distribution of industrial land, leading to a more transparent and efficient land allocation process.

Lo et al, (2023) conducted a study investigating the impact of land marketization, without privatization, on China's industrial structure. The study used data from China's urban land transactions from 2003 to 2015 and data covering 29 sectors in China's industrial and manufacturing sectors. This study enriches our understanding of land marketization reform in developing countries. It shows that even when land ownership remains unchanged, land use rights can still be allocated through market mechanisms such as auctions. This method can result in an improved industrial structure and enhanced economic efficiency. A separate study by Pakdeenurit et al. (2014) found that the presence of fundamental infrastructures, such as reliable electricity and power supply, proximity to transportation and logistics centers, access to export and trade processing facilities, and the availability of a skilled workforce, are critical factors in determining economic competitiveness through industrial parks.

Kien (2016) argues that IP generation is an essential process that greatly contributes to community development. However, this study highlights the concept of social problems triggered by the proliferation of IPs. The author argues that the rise of IPs has resulted in social challenges that could either benefit or decrease people's quality of life and thus require collective action. The long-term survival and expansion of the community depends on this decision. Kien (2016) asserts that the formation of IPs is a vital step in the improvement of local communities. This research, however, highlights the societal challenges brought on by the proliferation of IPs. The author contends that societal difficulties resulting from the growth of IPs are matters that could either improve or deteriorate people's quality of life, urging for collective action.

In his study titled "SEZs and Economic Transformation: Towards a Developmental Approach," Aggarwal (2019) introduced a three-pole analytical framework to examine the factors contributing to SEZs' success and development outcomes. The main contention was that nations that implement a meticulously planned approach towards SEZs, which can be harmonized with the overarching development strategy, executed efficiently, and consistently assessed and adjusted over time, are more prosperous in attaining economic transformation driven by SEZs compared to other countries. This necessitates the possession of strategic bureaucratic skills to make informed decisions and establish unambiguous strategic objectives; strategic bureaucratic adaptability to modify strategies dynamically and interactively as required; and strategic bureaucratic capabilities to effectively execute the chosen strategy. Moreover, the study investigates the experiences of countries worldwide that have achieved varying degrees of success in the context of the study framework.

On another study by Yu (2023), conducted a case study in China of the influence of mechanism of industrial park efficiency using DEA. The study used Jiangxi Province, a typical underdeveloped area in China, and measured the comprehensive efficiency (CE) of 36 industrial parks from 2010 to 2018 employing data envelopment analysis (DEA). The findings of the study provided a theoretical analysis of the impact of land supply and price, park type, management level, and economic location on industrial parks, and clarified the effect of these factors on industrial park efficiency. Moreover, findings revealed that the average CE of industrial parks in Jiangxi Province is low, as most of the parks are inefficient and technical efficiency is a shortcoming.

Karimzadeh et al. (2022) examined the economic effect of industrial parks activities on the surrounding rural settlements in Shahid Salimi industrial town of Tabriz, in Iran. To this end, the study used primary data collected from 306 rural households of 14 villages within 10km radius of the industrial town and employed descriptive statistics. The findings of the study indicate that the main economic effect of the establishment of Shahid Salimi industrial town on surrounding villages was an increase in the value added of agricultural products with an average of 0.366.

The path towards sustainability, particularly in prosperous countries, is marked by a combination of successes and failures, each accompanied by its own set of challenges (Zeng et al, 2021). The achievement of sustainability objectives through the development of industrial parks is not a one-size-fits-all process, but rather depends on the specific context of each country (Tavares et al, 2022). This necessitates a thorough examination to tailor suitable policy frameworks that align with the unique circumstances of each nation (Robinson, 2022). Integral to this process is the establishment of robust industrial infrastructure and investment, which are fundamental for sustainable industrial development (Brodny & Tutak, 2023). However, the success in attracting and retaining investors in African industrial parks is not uniform, but varies due to factors such as site dimensions, amenities, and the quality of infrastructure (Massil & Eric, 2024). These elements underscore the complexity of achieving sustainable industrial development and highlight the need for a nuanced approach that considers the diverse factors at play.

Utilizing an international framework, Negesa et al. (2022) assessed Hawassa Eco-Industrial Parks (EIPs) effectiveness and process. According to the study, sustainable industrial parks require stakeholders, information acquisition, and indicator system criteria. IPs promote export-oriented firms in Ethiopia, according to Tesfachew (2021). The study examines how affluent nations have used IPs to boost economic, social, and environmental growth. Tesfaw (2023) studies industrial parks' effects on Ethiopia's exports, jobs, and FDI. The research stresses the necessity of manufacturing workforce development and the use of strategies. It emphasizes the need for policies and institutional capacity building to link value chains forward and backward. Feyisa and Gebremariam (2019) investigated Ethiopia's Eastern Industry Zone, Bole Lemi 1, and Hawassa Industrial Parks. The study showed parks need more skilled personnel, materials, housing, banking, port operations, shipping services, and institutional, regulatory, and administrative competence to administer them.

Gebeyehu (2017) discovered that the development of industrial parks plays a significant role in reducing unemployment rates in emerging economies. However, the study also identified certain obstacles that hinder the progress of these parks. Mamo and Llobet (2017) shifted their focus to Ethiopia's industrial parks, specifically on the strategies to attract key businesses to these parks. This is crucial as the presence of key businesses can stimulate economic growth and create job opportunities. On the other hand, Giannecchini and Taylor (2018) found that the Eastern Industrial Zone (EIZ) in Ethiopia, despite its diverse industry focus, has limited potential to positively role industrial development and societal development. This suggests that a more targeted industry focus might be beneficial for maximizing the role of industrial parks.

Eco-industrial parks (EIPs) have been identified as a significant contributor to low-carbon development, Nie et al. (2022) have empirically established that implementing EIPs can substantially augment the low-carbon development trajectory of nations and regions. The Kalundborg eco-industrial system, as highlighted by Branson (2016), is often cited as the epitome of EIPs. This system has evolved organically over half a century, embodying an industrial symbiosis paradigm where waste exchange and infrastructure sharing are integral components. Liu et al (2018) further underscore that such a system not only confers environmental benefits but also enhances economic competitiveness.

While IPs can stimulate economic growth and social progress, they can also lead to adverse environmental and social consequences such as climate change, pollution, resource depletion, labor issues, and community disturbance (Gebremariam & Feyisa, 2019). According to UNIDO (2017), the economic benefits of establishing IPs may result in a decline in environmental quality in and around industrial areas. The case of Vietnam demonstrates that IPs can affect not just local populations but the entire surrounding region (Cu & Nguyen, 2021). Global instances illustrate that the effective enforcement of environmental protections in IPs hinges on their ability to compete and offer economical and non-intrusive solutions to the companies within them (UNIDO, World Bank Group, & GIZ, 2017). Various metrics used to analyze industrial zones' environmental and economic performance can be categorized into five primary groups: land area and population, resource consumption, energy use and emissions, environmental contamination, and governance and oversight (Mengistu & Panizzolo, 2023).

African nations progressively establish diverse IPs as a primary driver or significant catalyst for sustained economic advancement (Mebratu,2019). In this regard, Khisa et al. (2018) also noted that some African countries aim to enhance industrial productivity and achieve efficient industrial output by implementing Environmental Improvement Programs (EIPs) to address environmental challenges caused by swift industrial growth (Khisa et al., 2018). African nations, including Egypt, Ethiopia, and South Africa, are exploring the potential of industrial symbiosis, and partnering with the United Nations Industrial Development Organization (UNIDO) to conduct Eco-Industrial Park (EIP) projects (Negesa et al, 2022). This is due to the need for established techniques and standards for EIPs. The international EIP framework evaluation tool offers crucial indicators and performance assessment criteria to create sustainable EIPs, serving as a benchmark for individuals or entities in Ethiopia seeking more national or firm-level standards (Nessim et al, 2024). Implementing these criteria can help Ethiopia improve its indicators to be more regionally suitable (UNIDO, 2017; Khisa et al., 2018).

The study by Sueyoshi and Goto (2017) focuses on that industrialization is crucial for enhancing a nation's economy, even though it results in pollution and health problems. Moreover, Yoro and Daramola (2020) noted that industry contributes to approximately 28% of worldwide greenhouse gas emissions and 61% of environmental pollutants. With a focus on lowering pollutants and carbon emissions, Sustainable Development Goal 12 of the United Nations seeks to reduce the harm economic growth causes to the environment (Bebbington & Unerman, 2018). These objectives can only be accomplished by diminishing the carbon dioxide emitted from industrial operations (Yuan et al, 2020).

To assess the environmental effectiveness of China's national eco-industrial parks (EIPs), Liu et al. (2015) in their paper entitled Environmental Performance Analysis of China's Eco-Industrial Parks: A Data Envelopment Analysis Approach. In this study, the environmental effectiveness of national EIPs in China was evaluated using data envelopment analysis. Eco-efficiency and environmental performance indices were used to characterize the EIPs' static and dynamic environmental performance, respectively. There were three major results from this empirical research. First, eco-efficiency improvements, rather than environmental technical development, are mostly responsible for the overall improvement in environmental performance across 34 national EIPs. Second, the average eco-efficiency and environmental performance improvement of the demonstration EIPs was higher than that of the trial EIPs. Third, adjustments were made to the high-tech industrial development EIPs. The main reason for adjustment was that the average eco-efficiency of EIPs in high-tech industrial development zones was significantly greater than that of EIPs in economic and technical development zones that had undergone retrofitting.

The study titled "Comprehensive evaluation of environmental and economic benefits of industrial symbiosis in industrial parks in China" (Chen et al., 2022) proposed a method for a comprehensive evaluation of the benefits of industrial symbiosis by combining resource productivity and considering the effect of emissions when conducting an energy analysis. The China EIP study demonstrates that industrial symbiosis has a positive impact on a variety of factors, such as increasing the productivity of direct input materials, water, and energy, reducing the impact of emissions, saving money on equal investment, lowering the environmental load rate, and increasing the sustainable development index. The study provides park managers with a classification of symbiosis and a method for assessing the benefits of symbiosis, allowing them to establish networks of symbiosis and formulate strategies for environmentally friendly industrial growth

Falahatdoost and Wang (2022) conducted a study titled "The long-term impact of industrial parks on the sustainability levels in Iran and Turkey." The objective of this study was to investigate the correlation between the development of industrial parks and the levels of sustainability in Iran and Turkey, spanning the years 1980 to 2019. Despite extensive research conducted by several scholars across different geographical regions, a comprehensive understanding of the relationship between them remains elusive due to the general conflicting nature of the findings.

The article entitled “a public participation approach in the environmental governance of industrial parks’ by (Wang et al., 2023) examines the causes of the public's exclusion from environmental management and provides strategies for establishing effective and sustainable participation. While interest and institutional space encourage public participation, the absence of institutionally guaranteed systems and the inadequacy of the public inhibit it. On a platform for environmental governance, multiple stakeholders are required to promote continuous and effective engagement.

Zeng et al. (2017) also conducted a study that defines an eco-industrial park as implementing sustainable supply chain management at the industrial park level. Integrating the circular economy concept into supply chain management is crucial for achieving a desirable balance of economic, social, and environmental benefits, especially as external sustainability becomes increasingly challenging. The researchers developed a conceptual model based on institutional theory, following the "institution-conduct-performance" paradigm. They analyzed data from 363 questionnaires distributed to eco-industrial park enterprises in China to assess the relationship between institutional pressure, supply chain relationship management, sustainable supply chain design, and circular economy competency. The study demonstrates that institutional pressure positively impacts supply chain relationship management and the design of sustainable supply chains. Sustainable supply chain management strategies enhance companies' circular economy competence (Zeng et al., 2017).

Lyu et al. (2022) analyzed the green development of Chinese IPs by extracting and reviewing five leading research focuses through keyword clustering. Based on the literature, they concluded diversified practices of green development and discussed four challenges and prospects arising from the review and practice. The researchers describe the green development model for Chinese IPs and identify inadequate dissemination of concept and knowledge, heterogeneity of interest, untargeted assessment and guidance, and a backward management system as the five main challenges in the field (Lyu et al., 2022). The introduction of industrial ecology (I.E.) and its recognition have garnered worldwide interest in advancing and establishing eco-industrial parks (EIPs) (Belaud et al, 2019). EIP is an advanced industrial system developed from a conventional industrial park (Yuan et al, 2024). It focuses on preserving natural and economic resources, minimizing materials, enhancing operational efficiency, and facilitating knowledge exchange among companies at the inter-firm level (Korhonen, 2004). Industrial ecology is the most widely used method in related research, including input-output models, life cycle assessment, and material flow analysis. For instance, the environmental responsibility of corporations in IPs was measured based on an input-output model (Han & Cao, 2021).

A study entitled "Is the Eastern Industrial Zone in Ethiopia a Catalyst for Development?" was carried out by Phillip and Ian in 2018 on the basis of the theoretical framework of evolutionary economic geography and draws on the insights of Albert Hirschman to examine the advancements achieved by the Ethiopian Special Economic Zone (SEZ). The study focused mainly on investigation of the possible influence of the growth of this particular zone on the continuing process of structural transformation in Ethiopia. The region where the Eastern Industrial Zone is located has a deficiency in connections to the broader economic framework, both in terms of geographical and organizational dispersion. This study delves into the implications of Ethiopia's state plan for growth, specifically focusing on the investments made in major industrial parks.

The study conducted by Azmach (2019) focus on Regulating Ethiopia's Industrial Park development: A Critical Analysis. The purpose of this essay was to present a concise summary of IP regulatory domains and tools, as well as the diverse experiences, the most important lessons Ethiopia may learn from other nations, and the current evolution of regulatory domains worldwide. Some critical success criteria address the regulatory realms and instruments of site decisions, regulatory goals, investor selection, and land acquisition processes. We looked at how well the existing legal structures could handle different types of regulation.

On the other hand, Sime et al, (2021) studied Industrial Park Development Projects in Ethiopia: An Economic Impact Analysis. In this analysis, areas with close proximity to industrial parks are considered "treated zones," whereas those without such parks are considered "restricted zones." The purpose of this research is to analyze the macro and microeconomic consequences of industrial park development projects in Ethiopia, as well as the factors that affect these effects. The authors utilized both the Ordered Probit and the Difference in difference (DID) estimate methods. The research shows that Ethiopia has substantial social capital, a large amount of non-monetary resources, visible government backing, and high levels of community commitment. Industrial Park development initiatives in Ethiopia have less of an economic impact due to variables such as the availability of unskilled labor, the location of most industrial parks in urban centers, and the use of antiquated equipment, according to the report. Except for domestic capital formation, all of the investigated macroeconomic variables increased significantly after the implementation of the Industrial Parks Development Projects. Industrial Park development projects are seen as having a positive role on infrastructure, job creation, and the spread of new technologies by many of the survey's respondents. To encourage domestic investment in Ethiopia's industrial parks, the government is urgently urged to establish novel rules and incentive schemes.

The purpose of the study conducted by Guteta and Worku (2023) was to analyze the gaps in the policy framework that hinder the development of sustainable industrial parks in Ethiopia. The data was obtained through a combination of interviews conducted with key informants, surveys administered to participants, reviews of relevant documents, and direct observation. The findings of the study indicate deficiencies in environmental management safeguard mechanisms, insufficient systems for enhancing the economic sustainability of industrial parks, a limited framework for promoting social sustainability in the context of industrial park development, and inadequate governance practices. These governance practices include the absence of a country-specific framework for standardizing industrial parks, a lack of adaptability to the changing global landscape, weak institutional connections, and the absence of a contingency plan. Nevertheless, the study fails to address the absence of both a country-specific set of measures and an evaluation technique for facilitating the advancement of sustainable industrial parks in Ethiopia.

Industrial Symbiosis (IS), which seeks to use connections to convert wastes, byproducts, and products of one company into inputs for another, is facilitated by these connections.

The researchers acknowledged that planning and developing these clusters holistically while considering the three pillars of sustainability (economic, environmental, and social) is exceedingly challenging. To assess the performance of sustainable industrial parks, the paper discussed UNIDO, resilience indicators, and generic information performance indicators. Despite numerous attempts, there are very few studies that examine the overall performance of industrial parks in the country's economic, social, and environmental realms (Tadesse, 2018).

Several earlier studies on Ethiopian industrial parks, such as Gebremariam & Feyisa (2019), Giannecchini & Taylor (2018), and Negesa et al. (2022), Tesfachew (2021), Zeng (2021), Negesa et al. (2022), Tesfaw (2023), and Feyisa and Gebremariam (2019) conducted assessments of Ethiopian IPs utilizing different scopes, procedures, and timeframes. However, no research utilizes UNIDO's performance evaluation guideline to examine IPs' role in terms of advancing economic competitiveness, shared prosperity, and safeguarding the environment in the Ethiopian context. Moreover, no previous studies identify and reflect on the prevalence of set of required standards and requirements, including UNIDO proposed set of variables, to ensure industrial parks play its stated objectives.

2.3. Industrial Parks in Ethiopia

For Ethiopia, a country with a population of over 120 million, the majority of which is comprised of youth, economic development is not an option; it is the ultimate source of peace and stability (Firmansyah et al, 2023). Industrial expansion has consistently increased output and employment, resulting in unprecedented wealth growth (Mwinuka et al, 2023). The industrial era has made industrialization the focal point of structural reforms (Saputra et al, 2023). Therefore, fostering the growth of the industrial sector may be essential for attaining a sustainable future. In addition, the literature on growth and development (Pacheco-lopez and thirlwall, 2013) has extensively documented the correlation between the rise of manufacturing production and the expansion of the gross domestic product.

Since the conclusion of the 19th century, Ethiopia has endeavored to reorganize its economy. Although erudite manufacturing factories began to emerge in the 1920s, a concerted effort to establish a modern manufacturing economy was not initiated until the 1950s (Alemayehu et al, 2023). Since then, the industry has accelerated, and a comprehensive framework to promote industrialization and economic growth has been introduced (Ghebreyesus, 2013). Ethiopia's manufacturing sectors, which employ a few hundred thousand unskilled employees and utilize primitive technology to produce basic goods, are beset by complex problems. Consequently, logistics and transportation, land access, and inadequate public service delivery and facilitation are the greatest obstacles (MoFED, 2019).

Ethiopia's plan seeks to replicate the success of East Asian nations, such as Taiwan, Malaysia, and China that have relied heavily on industrial parks or Special Economic Zones (SEZs) to attract international investment and advance their industrialization (Tang, 2023). Since its inception in 2014, the Ethiopian Industrial Parks Development Corporation (IPDC) has been developing and implementing plans for the development of numerous industrial zones across the country (IPDC, 2022).

The Strategic Priorities for the Development of Industrial Parks in Ethiopia are outlined in the Industrial Parks Proclamation. Five objectives for industrial parks are listed in proclamation 886/2015 for industrial parks: 1) Governing the designation, construction, and operation of industrial parks; 2) Advancing the nation's technological and industrial infrastructure; 3) Promoting private sector participation in manufacturing industries and related investments; 4) Boosting the competitiveness of the nation's economic development; and 5) Generating a large number of job opportunities (Proclamation 886, 2015).

As per the Ethiopian industrial park proclamation, the term "industrial park" is defined as a demarcated region designated by the relevant authority for the purpose of developing a comprehensive, integrated, and diverse range of industrial functions (Proclamation 886, 2015). This development is contingent upon the planned provision of infrastructure and various services, including but not limited to roads, electricity, water, a centralized service center, and special incentive programs. The overarching objective of establishing industrial parks is to facilitate the attainment of predetermined goals (Seyoum, 2024). The Ethiopian government launched its IP program in the first Growth and Transformation Plan (GTP I) as part of a poorly planned and executed fiscal strategy, resulting in inconsistent results and a delay in implementation (MOFED, 2010). Growth and Transformation Plan 2010/11-2014/15 (GTP II, 2015). In accordance with Regulation No. 326/2014, Ethiopia establishes the Industrial Parks Development Corporation (IPDC) as a public corporation with combined developer and regulators functions. According to the establishment regulation, the governing body of the corporation will be a government-designated body.

The Ethiopian government has made tremendous efforts to facilitate the structural transformation of industrialization, with the development of industrial parks regarded as a fundamental strategy for promoting the manufacturing sector (Oqubay,2018). As a result, the Ethiopian government has made substantial investments in the establishment of industrial parks over the past decade as part of its efforts to promote industrial development. More than twenty industrial parks have been constructed in various regions by federal, state, and local governments as well as private investors (IPDC, 2023).

The eastern industrial zone and Bole Lemi, the planning and implementation of one industrial park, encountered numerous challenges due to the absence of IP-related regulations and managerial expertise (Giannecchini & Taylor, 2018). Several factors have impeded the project's success, including a lack of institutional arrangements to oversee IP development; ineffective policies, regulations, and institutional frameworks; weak roadmap and regulation approaches; insufficient infrastructure; and economic and financial analysis (Azmach, 2019).
Industrial parks are utilized frequently as policy instruments to promote industrialization and urbanization (Zheng et al, 2017). Industrial parks are utilized as a strategy for industrialization to enhance the competitiveness of businesses by increasing their output and profits while reducing expenses and improving quality (Weldesilassie et al, 2017). Utilizing industrial parks as a tool for urbanization involves regulating industrial

expansion, accomplishing systematic urbanization, harmonizing regional development, and establishing urban areas (Azmach, 2019). Industrial parks can assist developing nations in overcoming obstacles such as market imperfections, restrictions on access to information, technology, and financing, and high transaction costs resulting from a lack of infrastructure and weak institutions (Memedovi, 2012). As of the end of 2022, there were thirteen active public IPs and seven active private IPs. Private IPs serve both export and domestic consumers, as opposed to the majority of government-owned IPs, which are primarily focused on the light manufacturing sector, primarily apparel and leather products, and target the export market (IPDC, 2021).

Table 2 1:Publicly owned industrial parks in Ethiopia

No.	**Publicly owned industrial parks**	**Sector focus**
1	BLIP-II Bole Lemi Industrial Park Phase I and II	Textile and garments
2	HIP - Hawassa Industrial Park	Textile and garments
3	KIP - Kombolcha Industrial Park	Textile and garments
4	MIP - Mekelle Industrial Park	Textile and garments
5	AIP - Adama Industrial Park	Textile and garments, Machinery
6	DBIP - Debre Berhan Industrial Park	Garment and Agro-Processing
7	ICT-Information and Communication Technology Industrial Park	Information and communication technology
8	DDIP - Dire Dawa Industrial Park	Textile and garments
9	JIP - Jimma Industrial Park	Textile and garments
10	AIV - Addis Industrial Village	Textile and garments
11	BDIP - Bahir Dar Industrial Par	Garment
12	Kilinto - Kilinto Industrial Park	Pharmaceuticals
13	Semera Industrial Park	Mixed

Source: IPDC (2022)

Table 2 2:Privately owned industrial in Ethiopia

No.	Privately owned industrial parks	Sector focus
1	EIP - Eastern Industry Park	Mixed
2	GSIP - George Shoe International Park	Leather
3	HuIP - Huajian Industrial Park	Textile and apparel, leather
4	VIP - Velocity Industrial Park	Textile and garments
5	DBL IP – Debre Berhan Industrial Park	Textile and garments
6	CCCC Arerti Industrial Park	Construction material
7	CCECC Dire Dawa Industrial Park	Mixed

Sources: IPDC (2022)

2.4. Research Gaps

The researcher of this study has examined numerous empirical findings regarding industrial parks in general, with a specific focus on Ethiopian industrial parks. The empirical reviews provide an analysis of the scopes, areas, and methodologies of the evaluated empirical contributions. The empirical findings primarily focus on the effectiveness of industrial parks, their function in promoting exports, generating employment, attracting foreign direct investment (FDI), policy frameworks and gaps, as well as the factors that influence the growth of industrial parks.

Tesfaw (2023) studied industrial parks' effects on Ethiopia's exports, jobs, and FDI , Negesa et al. (2022) assessed Hawassa Eco-industrial Parks (EIPs) effectiveness and establishment process, Tesfachew (2021) examined the role of IPs in boosting export oriented economic growth, Feyisa and Gebremariam (2019) investigated Ethiopia's Eastern Industry Zone, Bole Lemi 1, and Hawassa Industrial Parks operations, Gebeyehu (2017) assessed role of IPs for employment creation, Mamo and Llobet (2017) shifted their focus on the strategies to attract key business to IPs, Phillip and Ian (2018) evaluated role of EIZ for structural transformation, Ermias (2019) focused on Regulating Ethiopia's Industrial Park Development, Sime (2021) studied Industrial Park Development economic impact analysis, Hailu and Gemechis's (2022) assessed governance Practice for promoting sustainable industrial parks development in Ethiopia focusing on challenges and prospects. However, no research utilizes UNIDO's performance evaluation approach to examine IPs' performance in terms of economic competitiveness, social inclusiveness and shared prosperity in the Ethiopian context.

The focus area of empirical studies reviewed in this study can be summarized into three. Some of them focus on Factors that affect the success of industrial parks or special economic zones (SEZ) while others on The economic effect of industrial parks activities. The third group of studies includes those that focus on Governance practices industrial parks. Moreover, the first and second group of studies relied exclusively on secondary data and the third group used both primary and secondary data. Moreover, despite aforementioned research gaps, none of them used the performance evaluation indicators proposed by UNIDO (2019c). Thus, cognizant of the marvelous contributions of previous empirical studies related to IPs, this study attempted to bridge the gap in noted across the empirical literature by investigating the roles of IPs in advancing economic competitiveness, creating shared prosperity, and safeguarding the environment of the Ethiopian using the indicators proposed by UNIDO (2019c).

Overall, this research is unique in four basic parameters from previous studies conducted on Ethiopian industrial parks. First, it uses globally accepted comprehensive performance evaluation framework developed and recommended by UNIDO. Second, the study encompasses all the three basic categories to examine the role of IPs: namely, economic, social, and environmental in its broader implication. Third, the study incorporates fifty percent of IPs in the study, ten industrial parks, of which seven are publicly owned and three are privately owned and managed. Lastly, the study utilized mixed method design to understand the performance of IPs in Ethiopia in all the three broader categories: economic, social and environmental.

2.5. Conceptual framework

Creating a reference framework, or a set of objectives against which performance can be measured, is important to define the success of industrial parks. KPIs can be established for a whole industrial park, a specific facility, or a variety of park-wide orfacility-specific operations (UNIDO, 2019c).

As has been observed in the literature review, the role of industrial parks can be investigated using different techniques. On this study the model developed by UNIDO has been chosen to analyze the broader economic, social, and environmental performance of industrial parks in achieving stated objectives. UNIDO has established three indicator categories that are in accordance with the fundamental ideas of "inclusive and sustainable industrial development" (ISID), consisting of a total of thirteen important industrial park performance metrics, of which 4 are economic, 5 are social, and 4 of them environmental matrices. Following Tas et al., (2021); UNCTAD (2019); and Zeng (2021), the three performances expected to flourish in a country due to industrial park development are described briefly below:

Economic performance: This performance or role includes among others, promoting local investment as the key for development; providing financial security and incentives to reverse capital flight; supporting and enhancing the bargaining power of local firms; direct and indirect employment creation; and linkages of the resident firms to SMEs in the Parks and the local communities outside the Parks.

Social performance: Improving local capacity utilization; shifting to strategic human resource management; provision of vocational training; improvement of social inclusion; upgrading labor force skills; technology and knowledge transfer; improving the provision of social infrastructures; support for local community well-being; improve occupational health & safety; and better security and crime prevention.

Environmental performance: “Effective environmental impact assessment framework in place; mainstreaming socio-ecological factors; climate change commitments at all levels of government; greening the supply chain through circular economy practices; cost-effective infrastructure which adapts to climate change; efficient power supply and management system; using green manufacturing technologies; water supply and wastewater management systems; and maintaining the natural areas and indigenous vegetation.

Table 2 3:UNIDO performance indicators relating to the ISID pillar

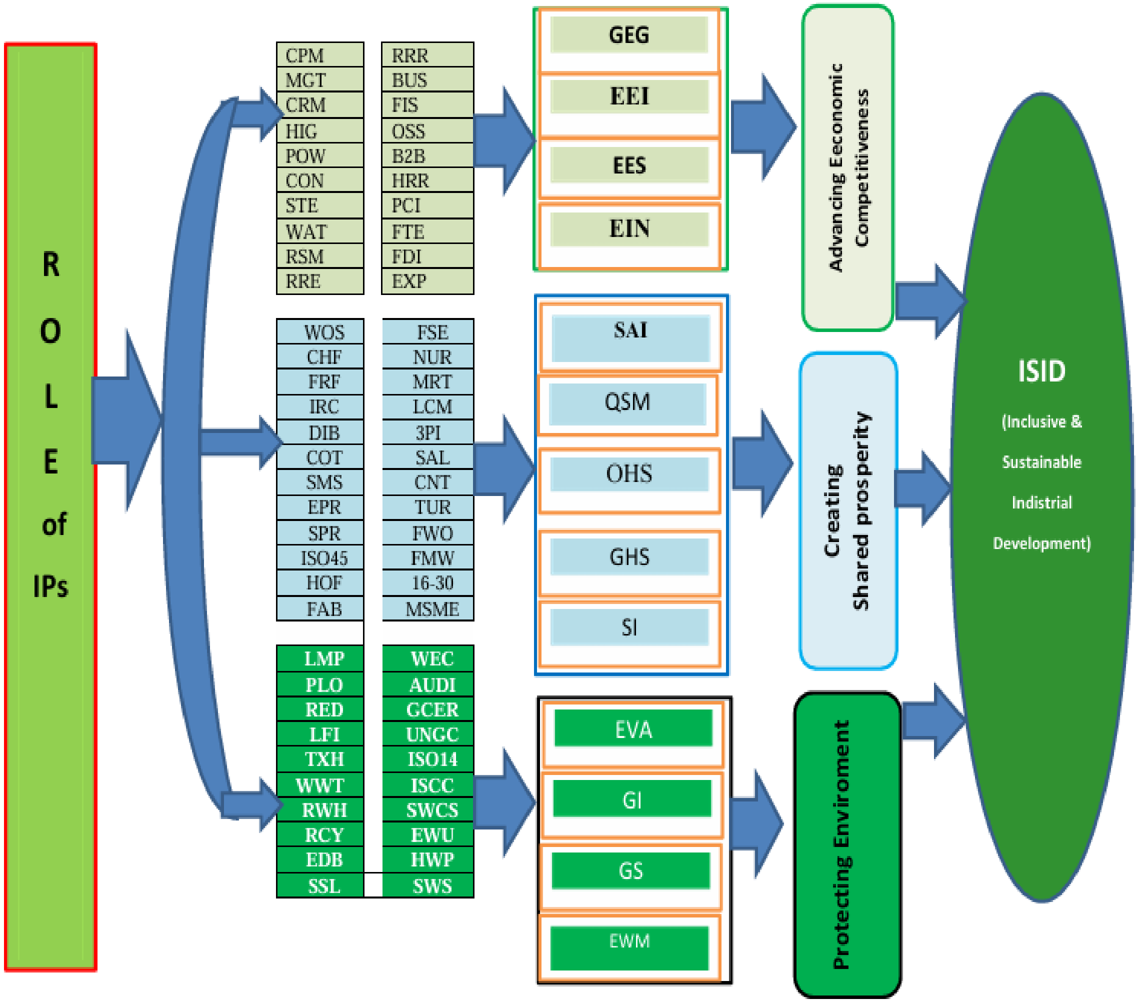
No.	Economic performance matrices	Social performance matrices	Environmental performance matrices
1	Good economic governance (GEG)	Socially appropriate site & social infrastructure (SAI)	Environmentally appropriate site (EVA)
2	Economically enabling site and infrastructure 'hardware.' (EEI)	Quality social management system& social services (QSM)	Green infrastructure (GI)
3	Economically enabling services'software.' (EES)	Occupational health & safety (OHS)	Green systems (GS)
4	Economically impactful nature (EIN)	Good labor relations& welfare (GHS)	Efficient & clean production, emissions& waste management (EWM)
5		Social inclusiveness (SI)	

Source: UNIDO (2019c)

This study examines the role of industrial parks in Ethiopia by utilizing the key performance indicators for Economic Social and Environmental dimensions (see Table 2.1). Further, these indicators are divided into sub-indicators, which are used as independent variables in this dissertation. For instance, there are 51 sub-indicators categorized under the four key economic performance indicators, 81 sub-indicators categorized under the five key social performance, and 59 sub-indicators categorized under the four key environmental performance indicators. Accordingly, it is not feasible to include all these sub-indicators in the study of industrial performance in any country. As a result, one-third of the total sub-indicators (64) were selected among the 191 of them. The criteria for selection sub indicators from each key indicator was their prevalence in industrial parks established in Developing countries in general and in Ethiopia in particular based on the pilot test conducted literature review that are strategically relevant to improve performance IPs in future.

For instance, one of the sub-indicators under economically enabling site &infrastructure 'hardware.' (EEI) is "Unencumbered land title". Since article 40 of the Ethiopian constitution stipulated that "Land is the property of the state and the people of Ethiopia and that its use shall be subject to specific regulation by law" enterprises operating in Ethiopian IPs cannot get land freely. Moreover, two sub-indicators categorized under good labor relations & welfare (GHS) say "Rights to Assemble, Unionize, engage in Collective Bargaining, and Strike" and "Percentage of workforce unionized in industrial park /% workforce unionized nationally". Since such human right issues are not well protected by low, they are not included. Therefore, based on the aforementioned criteria 20 sub-indicators for each were selected among the key economic performance and environmental performance indicators and 24 from key social performance indicators as independent variables of the three logistic models employed in this dissertation. The conceptual framework below depicts those sub-indicators selected from each key indicator.

Figure 2.1: Conceptual framework of the study



Source: Own design based on literature (2024)

Table 2 4: Description of variables depicted in the Conceptual framework

Key indicators	Variable	Description	Used in Logistic regression model
Economic Performance			
Good economic governance (GEG)	CPM	There is an open competitive tender system to select the private sector	COMP. TENDER
	MGT	The private sector is represented in the Management Board of IPs	MGTBOARD
	CRM	Operator Customer Relationship Management (CRM) system is in place	CRMSYSTEM
Economically enabling site & infrastructure 'hardware (EEI)	HIG	It is connected to an appropriate highway	PROX. HIGHWEY
	POW	It is in a proximity to power transmission or distribution grid	PROX. POWER
	CON	There is both telephone and internet connectivity service	CONNECTIVITY
	STE	There is a stable electric power supply with less hours of outage	STABLE ELEC. SS
	WAT	There is a good water supply with less hours of interruption	WATER SS
Economically enabling services 'software.' (EES)	RSM	Regular and Scheduled Buildings Maintenance	BUIL.MAINTENAN CE
	RRE	Dedicated Rapid-Response or Emergency Maintenance	EMER.MAINT.
	RRR	Repair, Rectification & Restoration (RRR) Services for utilities	RRR.SERV.
	BUS	Dedicated or Localized IP Business Support	BUSI.SUPP,
	FIS	Industrial Park user have access to specific financial support Programs	FINC.SUPP.
	OSS	Dedicated One-Stop Shop/Single-Window service is present for IPs	OSS.SERV.
	B2B	Business-to-business (B2B) gatherings are being held on regular basis	B2B.GATHER
	HRR	There is Human Resources Agency, for Recruiting and Training services	HR.REC. SERV.
Economically impactful nature (EIN)	PCI	The Per Capita Income in the Industrial Park higher than the National Per CapitaIncome in 2023	HIGH.PCI
	FTE	The ratio of Full-time employment to par-time employment in Industrial Park is greater than 1	FTEQ.EMP.
	FDI	FDI % to total investment (or GFCF) in industrial Park is higher than FDI % of total investment (or GFCF) Nationally in 2023	HFDI%GFCF
	EXP	US$ exports of processed or semi-processed goods as % of total Industrial Park US$ exports is higher than US$ exports of processed or semi-processed	US$.EXSPG/IPEX.

		goods as % of total national exports in US$ in 2023	
		Social Performance	
Socially appropriatesite & social infrastructure (SAI)	WOS	Power lines in Industrial park are buried, for workforce safety	POWER LINE BURRIES
	CHF	Presence of Childcare facilities	CHILDCARE FACILITIES
	FRF	Faith and prayer facilities for religious groups are prevalent	FAITH & PRAYERS FACILITIES
	IRC	Presence of on-site Incident Response Centre	ONSITE INCD. RESP. CEN
	DIB	Disabled-inclusive building design (i.e., access ramp and elevator in each building)	DISABLED INCLUSIV BD
	COT	Average commute time to Industrial Park workplace for employees is higher than average commute time to workplace nationally	HIGHER AVE. COMMUT TIME
Quality social management system& social services (QSM)	SMS	The is a social impact management & monitoring system (SMS)	SIMS SYSTEM
	EPR	There is Emergency Preparedness and Response system	EPR SYSTEM
	SPR	There is annual public/published Social Performance Report for IP	SOCIAL PERF. REPO.
Occupational health &safety (OHS)	ISO45	Percentage (%) of firms with OHSAS 18001/ ISO 45001 Certification in IP is greater than % firms with Certification Nationally[2]	MORE FIRMS WITH OHSAS 18001/ISO14001 CERTI.
	HOF	On-site hospital, clinic, or dispensary within IP	ONSITE HEALTH FACILITIES
	FAB	The number of Fire alarms/building is greater than the number Nationally	FIER ALARM PER BUILDING
	FSE	There is access by fire services to all parts of the Industrial Park	ACCESS TO FIRE SERVICECFS
	NUR	The number of nurses per capita (per 1000 people) is higher than the number the National per capita in 2023.	HIGHER NURSES PER CAPITA
	MRT	The mean Emergency (Police, Fire, & Ambulance) response time in IP is lower (or swift) compared the national average	LOWER AVE. RESPONSE TIME
Good labor relations & welfare (GHS)	LCM	An aggregated, publicly accessible labor complaints and its measurement mechanism related data are available	DATA ON COMPLAINTS & MEASURES
	3PI	There are on-site Regulator, Operator or Third-Party Authorized Labor Inspectors or Counselors	AUTORIZED 3P LAB. INSPACTORS ON SITE
	SAL	Average Salary of employees in IP is higher compared to Aver. Salary Nationally	HIGHER AVE. SALARY

	CNT	The % of employees on term or open-ended contracts in IP is higher than % employees on term or open-ended contracts Nationally	HIGHER EMP WITH OPEN ENDED CONTRACTS
	TUR	The % of employee annual turnover in IP is lower than the % of employees' annual turnover nationally	LOWER EMPLOYEES' TURNOVER
Social inclusiveness (SI)	FWO	The % of female workforce in IP to total workforce is higher than % of female workforce Nationally	HIGHER % FEMALE WORKFORCE
	FMW	Female wages as % of male wages in industrial park is higher than Female wages as % of male wages Nationally	HIGHER FEMALE WAGES TO MALE WAGES RATIO
	16-30	The % of employees between ages of 16 and 30 in IP is higher than % employees between ages of 16 and 30 Nationally	HIGHER % EMP AGE 16 TO 30
	MSME	Domestic MSME investment as a % total investment in IP is higher than MSME investment as a % total investment nationally	HIGHER DOM. MSMEs INVST.
Environmental Performance			
Environmentally appropriate site (EVA)	LMP	Site compatibility with Land Use Master Plan as regards non-agricultural use	SITE COMPATABILITY WITH LUMP
	PLO	The % of plots actually allocated to non-polluting or light manufacturing activities in IP is greater than % of GDP represented by non-polluting or light manufacturing activity nationally	PERCENTAGE OF PLOTS ALLOCATED TO LMA
	RED	Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing, and converting existing infrastructure or buildings	IPs IN REDEVELOPED BROWNFIELD SITE
Green infrastructure (GI)	LFI	Presence of an off-site landfill for IP solid waste management	OFF-SITE LANDFILL FOR IP SWM
	TXH	Presence of toxic and hazardous waste collection, storage and treatment or disposal management system	TOXIC & HAZARDEOUS MATERIALS CSTD MGT SYSTEM
	WWT	Presence of Public Wastewater Sewerage System, and/or of Wastewater Treatment Plant (WWTP)	WSS AND WWTP
	RWH	Presence of sustainable rain and storm water collection/ harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, waterhyacinth) and re-use systems	SUSTAINABLE RAINWATER COLLECTION & RE-USE SYSTEM
	RCY	Segregated recycling reception bins,	SEGREGATED

		bells and/or containers for: paper & card; recyclable plastic containers; recyclable metals and others.	RECYCLING RECEPTION BINS OR CONTAINERS
Green systems (GS)	EDB	There are buildings with environmental design related certificates	BUILDINGS WITH ENV.DESIGN CERT
	SSL	There are Solar Street lighting	SOLAR STREET LIGHTING
	WEC	Presence of waste exchange clearinghouse, promoting industrial symbiosis andeconomic circularity	WASTE EXCH CLEANING HOUSE
	AUDI	Annual environmental audits performed on each firm	ANNUAL ENV AUDIT PERFORMED
Efficient & clean production, emissions & waste management (EWM)	GCER	Presence of firms having obtained a “Green” certification at national level	FIRMS WITH “GREEN” CERT. AT NATIONAL LEVEL
	UNGC	Operator possesses UN Global Compact Registration	OPERATOR POSSESSES UN COMPACT REGIS.
	ISO14	Operator possesses ISO14001	OPERATOR POSSESSES ISO14001
	ISCC	Operator possesses International Sustainability & Carbon Certification (ISCC)	OPERATOR POSSESSES ISCC
	SWCS	Presence of solid waste collection service	SWC SERVICE
	EWU	The ratio of Efficient water uses in m3/US$ Sales in Industrial Park is lower than water use in m3/US$ Sales nationally	EFFICIENT WATER USE IN m3 TO USD SALES
	HWP	Hazardous waste produced/US$ in Sales nationally in Industrial Park is lower than Hazardous waste produced /US$ in Sales nationally	HAZARDOUS WASTE PRODUCED /US$ SALES
	SWS	Percentage (%) solid waste sent to landfills (store of garbage) in Industrial Park is lower than solid waste sent to landfills nationally	PERCENTAGE SOLIDE WASTE SENT TO LANDFILL

Source: Own construction (2024)

CHAPTER THREE: RESEARCH METHODLOGY

This chapter presents the methodology employed in this dissertation. This chapter is structured in nine (9) sections. Section 3.1 discusses the research philosophy of the dissertation followed by research design, research approach, and research strategy, which appear from section 3.2. Section 3.3 deals with the study area and population. Sample Size and Sampling Techniques are dealt with in section 3.4. Section 3.5 discusses the methods and procedures of data collection. Then tools of data collection instruments and validity and reliability tests are described in section 3.6 and 3.7, respectively. The methods of data analysis used in this dissertation are presented in detail in section 3.8. The last section presents the ethical considerations whereby research ethics adhered strictly throughout the research process articulated clearly.

3.1. Research philosophy

Pragmatism is the research philosophy of this dissertation. As the efficiency of industrial parks must be analyzed based on their unique and universal characteristics, the use of pragmatism as the guiding philosophy of this study is very important. On top that Pragmatism is the most commonly identified research paradigm for mixed method (Johnson and Onwuegbuzie, 2004, Feilzer, 2010).The proponents of the pragmatist approach emphasize the significance of multiple methods to address problems or develop a workable solution (Maxcy, 2003). The research approach or philosophy of pragmatism comments on the possibility of existing realities that are susceptible to scholarly claims; a singular truth or reality is not the focus of pragmatism (Creswell and Clark, 2011). However, pragmatism scholars also recognize objective reality despite human experiences, which are unaltered in the environment and can only be evaluated through human experiences (Tashakkori and Teddlie, 2008). Pragmatism focuses on the nature of the problem to be investigated, potential and practical solutions, and the sort of action.

3.2. Research design, approach, and strategy

3.2.1. Research design

This dissertation adopts a cross-sectional research design. In other words, the study was conducted using both descriptive and explanatory types of research design. The main characteristic of this method is that the researcher has no control over explanatory designs that establish cause-and-effect relationships. The primary purpose of explanatory research design was to determine how events occur and which ones may influence particular performances. Explanatory studies are characterized by research hypotheses that specify the nature and direction of the relationships between or among variables being studied. The variables can only report what has happened or what is happening (Kothari, 2004).

This dissertation adopts a cross-sectional research design. In other words, the study was conducted using both descriptive and explanatory types of research design. The selection of a particular research design among alternatives could be determined by factors such as the intended aim of integrating methodologies, the sequencing of quantitative and qualitative components, the degree of emphasis placed on each component, and the level of interdependence or autonomy between them (Creswell and Clark, 2018). Considering these facts, this dissertation employed mixed methods with explanatory sequential design. According to Fetters et al. (2013), the primary objective of an explanatory sequential design is that it frequently entails utilizing narrative data to elucidate or understand numerical findings, particularly those that deviate from anticipated outcomes.

Therefore, the research design employed in this dissertation is an explanatory sequential mixed methodology with quantitative component priorly and dominantly used. The qualitative method was implemented for triangulation of findings from quantitative analysis with the view of strengthening the findings of the quantitative method. Hence, the explanatory research design of this study informs the replicability of the finding.

3.2.2. Research approach

The chosen research approach for the dissertation is sequential quantitative based mixed method, which provides a deeper and broader comprehension of the proposed research problem or topic to generate more practical solutions and problem-solving answers and lay the groundwork for future research insights (Creswell and Clark, 2011). The mixed-method research approach incorporates collection of closed-ended quantitative and open-ended qualitative data, ensures proper and appropriate data type and size, augments and integrates data during analysis and conclusions, and orients results and empirical studies for valid conclusions and recommendations.

To these end, structured questionnaires were used to collect quantitative data from large sample respondents drawn randomly among 203 operators in 10 private and public industrial parks, which are subsequently examined numerically and statistically. According to Areeba *et al.*, (2016), quantitative primary data allowed the researcher to conduct objective analysis using descriptive and inferential statistics. Furthermore, qualitative data were collected using unstructured interview with purposefully selected Key interview informants (KII).

3.2.3. Research strategy

In this dissertation cross-sectional survey research strategy is adopted to operationalize the research questions. Survey research strategy is essential due to its uniqueness in collecting data not available from other sources, unbiased representation of the study population, and standardization of measurements and data collection instruments (Creswell, 2017). Consequently, the researcher conducted cross-sectional surveys using UNIDO (2019) compatible questionnaires to capture data from respondents.

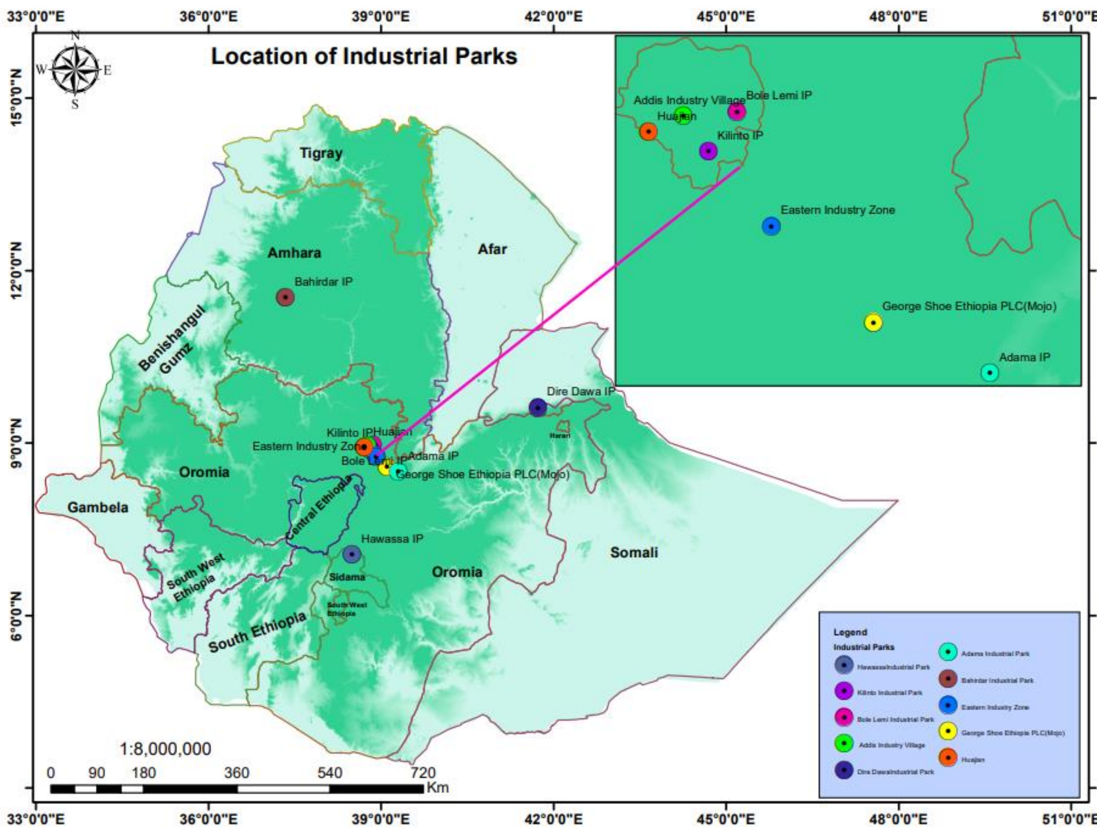
Additional data were also collected using a variety of methods, including the researcher's on-site observations and in-depth semi structured interview was conducted with fourteen (14) key informants in-person and telephone based on the respondents' preferences. The opinions of key informants collected through interactive interview were used for qualitative analysis on economic, social and environmental performances objectives of Ethiopia, aspired to achieve through the development of Industrial parks.

3.3. Study area and Population

3.3.1. Study area

The study area includes ten IPs located in seven cities across Ethiopia, the map below demonstrates the location of selected study IPs.

Figure 3.1: Study area map



Source: IPDC (2022)

3.3.2. Study population

The source of information for this study were management and technical staff working in different private, public, and joint venture companies operating within private and public Industrial parks (IPs). Whereas the unit of analysis of this study is the two hundred three (203) enterprises taken form the selected ten (10) operational IPs in Ethiopia. There are 20 IPs distributed all over the country in almost all regional states with different levels and capacities (IPDC, 2022). Since the purpose of this study is mainly assessing the role of

IPs in advancing economic competitiveness, social inclusiveness and shared prosperity, and environmental safeguarding of IPs, it is scientific to select those enterprises from the ten selected IPs to effect the data collection. Taking this into consideration, ten IPs were selected using criteria based purposive sampling method. The criteria considered were the location of industrial parks, year of establishment, size of IPs, employment level and type of business operating continuity and mode of ownership.

Then, the study population comprises all managerial and technical staff working in business enterprises located within 10 selected Industrial Parks (IPs). According to the data collected from IPDC, each company, operating in private or public IPs in Ethiopia, has a management staff ranging from 24 to 40. These management staff includes general manager, finance and HR, Procurement and logistic, operation manager, sales and marketing, and technical staff. Accordingly, considering the difference in the size of the enterprises, we take the minimum number of managerial and technical staff from each enterprise to determine the study population for the study. This in turn gives us, a total of 4,872 (203 x 24) study population for this study.

3.4. Sample size and Sampling techniques

3.4.1. Sample size

The sample size for this study was determined using the formula developed by Yemane (1967) and cited in Israel (1992)

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.1)$$

Where, n = sample size of the study; N = the study population; and e = Level of precision/allowable or margin error /sampling error, which is p=0.05 (5%) unit variance or 95% confidence level. Further, since the respondents are management and technical staff of enterprises operating in selected IPs, the total sample size is distributed to each enterprise operating in ten industrial parks proportionally using the formula below:

$$n_i = \frac{nN_i}{N} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.2)$$

Where, n_i and N_i are the samples from specific category of population (sample management staff enterprises in i industrial park) and the total number of populations within that specific category of population (total management staff enterprises in i industrial park), respectively. Then respondents were selected from the management teams of each enterprise, which include general manger, marketing manager, human resources manager, operation manger and finance manager or people assigned on a similar managerial and operational position. Whereas n and N are as defined above. Thus, first, the sample size was calculated from 4,872 study population using the statistical formula (3.1) and 95% confidence level or 5% margin error as follows

$$n = \frac{4{,}872}{1 + 4{,}872(0.05)^2}$$

$$n = \frac{4{,}972}{1 + 4{,}872(0.0025)} = \frac{4{,}872}{1 + 12} = 375$$

Adding 10% of the above sample (i.e.37) considering non-response rate, the sample size for this study becomes 412. This sample size is believed to be sufficient considering the nature of data required to investigate the role of industrial parks in achieving economic competitiveness, social inclusiveness and shared prosperity, environmental stewardship in Ethiopia. Second, this sample size was distributed to all enterprises operating in the ten private and public industrial parks propositionally using statistical formula (3.2) as follows:

$$n_1 = \frac{412(168)}{4{,}872} = \frac{69{,}216}{4{,}872} \backsimeq 14$$

$$n_2 = \frac{412(144)}{4{,}872} = \frac{59{,}328}{4{,}872} \backsimeq 12$$

$$n_3 = \frac{412(48)}{4{,}872} = \frac{19{,}776}{4{,}872} \backsimeq 4$$

$$n_4 = \frac{412(216)}{4{,}872} = \frac{88{,}992}{4{,}872} \backsimeq 18$$

$$n_5 = \frac{412(144)}{4{,}872} = \frac{59{,}320}{4{,}872} \backsimeq 12$$

$$n_6 = \frac{412(3{,}168)}{4{,}872} = \frac{133{,}380}{4{,}872} \backsimeq 268$$

$$n_7 = \frac{412(24)}{4{,}872} = \frac{9{,}888}{4{,}872} \backsimeq 2$$

$$n_8 = \frac{412(552)}{4{,}872} = \frac{227{,}424}{4{,}872} \backsimeq 47$$

$$n_9 = \frac{412(120)}{4{,}872} = \frac{49{,}440}{4{,}872} \backsimeq 10$$

$$n_{10} = \frac{412(288)}{4{,}872} = \frac{118{,}656}{4{,}872} \backsimeq 25$$

3.4.2. Sampling procedure and techniques

The sampling procedure to identify the study sample and determine the sample size followed multi-layer sampling method. The Table 3.1 presents a sampling distribution for a study conducted on Industrial Parks (IPs) in Ethiopia. The study includes both public and private IPs. Here's a description of the distribution:

1. Adama Industrial Park: This public IP has 7 business enterprises with a total of 168 management staff. A sample of 14 was drawn for the study.
2. Addis Industry Village: This public IP has 6 business enterprises with 144 management staff. A sample of 12 was drawn.
3. Bahirdar Industrial Park: This public IP has 2 business enterprises with 48 management staff. A sample of 4 was drawn.
4. Bole Leim: This public IP has 9 business enterprises with 216 management staff. A sample of 18 was drawn.
5. Dire Dawa Free Trade Zone: This public IP has 6 business enterprises with 144 management staff. A sample of 12 was drawn.
6. Eastern Industrial Zone: This private IP has 132 business enterprises with 3168 management staff. A large sample of 268 was drawn.
7. Modjo Gorge Shoe Tannery: This private IP has 1 business enterprise with 24 management staff. A small sample of 2 was drawn.
8. Hawassa Industrial Park: This public IP has 23 business enterprises with 552 management staff. A sample of 47 was drawn.
9. Hujan IP: This private IP has 5 business enterprises with 120 management staff. A sample of 10 was drawn.
10. Kilinto Industrial Park: This public IP has 12 business enterprises with 288 management staff. A sample of 25 was drawn.

In total, the study covers 203 business enterprises across 10 IPs with 4,872 management and technical staff. A total sample of 412 was drawn for the study with an addition of 10% in consideration of a potential nonresponse rate. The sample size varies depending on the number of business enterprises and management staff in each IP. The IPs are spread across different locations and include both public and private entities, providing a diverse and representative sample for the study.

Finally, sample respondents were selected from each enterprise using a simple random sampling method. The sample size for each enterprise was determined proportionally, as indicated in the referenced table. The samples were drawn from a pool of twenty-four available management and technical staff members at the enterprise level. A lottery method was used to select participants for the study, who were then asked to complete a self-administered questionnaire.

Table 3.1: Sample industrial parks and size of respondents

No.	Sample Industrial parks	City	No of Business Enterprises	Total Mgt. Staff	Sample Drawn	Remark
1	Adama Industrial Park	Adama	7	168	14	Public
2	Addis Industry Village	Addis A.	6	144	12	Public
3	Bahirdar Industrial Park	Bahirdar	2	48	4	Public
4	Bole Lemi	Addis A.	9	216	18	Public
5	Dire Dawa Free Trade zone	Dire Dawa	6	144	12	Public
6	Eastern Industrial Zone	Dukem	132	3168	268	Private
7	Modjo Gorge Shoe Tannery	Modjo	1	24	2	Private
8	Hawassa Industrial Park ,	Hawasa	23	552	47	Public
9	Hujan IP	Dukem	5	120	10	Private
10	Kilinto Industrial Park	Addis A.	12	288	25	Public
	TOTAL	**7**	**203**	**4,872**	**412**	

Source: Own calculation (2024)

3.5. Methods and procedures of data collection

This dissertation used both quantitative and qualitative data to achieve its specific objectives. The sources of these datasets were sample respondents and key informants.

3.5.1. Quantitative Data

Primary quantitative data were collected from sample respondents drawn randomly using structured and self-administered questionnaire, consisting of closed ended categorical questions. The questionnaire has three main sections/parts; part one presents demographic characteristics of respondents, and part two quantifiable ordinal responses or opinions of respondents regarding economic, social, and environmental performance indicators of IPs selected from UNIDO (2019c) guideline, measured by five-point Likert scale: 1=Very low; 2=low; 3=Neutral; 4=High; and 5=Very high. Questions outlined in part three of the questionnaire deals with questions on the agreement of respondents on the contributions of IPs towards achieving the economic, social, and environmental performance objectives of Ethiopia measured by binary dichotomous outcomes (1=Yes and 0=No). This part also gives opportunity for respondents to provide additional information and reflect freely his/her opinion, insights, and suggestions using open-ended question.

3.5.2. Qualitative Data

Primary qualitative data that are required for method-triangulation purposes, with the aim of substantiating the quantitative findings, qualitative data were collected using semi-structured interviews with interactive or probing approach. The KIIs for qualitative data were high level officials, purposively selected among those working in managerial and administrative positions of IPs due to their sufficient experience and willingness to participate in this study as a key informant. Interviews were conducted focusing on major topics of performance indicators identified under the three major categories of IPs performances' namely, economic, social, and environmental aspects of industrial parks in Ethiopia. The interview guiding questions were developed to manage the interview session.

3.6. Tools of data collection

This cross-sectional study utilized primary data, collected through structured questionnaires and semi-structured interviews. These instruments gathered quantitative and qualitative data, respectively, from operators in both private and public Industrial Parks, focusing on the variables of interest.

3.6.1. Structured questionnaire

The required primary data were collected from sample respondents who were selected randomly. The instrument of data collection employed was a structured and self-administered questionnaire, which was composed of closed-ended categorical questions. The questionnaire was divided into three main sections. The first section was designed to gather information about the demographic characteristics of the respondents. This included details such as age, gender, occupation, and other relevant demographic factors.

The second section of the questionnaire consisted of 64 open-ended quantifiable categorical questions. These questions were selected based on the guidelines provided by UNIDO (2019c) and were used as explanatory variables in the research. The questions were divided into three categories: 20 indicators for an economic competitiveness study, 24 indicators for a social inclusiveness and shared responsibility model, and 20 indicators for an environmental stewardship study. The respondents were asked to rate their agreement with the statements related to these explanatory variables or performance indicators, on a 5-point Likert scale. The scale ranged from where 1=Very low; 2=low; 3=Neutral; 4=High; and 5=Very high.

The third and final section of the questionnaire was designed to gauge the level of agreement among respondents regarding the contributions of IPs towards achieving the economic, social, and environmental performance objectives of Ethiopia. The responses were measured using binary/dichotomous outcomes, with 1 indicating ‘Yes’ and 0 indicating ‘No’.

This section also provided an opportunity for respondents to provide additional information and freely express their opinions, insights, and suggestions. This was facilitated through the inclusion of an open-ended question, allowing respondents to elaborate on their thoughts and provide more nuanced responses. This approach not only enriched the data collected but also provided a more comprehensive understanding of the respondents' perspectives.

3.6.2. Semi-structured interview protocol

The qualitative data were primarily needed for the purpose of method triangulation, with the objective of validating the quantitative findings. To achieve this, Key Informant Interviews (KIIs) were conducted. These interviews used semi-structured interview protocol with an interactive or probing approach to gather qualitative data.

The interviewees were high-level officials who were purposefully chosen from among those working in various managerial and administrative positions within Industrial Parks (IPs) and public officials. The selection was based on their extensive experience and their willingness to participate in this study as key informants. The interviews focused on the main topics of performance indicators identified under the three major categories of IPs performances. These categories are economic, social, and environmental aspects of industrial park performance in Ethiopia.

The guiding questions for the interview were developed to effectively manage the interview session. These questions served as a roadmap for the discussion, ensuring that all relevant topics are covered while also allowing for flexibility in the conversation. This approach allows for a comprehensive exploration of the respondents' perspectives and experiences, thereby enriching the data collected.

Table 3. 2: ***Qualitative data respondents (key informant interviewees – KII)***

No:	**Institutions taken for qualitative sampling**	**Number of KII**			**Remark**
		Male	Female	Total	
1	Industrial Parks Development Corporation	4	1	5	Management staff members
2	Ethiopian investment commission	2	1	3	Managerial level
3	Multi-national organization	2	-	2	Experts
4	Investors working at industrial parks	4	-	4	Investors
Total respondents				14	

Source: Own calculation (2024)

3.7. Validity and reliability tests

A statistical test for reliability was conducted in this dissertation to ensure the highest stability, internal consistency, and equivalence tests regarding the output obtained. Reliability, a measure of the consistency and repeatability of research (Chakrabartty, 2020), was assessed using Cronbach's alpha. This was generated after performing a Principal Component Analysis (PCA) to ensure internal consistency in both the character and stability of the results and the design approach in the dissertation.

Before embarking on full data collection, pilot data were collected from 30 randomly selected respondents. The reliability of the structured questionnaire or data collection instrument was tested using Cronbach's alpha. As per Kothari (2004), a data collection instrument is deemed reliable if it yields consistent results. Cronbach's alpha is frequently used as a measure of internal consistency or dependability of data collection instruments, as he pointed out. Sekaran and Bougie (2013) further noted that a Cronbach's alpha value less than 0.6 is viewed as poor, 0.7 as acceptable or good, 0.8 as very good, and 0.9 and above as excellent reliability. Therefore, it is crucial to evaluate the reliability and validity of all indicators associated with each sub-latent variable.

The results presented in Table 3.3 below indicate that the structured questionnaire was reliable, as the Cronbach's alpha values for each, major or key indicators, and the overall items thirteen economic, social, and environmental indicators or measures exceeded 0.7.

This suggests that the questionnaire was a dependable tool for collecting data on these factors. It’s important to note that achieving such high reliability scores underscores the robustness of the research methodology employed in this study.

Table 3.3: Reliability Test results for individual, key indicators, and overall items

Major indicators of IPs	Number of items	Cronbach’s alpha
Advancing Economic Competitiveness	**4**	**0.7460**
Good Economic Governance	3	0.7981
Economically Enabling site & Infrastructure ‘hardware’ (Appropriate site selection)	5	0.8556
Economically Enabling Services ‘software’	8	0.8027
Economically Impactful Nature: Employment, Investment, and Turn-over	4	0.7890
Creating Shared prosperity	**5**	**0.8066**
Socially appropriate site and social infrastructure	6	0.7280
Quality Social Management System and Service	3	0.7676
Occupational Health and Safety	6	0.7221
Good Labor Relations and Welfare	5	0.7231
Social inclusiveness	4	0.7331
Environmental Safeguarding	**4**	**0.8959**
Environmentally appropriate site	3	0.7343
Green Infrastructure	8	0.8101
Green Systems	5	0.7761
Efficient and Clean Production, Emissions and Waste Management	4	0.8012
Overall	**13**	**0.7445**

Source: Own computation from pilot survey data (2024)

After checking the reliability and internal consistency, the questionnaire was administered to sample respondents in person. As mentioned earlier, individual Likert-type questions used as explanatory variables are considered as ordinal, because the items have clear rank order, but don’t have an even distribution. With regards to the dependent variable, however, sample respondents were asked to rate their agreement levels to the binary question "Industrial parks (IPs) in Ethiopia serve as a vehicle for economic competitiveness, social inclusiveness and shared prosperity, and environmental stewardship or not". Thus, a binary Logistic regression is the most appropriate model for this study.

3.8. Methods of Data analysis

3.8.1. Quantitative data analysis methods

In this dissertation, the quantitative data collected using questionnaire were analyzed using descriptive statistics, such as frequency, percentages, mean, and standard deviation and econometrics model based on binary logistic regression model. These quantitative analysis methods are described below.

3.8.1.1. Descriptive statistics

Descriptive statistics are important tools to present research results clearly and concisely. Particularly, this dissertation used descriptive statistics analysis techniques such as frequencies, and percentages. Though, Sullivan and Artino (2013) argue that descriptive statistics, such as frequency, percentage, means and standard deviations, have unclear meanings when applied to Likert scale responses, primary data collected from respondents of Industrial parks in Ethiopian were examined using arithmetic mean and standard deviation.

In order to calculate the average value of the data gathered, mean was used, while standard deviation was used to display the dispersion or variation in responses to each question. According to Mohammed (2011), standard deviation is the most useful and most frequently used measure of variability or dispersion. It is expressed in the same units as the data and its value lies between 0 and ∞. A large standard deviation indicates that observations/data points are far from the mean and a small standard deviation indicates that they are clustered closely around the mean. Thus, the mean and standard deviation values calculated were used for analysis purpose, in such a way that high mean signifies that majority of the respondents agree with respective question and high/ low standard deviations are interpreted as the existence of high/low dispersion on their response relative to the mean, respectively.

3.8.1.2. Econometrics method

The quantitative data analysis was based on data collected using the survey questionnaire from the sample respondents. The quantitative model employed in this dissertation is Binary Logistic Regression (BLR).

a) Logistic regression model

In logistic regression analysis, many dependent variables are categorical and not continuous (Nafis and Yasir, 2023). They also highlighted that like linear regression, logistic regression uses the modeling technique to predict the relationship between categorical dependent variables and one or more independent variables. The difference lies in the character of the dependent variable, which is not a continuous variable but categorical with two or more outcomes, based on the objective of a study. Since the outcome is not continuous, the regression line is drawn using log techniques. Unlike linear regression, the log regression equation is not a straight line but a sigmoid-shaped curve.

In essence logistic regression works in the setting where the dependent variable is categorical. In this regard (Matějka and McKay, 2015) also noted that there are three types of logistic regression, differentiated by the type of dependent categorical variables regardless of the number of independent variables, which can be either categorical or continuous. First, a binary logistic regression is used when we are trying to predict a dependent variable with only two outcomes (binary or dichotomous variable), for example, positive or negative. Second, when the dependent variable has more than two categories, multinomial logistic regression is used. Third, if the dependent variable has ordered categories, ordinal logistic regression is employed. Statistically, when there is only one explanatory variable in any model including logistic regression model it means we are performing a univariate test, whereas if there are more than one explanatory variable it means we are performing multivariable[1] logistic regression test.

We know that the mathematical equation for regression line in linear regression, for more than one explanatory variable, as

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + - - - + \beta_n X_n + e_i \text{---------------------------------} \quad (3.3)$$

Where, Y is a continuous outcome in linear regression; X_2 ... X_n are set of explanatory variables; α is the constant or drift term; β_1 ... β_n are parameters of explanatory variables and e_i is the error term. Which is assumed to satisfy the classical linear regression assumptions?

On the other hand, logistic regression is a statistical technique that estimates the likelihood of success relative to the likelihood of failure. Besides, logistic regression model is utilized when the dependent variable is categorical or nominal in nature. Consequently, the outcomes of the study were expressed in odd ratios, which helps us to assess the influence of several independent factors on the prediction of membership in one of the two dichotomous/binary or many categorical dependent variables. Logistic regression is also capable of determining the correlations and magnitudes of the variables, while adhering to the assumptions.

In binary logistic regression, however, Z can take either of the two (1or 0) categorical values. Whereas the probability exists from 0% to 100%. Therefore, logistic regression equation, in multivariable setting, can be written as follows:

$$Probability\ (Z) = 1 + 1/e^{-(\alpha + \beta_1 X_1 + \beta_2 X_2 + - - - + \beta_n X_n)} \text{----------------------------} \quad (3.4)$$

1 *However, many research papers misleadingly referred a logit model with more than one independent variable as multivariate logistic regression instead of multivariable logistic regression.*

Where, the variables are as explained in equation (3.3). Odds means a ratio of the probability of the event (P) to the probability of nonevent (1–P). Thus, this can also be expressed on the scale of Log odds of Z as follows:

$$Ln[P(Z)/-(1-P(Z)] = \alpha + \beta_1 X_1 + \beta_2 X_2 + - - - + \beta_n X_n \text{-------------------- (3.5)}$$

Thus, logistic regression is commonly done to adjust the odd ratios (ORs) for confounding factors and to identify predictors for the outcome variable.

b) Econometrics Model specification

After checking the reliability and internal consistency, the questionnaire was administered to sample respondents in person. The questionnaire includes response or outcome variables that are dichotomous/binary in type and categorical in nature. Hence, an appropriate study model is one that accurately predicts the likelihood of individual regressors belonging to a specific group on the dependent variable. Accordingly, sample respondents were asked to rate their agreement levels to the three binary question "Industrial parks (IPs) in Ethiopia have contribute to advancing economic competitiveness, creating shared prosperity, and safeguarding the environmental or not" with a binary response of "YES" or "NO". On the other hand, individual Likert-type questions used as explanatory variables are ordinal, because the items have clear rank order; where1=Very low; 2=low; 3=Neutral; 4=High; and 5=Very high. Moreover, the logistic regression model used in this study are unconditional binary logistic regression, implying the study is unmatched (or cross-sectional study) that opt to identify the factors (or predictors) associated with economic, social, and environmental performances (dependent or outcome variable).

Letting Z_{ij} be the i^{th} respondent agreement level to the questions Industrial parks (IPs) in Ethiopia contribute for advancing economic competitiveness, shared prosperity, and safeguarding the environmental or not (a binary outcome, 1= if the response is yes, 0=otherwise) operating in the j^{th} public or private IPs as the dependent variable and X_i , observable economic, social, and environmental performance indicators expected to flourish following the establishment of IPs (selected from indicators suggested by

UNIDO, 2019c) as explanatory variables, the role of IPs on economic competitiveness, social inclusiveness and shared prosperity, and safeguarding the environment in Ethiopia was assessed based on the dependent variable indicated below.

$$Z_{ij} \sim Bernoulli\ (P_j) \text{ -- (3.6)}$$

This leads to the binary/dichotomous response or outcome variable:

$$Z_{ij} = \begin{cases} 1, if\ a\ respondent\ agree\ IPs\ contribure\ for\ Econ., Social, \&\ Envt., objective \\ 0, if\ a\ respondent\ does\ not\ agree\ IPs\ contribute\ for\ Econ., Social, \&\ Envt., obj \end{cases}$$

Then, supposing Z= 1 is a case whereby IPs in Ethiopia serve as vehicle for advancing economic competitiveness, creating shared prosperity, and safeguarding the environment or not, the linear functional relationship or linear probability model (LPM) between the probabilities of achieving economic, social, and environmental performance's objective through the development of IPs in Ethiopia and key observed ordinal performances indicators used as explanatory variables is specified as:

$$P_i = E(Z = 1/X) = \alpha + \beta_1 X_1 + \beta_2 X_2 + - - - + \beta_i X_i \text{-------------- (3.7}$$

Where *X's* are observed ordinal performances, indicators selected from UNIDO (2019) and used as explanatory variables and Z = 1 means Ethiopia achieved economic, social, and environmental objectives through the development of industrial parks (IPs). Hence, the representation for achieving economic, social, and environmental objectives in equation (3.7) can be written as:

$$P_i = E(Z = 1/X) = \frac{1}{1+e^{-(\alpha+\beta_1 X_1+\beta_2 X_2+---+\beta_i X_i)}} \text{------------------------- (3.8)}$$

Thus, following, Gugarati's (2004) work the cumulative logistic distribution model is specified as:

$$P_i = E(Z = 1/X) = \frac{1}{1+e^{-Z_i}} = \frac{e^Z}{1+e^Z} \text{-------------------------------------- (3.9)}$$

Where, $Z_i = \alpha + \beta_1 X_1 + \beta_2 X_1 + - - - + \beta_i X_i$

If P_i is the probability that IPs serve as a vehicle for economic competitiveness, social inclusiveness and shared prosperity, and environmental stewardship in Ethiopia's, given by equation (3.9), then the probability that Ethiopia does not achieve its objectives (economic, social, or environment objective) written as:

$$1 - P_i = \frac{1}{1+e^{Z_i}} \text{------------------------------ (3.10)}$$

Therefore, dividing equation (3.9) by equation (3.10), we get the odd's ratio expressed as:

$$L_i = \frac{P_i(Y_i=1/X_i)}{1-P_i(Y_i=1/X_i)} = \beta_0 + \beta_i X_i + \varepsilon_i \text{------------------------------ (3.11a) or}$$

$$Odds\ P(Z) = \frac{P_i}{1-P_i} = \frac{\frac{e^{Z_i}}{1+e^{Z_i}}}{\frac{1}{1+e^{Z_i}}} = e^{Z_i} \text{------------------------------ (3.11b)}$$

Equation (3.11b) indicates that logistic regression also estimate odds ratios ($\frac{P_i}{1-P_i}$) for each of the independent variables in the three binary logit models.

Furthermore, Cramer (2003) indicates that for logistic probabilities, the above odds are

$$Odds\ (Z_i) = \exp(Z) = \exp(\alpha + \beta_i X_i) - - - - - (3.11c)$$

Thus, taking take the natural logarithm on both sides of equation (3.11a), we obtain the log odds or logit regression model employed in this study to examine the role of IPs in serving as a vehicle for economic competitiveness, social inclusiveness and shared prosperity, and environmental stewardship in Ethiopia as:

$$logit[P/(Z_i)] = ln\frac{P/(Z_i)}{1-P/(Z_i)} = Z_i \text{ , which is also}$$

$$L_i = logit = ln\left(\frac{P_i}{1-P_i}\right) = \frac{\frac{e^{Z_i}}{1+e^{Z_i}}}{\frac{1}{1+e^{Z_i}}} = e^{Z_i} = Z_i \text{------- (3.12)}$$

Where, L_i refers to logit, and hence equation (3.12) is the logit model. It shows how log odd in favor of achieving IPs objectives change as the respective independent variable changes by a unit. It should also be noted that the estimated coefficients do not directly indicate the effect of change in the corresponding explanatory variables. The suffix ln refers to the log of the odds ratio, is not only linear in *X*, but also linear in the parameters.

Equation (3.12) says that the coefficient of logistic model is the corresponding logarithmic transformed odds ratio of logistic model. For Kasza and Wolfe (2014), the odds ratio is the factor by which the odds of being in the predicted level of the binary dependent variable multiplies when the independent variable increases one unit.

The study also estimated the marginal partial derivatives (dy/dx) after regressing nonlinear regression model (3.9) and shows discrete changes in explanatory variables on the probability (P) of the outcome occurring for binary variables at the reference points. Hence, the marginal effects and discrete changes of categorical explanatory variables are very useful when interpreting the result of a binary logit or probit model. By default, the means of independent variables are the reference point for discussing the values of marginal effects. Therefore, the logistic regression model such as models for dichotomous/binary responses as in the case of equation (3.12) can be viewed as latent-response models. Finally, the three Binary logistic models estimated in this dissertation take the form:

$$Z = \alpha + \beta_1 X_1 + \beta_2 X_1 + - - - + \beta_i X_i + \mu \text{---------------------- (3.13)}$$

Where,

- $Z =$ represent the three dependent variables (economic competitiveness, social inclusiveness & shared prosperity objective, and environmental stewardship)
- X_i =the vector of explanatory variables,
- β_i = the parameter estimates of the explanatory variables, and
- μ =the error terms

According to Wooldridge (2010) applied researchers estimate logistic models to infer the causal effect of one or more independent variables on the probability of a binary outcome (Z=1, 0 otherwise) for a population of interest (enterprises operating in ten industrial parks, in this study case). Thus, in line with argument, the binary logistic models estimated in this dissertation to infer the causal effect of economic, social, and environmental performance indicators on the probability of binary outcomes (achieving economic competitiveness, social inclusiveness and shared prosperity, and environmental safeguarding of Ethiopia through development of IPs or not) for private and public IPs.

There are a number of rationales for employing Logit model in this study. First, if we collect data from ungrouped or individual clients like this study, then OLS estimation is infeasible (Gujarati, 2004: 597). Second, though many studies suggest that both Probit and Logit models are appropriate in instances where the dependent variable is binary or dichotomous (Wooldridge, 2002). The Logit model is a more realistic pattern of change in the probability compared to other qualitative dependent variable models like the Probit, for four main reasons. That is, the odds ratio, which is a measure of the strength and direction of relationship between two variables, has a special property of not requiring variables to be normally distribute and mathematical transformation of the odds ratio is the Logit model. Moreover, this mathematical transformation removes the problem of asymmetry existing in the odds ratio and in turn makes this a superior method as argued by Peng et al, (2005). The third reason is that logistic regression model has powerful predictive power. That is, its close relationship to log-linear discriminate function analysis made the logistic model more popular than other related models, a feature that enables logistic regression to serve as a standard to which other models are compared. Fourth, compared to its competitor, the Probit model, Logit model is less sensitive to outliers and easy to correct a bias (Copas and Corbett, 2002). Finally, the basic assumptions that need to be fulfilled for statistical tests in logistic regression are far less restrictive than those for ordinary least squares regression.

Moreover, the discrete Logit model is preferable to Tobit model, also called the censored model, in that there is no censoring from below and above. In other words, Tobit model is designed to estimate linear relationships between variables when there is censoring from below and above (Cameron & Trivedi, 2005). Desalegn et al., (2020) also noted that in censored regression model, independent variables are known for all respondents in the sample, but the data of the dependent variable are observable only in a limited boundary; for instance, households below poverty line in poverty related studies. In such studies, Tobit model can measure not only the probability of a household being poor but also the intensity of poverty level. In this dissertation however, not only the independent variables are unknown for all respondents but they simply express their perception on their prevalence based on their experience but also the dependent variables are measured as binary or dichotomous responses because they are unobservable in a limited boundary to say above certain level, it will take the value 1 and 0 below that level.

c) Specification of Binary Logistic regression models

In accordance with previous theoretical and empirical studies, there are array of factors that determine economic, social, and environmental performances Ethiopia envisioned to achieve via construction of industrial parks. Hence, this section presents the functional relationship between the dependent variables (economic, social, and environmental performances) and factors/ indicators that affect the performances as well as the three binary logistic models estimated in this dissertation were specified.

In deciding the number of independent variables included in each model, the recommendations of scholars was taken as a reference point. For instance, Hosmer et al. (2013) recommended including a minimum of 10 observations for each independent variable in any regression model. However, they also advise that if feasible, researchers should aim to include 20 observations per independent variable. According to the research conducted by Leblanc and Fitzgerald (2000), it is recommended to have a minimum of 30 observations for each independent variable in a regression model. Accordingly, since the total sample size for this study was determined to be 412 respondents, 20, 24, and 20 independent variables were considered as feasible for economic competitiveness, social inclusiveness, and environmental safeguarding models, respectively. The criteria used for selection is their prevalence to enterprises performance operating in industrial parks established in Developing countries in general and in Ethiopia in particular and strategically relevant for economic, social, and environmental performances of the country in future based on information collected from 30 respondents for pilot test.

Particularly, array of factors that affect economic performance or achieving economic competitiveness objective of Ethiopia include sub-indicators embedded in economic governance, economically enabling site and infrastructure/ ‘Hardware’, services/’ Software’, and impactful nature related to employment, investment, and labor turnover.

Hence, considering the functional relationship between economic performances and its determinants is specified as:

$$\boldsymbol{ECOMP.OBJs} = \boldsymbol{f}\begin{pmatrix} \boldsymbol{COMP.TENDER, MGT.BOARD, CRM\ SYSTEM, PROX.HIGHWAY,,} \\ \boldsymbol{PROX.POWER, CONNECTIVITY, STABLE\ ELECTRIC\ SS, WATER\ SS,} \\ \boldsymbol{BUIL.MAINTENANCE, EMER.MAINT., RRR.SERVE., BUSI.SUPP.,} \\ \boldsymbol{FINC.SUPP., OSS.SERV., B2B\ GATER, HR.REC.SERV,, HIGH\ PCI,} \\ \boldsymbol{FTEQ\ EMPT., HIGH\ FDI\%GFCF, US\$EXspgIPEX} \end{pmatrix}$$

In terms of parametric specification, using binary logistic model (3.13), the economic competitiveness function takes the form:

$$\begin{aligned} \boldsymbol{ECOPM.OBJs} = \boldsymbol{\alpha} + \boldsymbol{\delta_1 COMP.TENDER_1} + \boldsymbol{\delta_2 MGT\ BOARD_2} + \boldsymbol{\delta_3 CRM\ SYSTEM_3} + \\ \boldsymbol{\delta_4 PROX.HIGHWAY_4} + \boldsymbol{\delta_5 PROX.POWER_5} + \boldsymbol{\delta_6 CONNECTIVITY_6} + \\ \boldsymbol{\delta_7 STABLE\ ELECTRIC\ SS_7} + \boldsymbol{\delta_8\ WATERSS_8} \qquad + \end{aligned}$$

$$\begin{aligned} &\boldsymbol{\delta_9 BUIL.MAINTENANCE_9} + \boldsymbol{\delta_{10} EME.MAINT_{10}} + \boldsymbol{\delta_{11} RRR\ SERV_{11}} \\ &+ \boldsymbol{\delta_{12} BUSI.SUPP_{12}} + \boldsymbol{\delta_{13} FINC.SUPP_{13}} + \boldsymbol{\delta_{14} OSS\ SERV_{14}} \\ &+ \boldsymbol{\delta_{15} B2B\ GATHERr_{15}} + \boldsymbol{\delta_{16} HR\ REC.SERV_{16}} + \end{aligned}$$

$$\begin{aligned} &\boldsymbol{\delta_{17} HIGH\ PCI_{17}} + \boldsymbol{\delta_{18} FTEQ\ EMPT_{18}} + \boldsymbol{\delta_{19} HIGH\ FDI\%GCFG_{19}} \\ &+ \boldsymbol{\delta_{20} US\$EXSPGIPEX_{20}} + \boldsymbol{\mu} - - - - - - - - - - (\mathbf{3.14}) \end{aligned}$$

Where, α is the constant term, $\delta_1 - \delta_{20}$ are parameters, and μ is the error term. Variables in equation (3.14) μ are as described in Table (3.4) below. The expected sign of each variable in model (3.14) are presented in column (3) of Table 3.4 below.

Table 3. 4:Variables definition and expected signs in Economic competitiveness study

Variable name	**Description**	**Expected sign**
ECOMP.OBJs	Economic competitiveness	Dependent variable
COMP.TENDER	There is an open competitive tender system to select the private sector	**(+)**
MGTBOARD	The Private sector is represented in the Management Board of IPs	**(+/-)**
CRMSYSTEM	Operator Customer Relationship Management (CRM) system is in place	**(+)**
PROX.HIGHWEY	It is connected to an appropriate highway	**(+)**
PROX.POWER	It is in a proximity to power transmission or distribution grid	**(+)**
CONNECTIVITY	There is both telephone and internet connectivity service	**(+)**
STABLE ELEC. SS	There is a stable electric power supply with less	**(+)**

	hours of outage	
WATER SS	There is good water supply with less hours of interruption	**(+/-)**
BUIL.MAINTENANCE	Regular and Scheduled Buildings Maintenance	**(+/-)**
EMER.MAINT.	Dedicated Rapid-Response or Emergency Maintenance	**(+)**
RRR.SERV.	Repair, Rectification & Restoration (RRR) Services for utilities	**(+/-)**
BUSI.SUPP,	Dedicated or Localized IP Business Support	**(+)**
FINC.SUPP.	Industrial Park user have access to specific financial support Programs	**(+/-)**
OSS.SERV.	Dedicated One-Stop Shop/Single-Window service is present for IPs	**(+)**
B2B.GATHER	Business-to-business (B2B) gatherings are being held on regular basis	**(+/-)**
HR.REC.SERV.	There is Human Resources Agency, for Recruiting and Training services	**(+/-)**
HIGH.PCI.	The Per Capita Income in the Industrial Park higher than the National Per CapitaIncome in 2023	**(+/-)**
FTEQ.EMP.	The ratio of Full-time employment to par-time employment in Industrial Park is greater than 1	**(+)**
HFDI%GFCF	FDI % to total investment (or GFCF) in IP is higher than FDI % of total investment (or GFCF) Nationally in 2023.	**(+/-)**
US$.EXSPG/IPEX.	US$ exports of processed or semi-processed goods as % of total IP US$ exports is higher than US$ exports of processed or semi-processed goods as % of total national exports in US$ in 2023.	**(+)**

Note: The dependent variable (ECOMP Objs) is binary/dichotomous, and all the independent variables are categorical, measured in likert scale. Where, (+) refers to positive effect & (-) negative effect hypothesized based on literature review.

On the other hand, indicators embedded in socially appropriate site and social infrastructure, quality social management system and service, occupational health and safety, good labor relations, and social inclusiveness are the major factors that affect social performance or achieving social inclusiveness and shared prosperity objective of Ethiopia. In a similar fashion, the functional relationship between social performances or social inclusiveness & Shared prosperity and its determinants is specified as:

$$SOCIAL\ INCLUSIVNESS$$
$$= f\begin{pmatrix} POWER\ LINE\ BURRIED, CHILDCARE\ FACILITIES, FAITH\ and\ PRAYERS\ FACILITIES, \\ ONSITE\ INCID.RESP.CEN., DISABLED\ INCLUSIVE\ BUIL.DESIGN, \\ HIGHER\ AVE.COMMUTE\ TIME\ TO\ IPs, SIMS\ SYSTEM, EPR\ SYSTEM, \\ SOCIAL\ PERF.REPO., MORE\ FIRMS\ WITH\ OHSAS\ 18001\ or ISO140001\ CERTI, \\ ONSITE\ HEALTH\ FACILITIES, FIRE\ ALARM\ PER\ BUILDINGS, \\ ACCES\ TO\ FIRE\ SERVICE, HIGHER\ NURSES\ PER\ CAPITA, \\ LOWER\ AVE.RESPONCE\ TIME, DATA\ ON\ COMPLIENTS\ and\ MEASURES, \\ AUTORIZED\ 3P\ LAB.INSPECTORS\ ONSITE, HIGHER\ AVE, SALARY, \\ HIGHER\ EMPT, WITH\ OPEN\ ENDED\ CONTRACTS, LOWER\ EMPLOYEES\ TURNOVER, \\ HIGHER\ FEMALE\ IN\ WORKFORCE, HIGHER\ FEMALE\ WAGES\ TO\ MALE\ WAGES, \\ HIGHER\ EMP.AGE\ 16\ TO\ 30, HIGHER\ DOM.MSMEs\ INVESTMENT \end{pmatrix}$$

The binary logistic model, specified in reference to equation (3.13), for social inclusiveness and shared prosperity objective of Ethiopia is:

$$\begin{aligned} &SOCIAL\ INCLUSIVNESS \\ &= \beta + \vartheta_1 POWER\ LINE\ BURRIED_1 + \vartheta_2 HILDCARE\ FACILITIES_2 \\ &+ \vartheta_3 FAITH\ \&\ PRAYERS\ FACILITIES_3 + \vartheta_4 ONSITE\ INCID.RESP.CEN_4 \\ &+ \vartheta_5 DISABLED\ INCLUSIVE\ BUIL.DESIGN_5 \\ &+ \vartheta_6 HIGHER\ AVE.COMMUTE\ TIME\ TO\ IPs_6 \\ &+ \vartheta_7 SIMS\ SYSTEM_7 + \vartheta_8 ERP\ SYSTEM_8 + \vartheta_9 SOCIAL\ PERF.REPO_9 \\ &+ \vartheta_{10} MORE\ FIRMS\ WITH\ OHSAS\ 18001\ OR\ ISO14001\ CERTI_{10} \\ &+ \vartheta_{11} ONSITE\ HEALTH\ FACILITIES_{11} + \vartheta_{12} FIRE\ ALARM\ PER\ BUILDINGS_{12} \\ &+ \vartheta_{13} ACCES\ TO\ FIRE\ SERVICE_{13} \\ &+ \vartheta_{14}\ HIGHER\ NURSES\ PER\ CAPITA_{14} + \vartheta_{15} LOWER\ AVE.RESPONCE\ TIME_{15} \\ &+ \vartheta_{16} DATA\ ON\ COMPLIENTS\ and\ MEASURES_{16} \\ &+ \vartheta_{17} AUTORIZED\ 3P\ LAB.INSPECTORS\ ONSITE_{17} \\ &+ \vartheta_{18} HIGHER\ AVE, SALARY_{18} \\ &+ \vartheta_{19} HIGHER\ EMPT, WITH\ OPEN\ ENDED\ CONTRACTS_{19} \\ &+ \vartheta_{20} LOWER\ EMPLOYEES\ TURNOVER_{20} \\ &+ \vartheta_{21} HIGHER\ FEMALE\ IN\ WORKFORCE_{21} \\ &+ \vartheta_{22} HIGHER\ WAGES\ TO\ MALE\ WAGES_{22} \\ &+ \vartheta_{23} HIGHER\ EMPT, AGE\ 16\ TO\ 30_{23} + \\ &+ \vartheta_{24} HIGHER\ DOM.MSMEs\ INVESTMENT_{24} + \varepsilon \end{aligned}$$

………… (3.15)

Where, β is the constant term, $\vartheta_1 - \vartheta_{24}$ are parameters, and ε is the error term. Variables in equation (3.15) are as described in Table (3.5) below. The expected sign of each variable in model (3.15) are presented in column (3) of Table 3.5.

*Table 3. 5:**Variables definition and expected signs in Social inclusiveness and shared prosperity model***

Variable name	Description	Expected sign
SOCIAL INCLUSSIVNESS	Social inclusiveness and shared prosperity	**Dependent variable**
POWER LINE BURRIES	Power lines in Industrial Park are buried, for workforce safety	**(+)**
CHILDCARE FACILITIES	Presence of Childcare facilities	**(+)**
FAITH & PRAYERS FACILITIES	Faith and prayer facilities for religious groups are prevalent	**(+)**
ONSITE INCD. RESP. CEN	Presence of on-site Incident Response Centre	**(+)**
DISABLED INCLUSIV BD	Disabled-inclusive building design (i.e., access ramp and elevator in eachbuilding)	**(+/-)**
HIGHER AVE. COMMUT TIME	Average commute time to Industrial Park workplace for employees is higher than average commute time to workplace nationally	**(+/-)**
SIMS SYSTEM	The is a social impact management & monitoring system (SMS)	**(+/-)**
EPR SYSTEM	There is Emergency Preparedness and Response system	**(+)**
SOCIAL PERF. REPO.	There is annual public/published Social Performance Report for IP	**(+)**
MORE FIRMS WITH OHSAS 18001/ISO14001 CERTI.	Percentage (%)of firms with OHSAS 18001/ ISO 45001 Certification in IP is greater than % firms with Certification Nationally[2]	**(+/-)**
ONSITE HEALTH FACILITIES	On-site hospital, clinic, or dispensary within IP	**(+)**
FIER ALARM PER BUILDING	The number of Fire alarms/building is greater than the number Nationally	**(+)**
ACCESS TO FIRE SERVICECFS	There is access by fire services to all parts of the Industrial Park	**(+)**
HIGHER NURSES PER CAPITA	The number of nurses per capita (per 1000 people) is higher than the number the National per capita in 2023.	**(+/-)**
LOWER AVE. RESPONSE TIME	The mean Emergency (Police, Fire, & Ambulance) response time in IP is lower (or swift) compared the national average	**(+/-)**
DATA ON COMPLAINTS & MEASURES	An aggregated, publicly accessible labor complaints and its measurement mechanism related data are available	**(+)**
AUTORIZED 3P LAB. INSPACTORS ON SITE	There are on-site Regulator, Operator or Third-Party Authorized Labor Inspectors or Counselors	**(+)**
HIGHER AVE SALARY	Average Salary of employees in IP is higher compared to Aver. Salary Nationally	**(+)**

HIGHER EMP WITH OPEN ENDED CONTRACTS	The % of employees on term or open-ended contracts in IP is higher than % employees on term or open-ended contracts Nationally	**(+/-)**
LOWER EMPLOYEES' TURNOVER	The % of employee annual turnover in IP is lower than the %of employees' annual turnover nationally	**(+)**
HIGHER % FEMALE WORKFORCE	The % of female workforce in IP to total workforce is higher than % of female workforce Nationally	**(+)**
HIGHER FEMALE WAGES TO MALE WAGES RATIO	Female wages as % of male wages in industrial park is higher than Femalewages as % of male wages Nationally	**(+/-)**
HIGHER % EMP AGE 16 TO 30	The % of employees between ages of 16 and 30 in IP is higher than % employees between ages of 16 and 30 Nationally	**(+/-)**
HIGHER DOM. MSMEs INVST.	Domestic MSME investment as a % total investment in IP is higher than MSME investment as a % total investment nationally	**(+)**

*Note: The dependent variable (*SOCIAL INCLUSSIVNESS*) is binary/dichotomous and all the independent variables are categorical, measured in likert scale. Where, (+) refers to positive effect & (-)negative effect hypothesized based on literature review.*

Finally, a number of environment related indicators, such as environmentally appropriate site indicators, green infrastructure indicators, green systems indicators, and efficient and clean production, emissions, and waste management indicators. The functional relationship between environmental stewardship and determinants can be specified as:

$$\textbf{\textit{ENVIRONMENTAL STEWARDSHIP}} = f\left(\begin{array}{c} \textbf{\textit{SITE COMPATABILITY WITH LUMP, \%PLOT ALLOCATED TO LMA.,}} \\ \textbf{\textit{IPs SITUATED IN REDEVELOPED BROWNFIELD, OFSITE LANDFILLS FOR SWM,}} \\ \textbf{\textit{TOXIC and HAZARDOUS WASTE COLLECTION CSTD MGT SYSTEM, WSSWWTP,}} \\ \textbf{\textit{SUSTAINABLE RAIN WATER COLLECTION AND REUSE SYS,}} \\ \textbf{\textit{SEGREGATED RECYCLING RECEPTION BINS and CONTAINERS,}} \\ \textbf{\textit{BUILDINGS WITH ENV. DESIGN CERTIFICATE, SOLAR STREET LIGHTING,}} \\ \textbf{\textit{WASTE EXCH. CLEARING HOUSE, ANNUAL ENV. AUDIT , PERFORMED,}} \\ \textbf{\textit{FIRMS WITH "GREEN" CERT. NATIONAL LEVEL,}} \\ \textbf{\textit{OPERATORS POSSESSES UN COMPACT REGIS.,}} \\ \textbf{\textit{OPERATORS POSSESSES ISO 14001, OPERATORS POSSESSES ISCC,}} \\ \textbf{\textit{SWC SERVICE, EFFICIENT WATER USE m3 per US\$ SALES,}} \\ \textbf{\textit{HAZARDOUS WASTE PRODUCED PER US\$ SALES,}} \\ \textbf{\textit{PERCENTAGE OF SOLID WASTE SENT TO LANDFILLS}} \end{array}\right)$$

In terms of parametric specification, using binary logistic model (3.11), the environment stewardship function has the following form:

$$
\begin{aligned}
&\boldsymbol{ENVIRONMENTAL\ STEWARDSHIP}\\
&= \boldsymbol{\theta + \lambda_1 SITE\ COMPATABILITY\ WITH\ LUMP_1 + \lambda_2 \%PLOTE\ ALLOCATED\ TO\ LLMA_2}\\
&+ \boldsymbol{\lambda_3 IPs\ SITUATED\ IN\ REDEVELOPED\ BROWNFIELD_3}\\
&+ \boldsymbol{\lambda_4 OFFSITE\ LANDFILLS\ FOR\ SWM_4}\\
&+ \boldsymbol{\lambda_5 TOXIC\ and\ HAZARDOUS\ WASTE\ COLLECTION\ \ CSTED\ MGT\ SYSTEM_5}\\
&+ \boldsymbol{\lambda_6 PSSWWPT_6}\\
&\qquad + \boldsymbol{\lambda_7 SUSTAINABLE\ RAINWATER\ COLL\ REUSE\ SYS_7}\\
&\qquad + \boldsymbol{\lambda_8 SEGREGATED\ RECYCLING\ RECEPTION\ BINS/CONTAINERS_8}\\
&\qquad + \boldsymbol{\lambda_9 BUILDINGS\ WITH\ ENV.DESIGN\ CERTEFICATE_9}\\
&\qquad + \boldsymbol{\lambda_{10} SOLAR\ STREET\ LIGHTENING_{10}}\\
&\qquad + \boldsymbol{\lambda_{11} WAST\ EXCH.CLEARING\ HOUSE_{11}}\\
&\qquad + \boldsymbol{\lambda_{12} ANNUAL\ ENV\ AUDIT\ PERFORMED_{12}}\\
&\qquad + \boldsymbol{\lambda_{13} FIRMS\ WITH\ \text{"GREEN"}\ CERT.AT\ NATIONAL\ LEVEL_{13}}\\
&\qquad + \boldsymbol{\lambda_{14} OPERATORS\ POSSESSES\ UN\ COMPACT\ REGIS._{14}}\\
&\qquad + \boldsymbol{\lambda_{15} OPERATOR\ POSSESES\ ISO14001_{15}}\\
&\qquad + \boldsymbol{\lambda_{16} OPERATORS\ POSSESSES\ ISCC_{16} + \lambda_{17} SWC\ SERVICE_{17}}\\
&\qquad + \boldsymbol{\lambda_{18} EFFICIENT\ WATER\ USE\ m3\ PER\ US\$\ SALES\ _{18}}\\
&\qquad + \boldsymbol{\lambda_{19} HAZARDOUS\ WASTE\ PRODUSED\ PER\ US\$\ SALES_{19}}\\
&\qquad + \boldsymbol{\lambda_{20} \%\ OF\ SOLIDE\ WASTE\ SENT\ TO\ LANDFILLS_{20} + e} --- (\mathbf{3.16})
\end{aligned}
$$

Where, θ is the constant term, $\lambda_1 - \lambda_{20}$ are parameters, and e is the error term. Independent variables and their expected signs in model (3.16) are presented in Table 3.6 below.

Table 3. 6:Variables definition and expected signs in Environmental safeguarding Model

Variable name	Description	Expected sign
ENVIRONMENTAL SAFGUARDING	Environmental protection and safeguarding	**Dependent variable**
SITE COMPATABILITY WITH LUMP	Site compatibility with Land Use Master Plan as regards non-agricultural use	**(+)**
PERCENTAGE OF PLOTS ALLOCATED TO LMA	The % of plots actually allocated to non-polluting or light manufacturing activities in IP is greater than % of GDP represented by non-polluting or light manufacturing activity nationally	**(+)**
IPs IN REDEVELOPED BROWNFIELD SITE	Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing, and converting existing infrastructure or buildings	**(+/-)**
OFF-SITE LANDFILL FOR IP SWM	Presence of an off-site landfill for IP solid waste management	**(+/-)**
TOXIC &	Presence of toxic and hazardous waste collection,	**(+/-)**

HAZARDEOUS MATERIALS CSTD MGT SYSTEM	storage and treatment or disposal management system	
WSS AND WWTP	Presence of Public Wastewater Sewerage System, STP and/or of Wastewater Treatment Plant (WWTP)	**(+)**
SUSTAINABLE RAINWATER COLLECTION & RE-USE SYSTEM	Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, waterhyacinth) and re-use systems	**(+)**
SEGREGATED RECYCLING RECEPTION BINS OR CONTAINERS	Segregated recycling reception bins, bells and/or containers for: paper & card; recyclable plastic containers; recyclable metals and others.	**(+)**
BUILDINGS WITH ENV. DESIGN CERTFICATES	There are buildings with environmental design related certificates	**(+)**
SOLAR STREET LIGHTING	There are Solar Street lighting	**(+/-)**
WASTE EXCH CLEANING HOUSE	Presence of waste exchange clearinghouse, promoting industrial symbiosis and economic circularity	**(+)**
ANNUAL ENV AUDIT PERFORMED	Annual environmental audits performed on each firm	**(+/-)**
FIRMS WITH "GREEN" CERT. AT NATIONAL LEVEL	Presence of firms having obtained a "Green" certification at national level	**(+/-)**
OPERATOR POSSESSES UN COMPACT REGIS.	Operator possesses UN Global Compact Registration[3]	**(+/-)**
OPERATOR POSSESSES ISO14001	Operator possesses ISO14001	**(+)**
OPERATOR POSSESSES ISCC	Operator possesses International Sustainability and Carbon Certification (ISCC)	**(+/-)**
SWC SERVICE	Presence of solid waste collection service	**(+/-)**
EFFICIENT WATER USE IN m3 TO USD SALES	The ratio of Efficient water use in m3/US$ Sales in Industrial Park is lower than water use in m3/US$ Sales nationally	**(+/-)**
HAZARDOUS WASTE PRODUCED /US$ SALES	Hazardous waste produced/US$ in Sales nationally in Industrial Park is lower than Hazardous waste produced /US$ in Sales nationally	**(+)**
PERCENTAGE SOLIDE WASTE SENT TO LANDFILE	Percentage (%) solid waste sent to landfills (store of garbage) in Industrial Parkis lower than solid waste sent to landfills nationally	**(+)**

*Note: The dependent variable (*ENVIRONMENTAL SAFGUARDING*) is binary/dichotomous and all the independent variables are categorical, measured in likert scale, Where (+) refers to positive effect & (-)negative effect hypothesized based on literature review.*

3.8.1.3. Diagnostic Tests of Logistic regression

In order to check the validity of the binary logistic models used in this dissertation, because the models have satisfied the basic assumptions of logistic regression, important diagnostics tests were performed. When the assumptions are not met, the analysis may provide biased estimates of the coefficients, which may lead to misinterpretation of the results. It is, therefore, important to check the underlying assumptions before considering the logistic regression analysis valid. Accordingly, this section presents the four important diagnostics tests performed in order to validate the assumptions of Binary logistic regression, namely multicollinearity test, model fit, classification test, and area under the curve.

1. Multicollinearity test

Multicollinearity is a statistical phenomenon that occurs when two or more independent variables in a regression model are highly correlated with each other. That is, multicollinearity refers to a situation in which one or more independent variables are a linear combination of (highly correlated with) other independent variables in a model. In short, multicollinearity indicates a strong linear relationship among the predictor variables (Tabachnick and Fidell, 2013).

Guajarati (2004) also noted that if multicollinearity exists the regression coefficients of independent variables are undetermined, and it is difficult to measure their standard error. That is, the model becomes dubious (i.e., the model may not provide a correct estimate of the regression coefficients) when multicollinearity is present. The occurrence of multicollinearity among the exogenous latent constructs can potentially affect the estimates of regression coefficients and the statistical significance tests (Hair et al., 2006). Specifically, multicollinearity upturns the standard errors of the coefficients, which leads to decrease in the predictive power of the independent variables on the dependent variables (Tabachnick and Fidell, 2007).

In other words, multicollinearity can create challenges in the regression analysis because it becomes difficult to determine the individual effects of each independent variable on the dependent variable accurately. Furthermore, when multicollinearity exists, it leads to large, unpredictable, unstable and unreliable coefficient estimates, making it harder to interpret the results and draw meaningful conclusions from the model, leading to unreliable inferences about the effects of the predictor variables on the response variable. Therefore, it is logical to check for multicollinearity of the independent variables included in the binary logistic models employed in this dissertation and take remedial measures if there is multicollinearity problem. Hair et al.,(2016) suggest applying one of the three remedial to fix multicollinearity problem. These measures include removing one of the highly correlated variables or omitting the variable(s) with a very high (or very low) SE until the magnitude of the SEs hovers between 0.001 and 5.0 or use a dimensionality reduction technique such as principal component analysis to reduce the number of variables while retaining most of the information and improve the predictability of a model.

Accordingly, four approaches were used in order to detect multicollinearity in the dataset used in this dissertation and take remedial measure to fix the problem. First, it was checked by generating a correlation matrix of the independent variables included in the economic, social, and environmental performances models using Pearson correlation coefficients. According to Marczyk et al. (2005), correlation analysis is the most common and basic measure or tool for investigating the relationship between two or more variables. The Pearson correlation coefficients (r) and the population correlation value (p) are used to quantitatively determine the degree to which the variables are correlated. If the population correlation value (p) is close to 0, then it is understood that there is a significant linear correlation between the study variables. In general, pairwise correlation coefficient values of 0.7 and above indicate the presence of multicollinearity problem. On the other hand, if the p value is significantly different from 0, then there is no significant correlation between the variables. Here, a question must be raised as how close the p value must be to conclude that there is a significant correlation between the variables and vice versa. Moreover, 95%confidence interval or 5% level significance (i.e., p value of 0.05 or below) was used to determine the statistical significances of each correlation coefficient. To generate the correlation matrix, use the following command:

$$pwcorr\ X_1X_2 - - - X_n, star(5) \text{-----------------------------}\ (3.17)$$

Another simple and subjective way to examine multicollinearity is visual inspection of the standard errors (SE) of each independent variable coefficient as provided after estimation of equation (3.14 to 3.16). The reason is that predictor variables with high multicollinearity may have inflated standard errors and p-values, which can lead to incorrect conclusions about their statistical significance. If multicollinearity is present and affects the model, the magnitude of the standard errors (SEs) of some of the coefficients will be very high (greater than 5.0) or very low (less than 0.001). The existence of multicollinearity means that the model is not statistically stable.

Third, sometimes an independent variable may have a strong correlation with the constant (residuals or errors) in the model. If there is a strong correlation between the constant and any of the independent variables, you can omit the constant from the model. To check the correlation between constant and independent variables in the model, first generate a residual variable (representing the constant) by using the following command:

$$predict\ residual, resid \text{----------------------}\ (3.18)$$

This command will generate a new variable "residual" containing the residual values (errors). Now, to get the correlation matrix of independent and residual variables, use the following command:

$$pwcorr\ X_1X_2 - - - X_n\ residual, star(5) \text{----------------------}\ (3.19)$$

Where, $X_1X_2 - - - X_n$ refer to the independent variables in the three binary logit models. Then, we look at the correlation between one or more of the independent variables and residual (constant). If there is a correlation coefficient greater than 0.7,$r \geq 0.70$, it indicates the presence of multicollinearity problem. However, if all correlation coefficients below 0.7 or $r < 0.70$, it indicates absence of multicollinearity problem. The absence of multicollinearity affects the results obtained from regression of equation (3.5) since none of the SEs of coefficients are greater than 5.0 or less than 0.001. If there is multicollinearity problem, we can infer that the variable (s) with the correlation between it and residual greater than 0.7 had affected the results, some of the SEs of the coefficients would have been either greater than 5.0 or less than 0.001. If there is a problem like this or is multicollinearity problem, it is suggested to run the binary logistic regression analysis without (omitting) the constant. Since all the independent variables are ordinal or polychotomous categorical variables, the following is the command to do the analysis without the constant in the model:

$$logistic\ Z\ i.X_1 i.X_2 - - - i.X_n\ , nocons \text{ ---------------------- } (3.20)$$

Where, Z is the dependent variable and $X_1 X_2 - - - X_n$ are the independent variables. Whereas $nocons$ refers to mean no constant.

Forth, in addition to correlation coefficient of explanatory variables, researchers also applied variance inflation factor (VIF) or tolerance, which is the reciprocal of VIF in order to detect collinearity (or multicollinearity) among predictors in their models (Hair et al., 2016). Hence, VIF and tolerance values for explanatory variables included in the three models used in this dissertation (Model 3.14 to 3.16) were obtained in this dissertation, after regressing Ordinary least square (OLS) models and performing the VIF test. The VIF score of an independent variable represents how well the variable is explained by other independent variables. When VIF of individual explanatory variable is higher than 10 or tolerance is lower than 0.1, there is significant multicollinearity that needs to be corrected.

2. Checking for model fit

Hosmer and Lemeshow (2000) noted that hen the intention of analysis is prediction (i.e., to identify the predictors), then the question is "How good is the model for prediction?" This is judged based on the Hosmer-Lemeshow goodness-of-fit test and the positive and negative predictive values given in the classification table. This test indicates how well the observed and predicted values fit with each other (i.e., the observed and predicted probabilities match with each other). This test is done by writing the command in equation (3.21) after estimating the binary logistic regression:

$$lfit, group(10) table \text{ -------------------------------- } (3.21)$$

In doing so, the 10-fold cross validation is employed to help minimize the bias associated with the analysis of performances and test data as suggested by many scholars (see 10 in bracket after group, in equation 3.21). The result obtained using the above command is interpreted as follows. If the Hosmer-Lemeshow chi-square test p-value is greater than 0.05 or statistically insignificant, then we can conclude that the model is fit or useful for prediction of the outcome variable by the independent variables included in the model. On the contrary, if the Hosmer-Lemeshow chi-square test is significant ($p<0.05$), we will conclude that the model is not good enough to predict the outcome variable in the model. In this case, the null and alternate hypotheses to be estimated are

H_0: The model fits to predict the outcome variable

H_0: The model does not fit to predict the outcome variable

Where the desired outcome of any investigation is not to reject or accept the null hypothesis that the model fits. The acceptance of the null hypothesis also implies that there is no difference between the observed and model-predicted values, or they are close together.

3. Classification test

The classification table provides us with the sensitivity, specificity, and positive and negative predictive values, and overall accuracy of the model. The predictive values indicate how well the model is able to predict the correct category of the dependent variable (i.e., have or do not have the disease). To get the sensitivity, specificity, and positive and negative predictive values, we need to generate the classification table by using the following command (after running the logistic regression analysis). Usually, the classification table is generated at a cut-off value of 0.5 (50%). You can, however, change the cut-off value of your choice.

$$lstat, cutoff(0.5) \text{ -------------------------------- } (3.22a) \text{ or}$$

$$estat\ classification \text{ --------------------------- } (3.22b)$$

For Hosmer and Lemeshow (2000), classification is sensitive to the relative size of the two outcome component groups and always favors classification into the larger group, a fact that is also independent of the fit of the model. They also highlighted that the classification test table is more appropriate only if classification is the stated goal of the analysis; otherwise, it should only supplement more rigorous methods of assessment of fit.

4. Area under ROC curve

As equation (3.22a) demonstrates, sensitivity and specificity rely on a single cut-point to classify a test result as positive. A more complete description of classification accuracy, however, is given by area under ROC. It plots the probability of detecting true signal (sensitivity) and false signal (1 - specificity) for the entire range of possible cut-points. According to Copas and Corbett (2002), the area under the curve provides a measure of the model's ability to discriminate between those subjects who experience the outcome of interest versus those who do not. In our case, we predict that Ethiopia will achieve economic, social, and environmental objectives through expansion of IPs if the $Pr(Z = 1) \geq 0.50$ and predict Ethiopia will not achieve these through expansion of IPs if $Pr(Z = 1) < 0.50$.

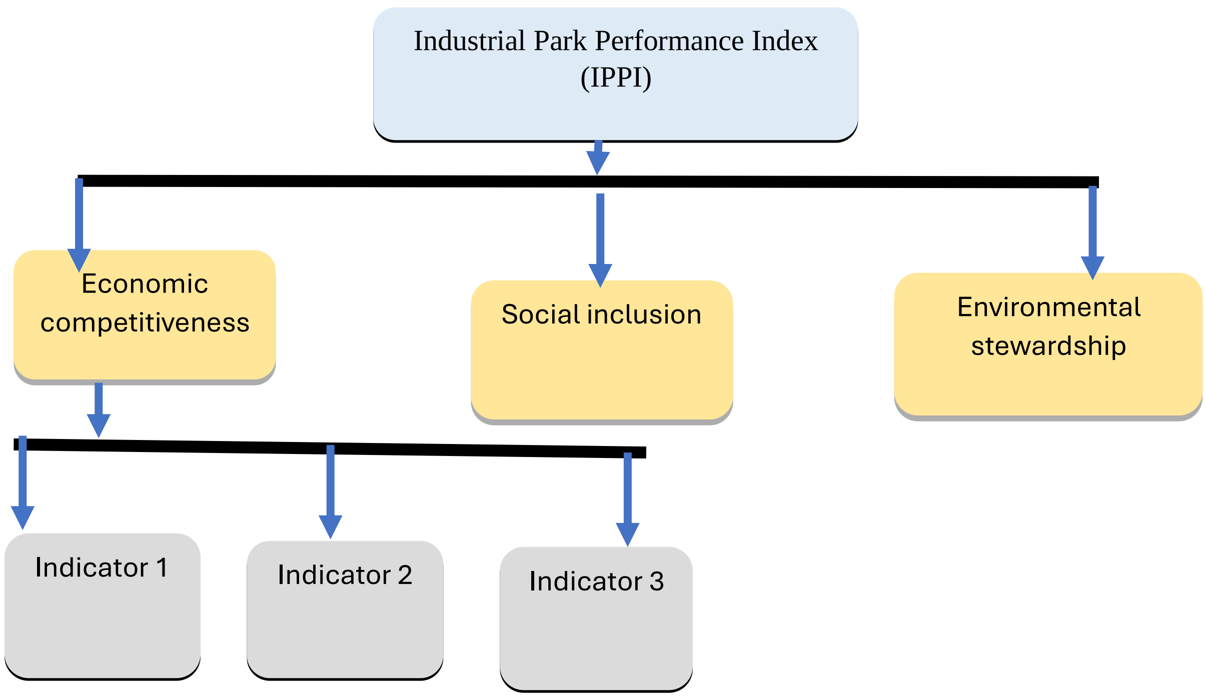
Thus, we can construct the Receiver-operating characteristic (ROC) curve to assess the model discrimination, which is an indication of the accuracy of logistic regression model. Discrimination is defined as the ability of the model to distinguish between those who have the outcome (e.g., a disease) and those who do not have the outcome. Discrimination is evaluated by using the ROC curve analysis. In ROC curve analysis, the area under the curve is measured. The area under the ROC curve ranges from 0 to 1. A value of 0.5 indicates the model is useless. Values between 0.7 and 0.8 are considered acceptable discrimination, values between 0.8 and 0.9 indicate excellent discrimination, and values ≥0.9 indicate outstanding discrimination. To get the ROC curve, after performing the logistic regression analysis, use the following command

$$lroc \text{ -------------------------------- } (3.23)$$

3.8.1.4. Econometrics method

The Industrial Park Performance Index (IPPI) is a comprehensive tool that assesses the performance of industrial parks from economic, social, and environmental perspectives. It provides valuable insights into how industrial parks are contributing to economic growth, fostering shared prosperity, and practicing environmental safeguarding. The overall structure of the estimation stages is presented as follows:

Figure 3. 2: IPPI estimation stage



Source: Own design based on literature (2024)

Let n represent the number of companies and $m \geq 2$ be the number of dimensions. Each dimension is represented by an indicators j, where j is between1and d. Let $Y = |Y_{ij}|$ denote the $n \times d$ matrix of achievements, where the typical entry $Y_{ij} \geq 0$ is the achievement of companies i=1,2, …,n in wellbeing indicator j=1,2, …,d. Wellbeing indicator is defined as a situation of achieving the indicators in economic, social, and environmental dimensions. For the indicator cutoff, the report uses dimensional level min-max approach.

For any given Y, let $g = |g_{ij}|$ is an achivement score matrix, which has a value between zeo and one. The value approaches to one when company i entitlement is closer to the maximum value in the j^{th} indicator, and it approaches to zero when company i entitlement is closer to the minimum value in the j^{th} indicator. For the IPPI estimation, the min and the max values are five and one, respectively.

$$g_{ij} = \frac{Y_{ij} - min}{max - min} \text{-------------------------------- (3.24)}$$

After the identification of achivement score matrix, the next step is assigning weights to each dimension (economic, social, and environmental). The index allows the assignment of varied weights to the dimensions. However, in this study, an equal weight to each dimension and similar weights to all indicators j within a dimension is adopted. This has been done by assuming that the available chosen dimensions are relatively equally important.

Having the weighted achivement score matrix ($w_j g_{ij}$) for each indicator, finding the aggregate score for all dimension (C_i) is the next task. C_i is defined as the horizontal sum of weighted achivement score matrix for dimensions, which is written as follows:

$$C_i = \sum_{j=1}^{d} w_j g_{ij} \text{ -------------------------------- (3.25)}$$

The index ranges between zero and one, where one represents the highest value, and zero represents the lowest value. Therefore, values approaching zero represent “the lack of” while values approaching to one represent “the strong presence of” the respective indicators. Values that approximately fall around 0.5 are taken as a moderate condition.

$$IPPI = \frac{1}{n}\sum_{i=1}^{n}\frac{1}{d}(C_i^*) \text{ ----------------------------- (3.26)}$$

The industrial park performance index proposes three dimensions and sixty-four indicators.

Decomposing by population sub-groups

Suppose the population size of achievement matrix Y is denoted by n. Matrix Y is divided into two population subgroups: Y' with population size n_1 and Y'' with population size n_2

such that $n = n_1 + n_2$. Population Subgroup Decomposability: An IPPI measure is additive population subgroup decomposability if:

$$M(Y) = \frac{n_1 M(Y^{'})}{n} + \frac{n_2 M(Y^{''})}{n} \text{ ----------------------------- } (3.27)$$

Then, one can calculate the contribution $S(Y')$ of each group to overall IPPI, which can be calculated as follows:

$$S(Y') = \frac{n_1 M(Y^{'})}{nM(Y)} \text{ ----------------------------- } (3.28)$$

The IPPI methodology decomposes achievements by indicators and dimensions. This decomposition is based on the headcount industrial park performance index (H) which is defined as:

$$H_j = \sum_{i=1}^{n} g_{ij} \text{ ----------------------------- } (3.29)$$

3.8.2. Qualitative data analysis methods

Data for the qualitative analysis were gathered through unstructured interviews and document review. As outlined in the research design, these qualitative data were summarized and analyzed thematically. This approach was employed to check for any convergence between the findings of the qualitative and quantitative results.

Indeed, this method of qualitative data analysis proved beneficial for the researchers. It allowed them to identify or explore ideas and opinions that fell outside the scope of quantitative measuring scales. This underscores the importance of qualitative analysis in providing a more comprehensive understanding of the research topic, beyond what can be measured quantitatively. It offers valuable insights into the subjective experiences and perceptions of the respondents, thereby enriching the overall findings of the study.

3.9. Knowledge translation

Knowledge Translation (KT) is a term used in research to denote the process of converting new knowledge and findings from research into practical applications that can enhance practices and policies (Straus, Tetroe, & Graham, 2009). In the context of this study report on the role of Industrial Parks (IPs) in Ethiopia, the researcher has outlined a comprehensive plan for knowledge translation:

1. **Identifying Key Findings**: The first step involves identifying the key findings that are relevant for improving the existing economic, social, or environmental performance of the IPs.
2. **Determining Knowledge Users**: The next step is to identify the beneficiaries of these findings. This could include policymakers, IP managers, and other stakeholders in Ethiopia's industrial sector. A list of beneficiaries in both the private and public sectors will be prepared, and communication will be established with them.
3. **Translating the Findings**: The findings will be translated into a format that is easily understandable and actionable for the knowledge users. This could involve simplifying complex data, using visual aids, or writing executive summaries (Straus, Tetroe, & Graham, 2009).
4. **Organizing Presentations**: Presentations will be organized on the translated findings that are readily usable by policymakers, IP officials, and relevant actors.
5. **Establishing Partnerships**: A partnership will be established with UNIDO to initiate a project with the primary focus on advancing the role of IPs for their positive contribution to economic, social, and environmental development. This will involve wider collaboration and integration of stakeholders, with the Ethiopian government playing a central role.
6. **Devising Dissemination Mechanisms**: Mechanisms devised for disseminating translated knowledge. This could involve the use of local media (radio, TV), social media, etc., with the aim of sharing the translated findings with potential knowledge users. This could be through presentations, reports, policy briefs, or other forms of communication.

In conclusion, the process of Knowledge Translation is a critical aspect of this research. It ensures that the findings from the study are not just confined to the academic realm but are translated into actionable insights that can bring about real-world impact in the operation of Industrial Parks in Ethiopia through the respective policy makers and leaders.

3.10. Ethical considerations

In conducting this research, the researcher was deeply committed to upholding the highest ethical standards. This commitment was not just a professional obligation, but a cornerstone of the research process. The researcher began by ensuring respect for all participants. This meant honoring their privacy, desires, culture, religion, dignity, values, gender, and interests. Participation in the study was entirely voluntary, a principle that was upheld throughout the research process. Before any data were collected, the researcher made sure to clearly articulate the purpose of the study to the participants. This was done both verbally and in writing. By doing so, the researcher ensured that all participants gave their informed consent, fully aware of the nature of the study and their role in it.

Confidentiality was another key ethical principle that the researcher adhered to. The data provided by the sample respondents, who were investors or delegates drawn from foreign companies in IPs engaging in manufacturing activities, were treated with the utmost confidentiality. The researcher assured the respondents that their data would be used solely within the context of this research and would not be shared with any unauthorized parties. The researcher also took great care not to exploit or unduly influence the targeted population. The collected data were used only for the intended purpose of the study, and not for any other ulterior motives. Throughout the research process, the researcher adhered to all appropriate behavioral standards. This included ensuring the impartiality of the research, avoiding any form of bias or prejudice that could skew the results.

In conclusion, the researcher's commitment to these ethical principles ensured the integrity of the study, the protection of the participants, and the validity of the findings. This ethical approach is not only a matter of professional responsibility, but also a crucial factor in gaining and maintaining the trust of the research participants and the wider academic community. Moreover, this study gained ethical clearance from college of development studies Institutional Review Board (IRB) to conduct the dissertation.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Empirical studies on the role of industrial parks in economic, social, and environmental performance using UNIDO (2019c) guidelines are scarce. This chapter thus attempts to contribute to the empirical literature on the role of industrial parks in advancing economic competitiveness, shared prosperity, and environmental stewardship objectives of Ethiopia. To this end, quantitative data were collected using structured questionnaire from 395 randomly selected respondents and qualitative data from fourteen (14) Key informants. Moreover, the study employed mixed method of data analysis, whereby the quantitative data collected from respondents using questionnaire were analyzed using descriptive statistics and Binary logistic regression models developed for analysis purpose. On the other hand, qualitative data were analyzed using thematic and content analysis.

More specifically, the chapter aims at examining how selected economic, social, and environment performance indicators affect the advancing economic competitiveness, social inclusiveness and shared prosperity, and environment safeguarding objectives of Ethiopia through the development of Industrial parks since 2015. As a result, three separate binary logistic regression models were estimated using STATA 14 software.

This chapter is organized into four sections. Section 4.1 presents the results and discussion of socio-demographic characteristics of respondents followed by section 4.2, which presents the results and analysis of descriptive statistics of the study variables. Section 4.3 presents the results and discussion of Binary logistic regression on the role of industrial parks in promoting economic competitiveness, shared prosperity, and environmental safeguarding objectives of the country through expansion of IPs. Finally, Section 4.4 discuss the various results of diagnostics tests performed.

4.1. Socio-demographic characteristics of respondents

In this study, a sample size of 412 respondents was determined for data collection through questionnaires. These questionnaires were distributed among selected Ethiopian Industrial Parks, managerial, administrative and technical managers working in ten industrial parks, with various manufacturing specialization including construction materials, textile, leather & apparel, automotive, and food & beverage. These IPs are located in seven cities namely, Dukem, Hawassa, Bahir Dar, Mojo, Dire Dawa, Adama, and Addis Ababa.

The socio-demographic characteristics of the respondents, as presented in Table 4.1 reveal that 84.3% of respondents were male and 15.7% were female. The majority (about 72%) was aged between 31 and 40 years, with 22.28% aged 18 to 30, and about 5.8% of the respondents were above 41 years of age. The mean age of the sample respondents was 35.17 (SD=4.76). The majority (60.5%) held a master's degree, while others had a terminal degree (1.77%) or a bachelor's degree (37.72%). Over half (52.91%) had experience in the manufacturing sector, and 81.77% were employed in the private sector, providing insights into the opportunities and challenges faced by private operators within industrial parks. The vast socio-demographic characteristics of the respondents have important implications for this research finding in understanding the role of IPs for economic competitiveness, shared prosperity, and environmental safeguarding in Ethiopia.

Table 4. 1: Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	333	84.30
	Female	62	15.70
Age group	1=18 – 30	88	22.28
	2=31 – 40	284	71.90
	3=41 – 60	23	5.82
Educational Qualification	1=BA degree	149	37.72
	2=Masters' degree	239	60.50
	3= PhD degree	7	1.77
Number of years in current Position	1= 1-5 years	209	52.91
	2= > 5 years	186	47.09
Do you have experience working in the manufacturing sector?	Yes	229	57.97
	No	166	42.03
What is the business form of your company?	Public	70	17.72
	Private	323	81.77
	Joint venture	2	0.51
Total respondents		**395**	**100%**

Source: *Computed from Survey data (2024)*

4.2. Descriptive statistics of Dependent and Independent variables

4.2.1. Dependent variables

This section provides the analysis of descriptive statistics for the three dependent variables and independent variables. As can be seen from Table 4.2 below, the level of agreement of respondents to the achievement of safeguarding the environment objective through establishment of private and public industrial parks was about 82 percent followed by advancing economic competitiveness objective of Ethiopia was about 67 percent. Those respondents who agree on the achievement of shared prosperity were only 54.2 percent. Thus, based on the opinion of respondents it can be concluded that the achievement of the three objectives through the establishment of IPs in Ethiopia since 2008 was moderate.

Table 4. 2: Respondents' perception on the three objectives of Industrial parks

No	Short form	Questions	Binary responses	
			Yes	No
1	ECOMP.OBJs	Do you think that Ethiopia has achieved advancing economic competitiveness objective through development of IPs?	265 (67.09%)	130 (32.93%)
2	SOCIAL INCLUSIVNESS/SHARED PROSPERITY	Do you think that Ethiopia has achieved shared prosperity objective through development of IPs?	214 (54.18%)	181 (45.82%)
3	ENVIRONMENTAL STEWARDSHIP	Do you think that Ethiopia has achieved safeguarding its environment objective through development of IPs?	324 (82.03%)	71 (17.97%)

Source: Own computation from survey data (2024)

4.2.2. Descriptive statistics independent variables

4.2.2.1. Description of variables used in economic competitiveness model

The role of industrial parks in advancing economic competitiveness was assessed using twenty (20) quantitative economic performance sub-indicators selected from UNIDO (2019c) guideline for analysis purpose. Table 4.3 below summarizes the frequencies and percentages of respondents answering for the 5 Likert scale questions. The key economic performance indicators were categorized under four key indicators: good economic infrastructure (3); Economically enabling site & infrastructure or ‘Hardware’ (5); Economically enabling services or ‘Software’ (8); and Economically Impactful Nature: Employment, Investment, and labor Turn-over (4).

The respondents’ response to the 20 questions related to different economic indicators vary significantly. Respondents level of agreement for the three questions under good economic governance matrix indicate that respondents who responded very high and high were above 36.7 percent. Respondents who respond very high and high about the existence of open competitive tender system to select the private sector and the private sector is represented in the management board of IPs account for 52.15 and 51.14 percent, respectively. Hence, it can be concluded that the contribution of private and public industrial parks established in Ethiopia towards improving the level of transparency in selection of private enterprises interested to operate in the IPs and engagement of the private sector in strategic decision makings, which in turn improve their ownership of the benefits and challenges observed and commitment towards addressing the challenges are marginal. The implication is thus, more effort should be exerted in improving the competitiveness of bids, and the participation of private sector in the management position. The overall cumulative average level of agreement of respondents on the existence of good governance (based on their response as very high and high) was 46.6 percent, which is lower than economically enabling site & infrastructure indicator by 23.4 percentage point.

Compared to good economic governance, the majority of respondents (above 70.4% responded very high and high to the five economically enabling site & infrastructure or ‘Hardware’ indicators. Those who expressed their agreement for the proximity of the private and public IPs to an appropriate highway and power transmission and distribution grid were 60.51 and 68.6 percent, respectively. On the other hand, about 80 percent responded very high and high with the existence of both telephone and internet connectivity service (77.46 percent) and stable electric power supply with less hours of outage (77.98 percent) compared to 67.34 percent agreement on the availability of good water supply with less hours of interruption. These perceptions demonstrate that there is a need for construction of additional highways and electric power distribution facilities around private and public IPs in addition to availing amenable water supply with less hours of interruption.

On the other hand, the respondents do not seem to agree with the presence of economically enabling services or ‘Software’ indicators except for maintenance issues whereby a litter more than 50 percent agreed for their presence. The maximum number of respondents who responded very high and high who have observed for the presence of repair, rectification, and restoration (RRR) services for utilities, about 58.98 percent followed by the presence of dedicated rapid-response or emergency maintenance within private and public IPs, 54.28 percent. Those who responded very high and high to the question there is regular and scheduled buildings maintenance service account about 51.14 percent. Whereas the percentage of respondents who perceive the presence of dedicated or localized IP Business Support were only 43.8 percent. What is surprising is that though, foreign companies could get up to 70 percent of their investment capital from Development Bank of Ethiopia as an incentive to attract foreign direct investment (FDI), respondents who responded high to the question Industrial Park user have access to specific financial support programs was the least of all, only about 31.9 percent.

Table 4.3: Descriptive statistics for variables of advancing economic competitiveness (N=395)

	Key indicators & sub-indicators	**5**	**4**	**3**	**2**	**1**
I	**Good Economic Governance**	**72 (18.2%)**	**112 (28.4%)**	**121 (30.6%)**	**49 (12.4%)**	**41 (10.4%)**
	a) There is an open competitive tender system to select the private sector	70 (17.72%)	136 (34.43%)	125 (31.65%)	44 (11.14%)	20 (5.06%)
	b) The Private sector is represented in the Management Board of IPs	85 (21.52%)	117 (29.62%)	90 (22.78%)	42 (10.63%)	61 (15.44%)
	c) Operator Customer Relationship Management (CRM) system is in place	61 (15.44%)	84 (21.27%)	148 (37.47%)	60 (15.19%)	42 (10.63%)
II	**Economically enabling site & infrastructure or ‘Hardware’**	**141 (35.8%)**	**137 (34.6%)**	**65 (16.5%)**	**33 (8.3%)**	**19 (4.9%)**
	a) It is connected to an appropriate highway	104 (26.33%)	135 (34.18%)	76 (19.24%)	53 (13.42%)	27 (6.84%)
	b) It is in a proximity to power transmission or distribution	96 (24.30%)	175 (44.30%)	86 (21.77%)	31 (13.42%)	7 (1.77%)

	Key indicators & sub-indicators	5	4	3	2	1
	grid					
	c) There is both telephone and internet connectivity service	172 (43.54%)	134 (33.92%)	55 (13.92%)	18 (4.56%)	16 (4.05%)
	d) There is a stable electric power supply with less hours of outage	180 (45.57%)	128 (32.41%)	29 (7.34%)	36 (9.11%)	22 (5.57%)
	e)There is good water supply with less hours of interruption	154 (38.99%)	112 (28.35%)	79 (20.00%)	25 (6.33%),	25 (6.33%)
III	**Economically enabling services or 'Software'**	**72 (18.2%)**	**105 (26.6%)**	**128 (32.4%)**	**68 (17.2%)**	**22 (5.6%)**
	a) Regular and Scheduled Buildings Maintenance	103 (26.08%)	99 (25.06%)	94 (23.80%)	64 (16.20%)	35 (8.86%)
	b) Dedicated Rapid-Response or Emergency Maintenance	101 (25.57%)	113 (28.61%)	124 (41.39%)	49 (12.41%)	8 (2.03%)
	c)Repair, Rectification & Restoration (RRR) Services for utilities	83 (21.01%)	150 (37.97%)	104 (26.33%)	50 (12.66%)	8 (2.03%)
	d) Dedicated or Localized IP Business Support	76 (19.24%)	97 (24.56%)	155 (39.24%)	38 (9.62%)	29 (7.34%)
	e) Industrial Park user have access to specific financial support Programs	45 (11.39%)	81 (20.51%)	149 (37.72%)	79 (20.00%)	41 (10.38%)
	f)Dedicated One-Stop Shop/Single-Window service is present for IPs	96 (24.30%)	118 (29.87%)	99 (25.06%)	76 (19.24%)	6 (1.52%)
	g)Business-to-business (B2B) gatherings are being held on regular basis	60 (15.18%)	102 (25.82%)	136 (34.43%)	83 (21.01%)	14 (3.54%)
	h) There is Human Resources Agency, for Recruiting and Training services	74 (18.73%)	80 (20.25%)	123 (31.14%)	86 (21.77%)	32 (8.10%)
IV	**Economically Impactful Nature: Employment, Investment, and labor Turn-over**	**23 (5.8%)**	**75 (19.0%)**	**202 (51.2%)**	**66 16.6%)**	**29 (7.4%)**
	a) The Per Capita Income in the Industrial Park higher than the National Per Capita Income in 2023	20 (5.06%)	68 (17.22%)	209 (52.91%)	75 (18.99%)	23 (5.82%)
	b) The ratio of Full-time employment to par-time employment in Industrial Park is greater than 1	60 (15.19%)	60 (15.19%)	168 (41.53%)	67 (15.96%)	40 (10.13%)
	c) FDI % to total investment (or GFCF) in industrial Park is higher than FDI % of total investment (or GFCF) Nationally in 2023	12 (5.82%)	85 (18.99%)	200 (50.63%)	75 (18.99%)	23 (5.82%)

	Key indicators & sub-indicators	5	4	3	2	1
	d) US$ exports of processed or semi-processed goods as % of total Industrial Park US$ exports is higher than US$ exports of processed or semi-processed goods as % of total national exports in US$ in 2023	-	87 (22.03%)	232 (58.73%)	45 (11.39%)	31 (7.85%)

Source: Own computation from survey data (2024)

Note: The Likert scale numbers at the top of the Table indicate that where*1=Very low; 2=low;3=Neutral; 4=High; and 5=Very high.*

Though, the establishment of Ethiopian Investment Authority (EIA) was meant to serve as one-stop-shop for foreign investors, their level of agreement to the question regarding the presence of dedicated one-stop shop/single-window service for IPs was only 54.17 percent and that the level of agreement of respondents on Business-to-business (B2B) gatherings are being held on regular basis about 41 percent. And only 38.98 percent of the respondents to the presence of human resources agency, for recruiting and training services in IPs. Overall, the responses of sample respondents towards indicators under economically enabling services or 'Software' category indicate their dissatisfaction. That is based on respondents' response as very high and high for the eight indicators, it can be concluded that the overall cumulative average level of agreement of respondents on the existence of economically enabling services was 44.8 percent, which is lower than Good Economic Governance and economically enabling site & infrastructure indicators but better than Economically Impactful Nature: Employment, Investment, and labor Turn-over, which was 24.8 percent.

The experience of other countries such as South Korea and China even Indonesia and Vietnam show that developing effective economically impactful nature for employment, investment, and reducing labor turnover was one of the factors that contribute to reap a number of economic benefits from developing industrial parks and attracting more FDI, One among them was enhancing their competitiveness and integration to international trade. Despite this, however, the responses of sample respondents to the three indicators, namely the per capita Income in the industrial parks is higher than the national per capita income in 2023, FDI as a percentage of total investment (or GFCF) in industrial Park is higher than FDI to total investment (or GFCF) Nationally in 2023, and US$ exports of processed or semi-processed goods as a percentage of total Industrial Park US$ exports is higher than US$ exports of processed or semi-processed goods as percentage of total national exports in US$ in 2023 indicate that their level of agreement is below 30 percent. On the other hand, about 30.14 percent responded very high and high with the question that says the ratio of full-time employment to par-time employment in Industrial parks is greater than one. This low-level agreement of respondents to the above question indicates that the majority (about 68.86%) believe that most employees working in IPs are par-time workers.

In general, it can be concluded that the level of agreement of respondents to the presence of economically enabling services or 'Software' and economically impactful nature: Employment, Investment, and labor turn-over indicators was very dismal, suggesting the need for improvement of these categories to enhance the level of confidence of investors within private and public industrial parks thereby ensure the achievement of economic competitiveness objective the country envisioned to achieve through expansion of IPs.

Moreover, in support of the above analysis, the mean, standard deviation, the maximum and minimum statistics were computed for advancing economic competitiveness and its determinants. In order to assess respondents' perception on advancing economic competitiveness 20 item questionnaires with Likert scale type were prepared and respondents were asked to show their agreement or disagreement. As clearly depicted in Table 4.4 all of the items were rated above the average of the five point Likert scale. Among the four main indicator high mean score is rated for Economically Enabling site & Infrastructure or 'hardware' (M=3.88, SD=0.81) followed by Economically Enabling Services or 'software' (M=3.44, SD=0.74). On the other hand, high mean score is rated for items like there is both telephone and internet connectivity service (M=4.08, SD=1.06) and followed by there is a stable electric power supply with less hours of outage (M=4.03, SD=1.2). Lowest scored item is the one labeled as US$ exports of processed or semi-processed goods as percentage of total Industrial ParkUS$ exports is higher than US$ exports of processed or semi-processed goods as % of total national exports in US$ in 2023 (M= 2.96, SD=0.80), followed by The Per Capita Income in the Industrial Park higher than the National Per Capita Income in 2023 (M=2.97, SD=0.89) and (M=2.97, SD=0.87) which is FDI % to total investment (or GFCF) in industrial Park is higher than FDI % of total investment (or GFCF) Nationally in 2023.

Table 4.4: Respondents' perception on Advancing Economic competitiveness and its variables (N=395)

Variables	Mean	Std. Dev	Min	Max
ECOMP OBJs.	0.6709	0.4705	0	1
Good Governance	**3.3181**	**0.8538**	**1.67**	**5**
COMP.TENDER	3.4861	1.0647	1	5
MGTBOARD	3.3113	1.3374	1	5
CRMSYSTEM	3.1570	1.1775	1	5
Economically Enabling site & Infrastructure or 'hardware'	**3.8823**	**0.8079**	**1.25**	**5**
PROX.HIGHWAY	3.5975	1.2038	1	5
PROX.POWER	3.8152	0.9499	1	5
CONNECTIVITY	4.0835	1.0571	1	5
STABLE ELEC. SS	4.0329	1.1971	1	5
Economically Enabling Services or 'software'	**3.4473**	**0.7394**	**2**	**5**
WATER SS	3.8734	1.1833	1	5
BUIL.MAINTENANCE	3.4329	1.2755	1	5
EMER.MAINT	3.6329	1.0565	1	5
RRR.SERV.	3.6329	1.0148	1	5
BUSI.SUPP.	3.3873	1.1217	1	5
FINC.SUPP.	3.0253	1.1307	1	5
OSS.SERV.	3.5620	1.1006	1	5
B2B.GATHER	3.2810	1.0685	1	5
HR.REC.SERV.	3.1975	1.2076	1	5
Economically Impactful Nature: Employment, Investment, Turn-over	**2.9924**	**0.6884**	**1.6**	**4.5**
HIGH.PCI.	2.9671	0.8935	1	5
FTEQ.EMP.	3.0835	1.1535,	1	5
HFDI%GFCF	2.9696	0.8721	1	5
US$.EXSPG/IPEX.	2.9594	0.8045	1	4
Average mean of 20 items	**3.4100**			

Source: Own computation from survey data (2024)

Note: The 5 point Likert scale used are 1=Very low; 2=low;3=Neutral; 4=High; and 5=Very high.

Generally, the above result shows that management and technical staff perception towards advancing economic competitiveness and its determinants is positive given the average mean score of 3.41. Mangers and technical staff perception is a prerequisite to improve economic indicators that should be developed to attract more enterprises to the IPs already constructed and under construction.

4.2.2.2. Description of variables used in creating shared responsibility model

In this dissertation, twenty-four (24) quantitative social performance sub-indicators were selected from UNIDO (2019c) guideline for analysis purposes. As shown in Table 4.5 below, these indicators were categorized under five key indicators: socially appropriate site and social infrastructure (6); Quality social management system and service (3); Occupational health and safety (6); Good labor relation and welfare (5); and Social Inclusiveness (4).

The level of perception of sample respondents on quantitative sub-indicators categorized under key socially appropriate site and social infrastructure indicate that except for the question that asks power lines in industrial park are buried (about 61 percent), for workforce safety, the respondents who responded very high and high to the question account less than 50 percent. For instance, those respondents responded very high and high to the question about the presence of childcare facilities were only 28.58 percent. Similarly, the prevalence of faith and prayer facilities for religious groups in IPs is agreed only by 26.14 percent of respondents. The low level of agreement (< 30%) to the presence of childcare facilities and faith and prayer facilities for religious groups in IPs imply that they are not to the extent of satisfying employees working in industrial parks. Relatively, about 48.1 percent of the respondents responded very high and high to the question about the presence of presence of on-site incident response center.

Further, the level of agreement of respondents to the availability of disabled-inclusive building design (i.e., access ramp and elevator in each building) in IPs was about 34.69 percent. Last but not least, respondent's perception to the question that says the average commute time to industrial park workplace for employees is higher than the average commute time to workplace nationally was 41.01 percent, indicating employees commute time is not to the satisfaction of management staff of companies operating in IPs. Thus, the description of variables above and a cumulative average level of agreement of respondents of 39.75 percent indicate that it is far to conclude socially appropriate site and social infrastructure are well developed and prevalent within industrial parks in Ethiopia.

The level of response of respondents on the three quantitative sub-indicators under quality social management system and service indicators was also below 50 percent (see Table 4.5). For instance, those responded very high and high to the question about the presence of social impact management and monitoring system (SIMS) as well as annual public/published social performance report for industrial park account equally about 32.15 percent. Nevertheless, about 48.07 percent responded very high and high to the presence of emergency preparedness and response system. Similarly, it can be inferred from the description of variables above that it is impossible to claim that quality social management system and service are well developed within industrial parks in Ethiopia.

Analyzing the descriptive statistics of six quantitative sub-indicators of occupational health and safety indicators show that respondents that were responded very high and high to the question that the percentage of firms with OHSAS 18001/ ISO 45001 Certification in IP is greater than percentage of firms with similar certification nationally were very low, about 25.82 percent. This perception level reveals that all firms operating in IPs do not have OHSAS 18001/ ISO 45001 certification. In this regard, Health and Safety Executive (HSE, 2020) noted that the health and safety policies adopted in industrial parks for the prevention of incidents and occupational disasters of employees and involved third parties and a health and safety (HS) risk management process (ISO 45001, 2018; OHSAS 18001, 2007) should be established to define hazard identification and analysis approach, risk evaluation methodology, preventive and protective measures, chain of authority and responsibility, and monitoring and follow-up. OHSAS 18001 or ISO 45001 is an international standard, which aims to reduce work-related injuries and diseases, going beyond legal requirements to promote and protect both the physical and mental health of employees. By integrating safety into company policies and practices, OHSAS 18001 or ISO 45001 fosters positive safety culture, boosts productivity, and potentially lowers insurance costs.

On the other hand, though about 47.34 percent of respondents marked very high and high to the question that there are on-site hospital, clinic, or dispensary within industrial parks, such perception also indicates that the availability of health facilities in IPs are not to the extent of satisfying management staff of enterprises. With regards to the number of fire alarms per building is greater than the number nationally, only 38.74 percent of respondents opined to the question; indicating there are also buildings without fire alarms. Contrary to this, about 60.75 percent of respondents revealed their higher agreement to the question “There is access to fire services in all parts of the industrial park”. Therefore, if there is good access to fire services in IPs, installing fire alarm in each building should be the prime task of the concerned in order to improve occupational safety of employees working in IPs.

In line with low level of perception of respondents regarding the availability of health facilities in IPs, respondents that inclined to very high and high to the question “The number of nurses per capita (per 1000 people) is higher than the national per capita in 2023” were very low, only 19.24 percent. Another striking response of the respondents was only 29.11 percent of them responded very high and high to the question “The mean emergency (police, fire, and ambulance services) response time in industrial park is lower (or swift) compared the national average”. Overall, the low perception of respondents to quantitative sub-indicators indicates that the underdevelopment of occupational health and safety (H&S) indicators within industrial parks. This implies not having well-developed emergency response plan and services that enable efficient and effective response coordination, reduces losses and severity, prevent fatalities, and injuries of an event affecting a workplace may affect sustained high standards of health and safety (H&S) at workplace and ensuring business continuity within industrial parks in Ethiopia.

Moreover, the empirical study of DeAngelo et al. (2023) on police response time and injury outcomes found strong causal relationship whereby increasing response time increases the likelihood that an incident results in an injury. The effect was higher among female victims, suggesting that faster response time could potentially play an important role in reducing injuries related to domestic violence.

Table 4. 5:Descriptive statistics on the variables of shared prosperity (N=395)

No.	Indicators	5	4	3	2	1
I	**Socially appropriate site and social infrastructure**	**49 (12.41%)**	**108 (27.34%)**	**106 (26.84%)**	**75 (18.99%)**	**57 (14.43%)**
	a) Power lines in Industrial Park are buried, for workforce safety	81 (20.51%)	160 (40.51%)	87 (22.03%)	49 (12.41%)	18 (4.56%)
	b) Presence of childcare facilities	58 (14.65%)	55 (13.92%)	90 (22.78%)	96 (24.30%)	96 (24.30%)
	c) Faith and prayer facilities for religious groups are prevalent	22 (5.57%)	79 (20.57%)	104 (26.33%)	88 (22.28%)	102 (25.82%)
	d) Presence of on-site Incident Response Centre	51 (12.91%)	139 (35.19%)	107 (27.09%)	47 (11.90%)	51 (12.91%)
	e)Disabled-inclusive building design (i.e., access ramp & elevator in each building)	59 (14.94%)	78 (19.75%)	120 (30.38%)	77 (19.496)	61 (15.44%)
	f) Average commute time to Industrial Park workplace for employees is higher than average commute time to workplace nationally	25 (6.33%)	137 (34.68%)	130 (32.91%)	92 (23.29%)	11 (2.78%)
II	**Quality social management system and service**	**34 (8.61%)**	**110 (27.85%)**	**133 (33.67%)**	**83 (21.01%)**	**35 (8.86%)**
	a) There is social impact management & monitoring system (SMS) in IPs	31 (7.85%)	96 (24.30%)	160 (40.51%)	68 (17.22%)	40 (10.13%)
	b) There is Emergency Preparedness and Response system	50 (12.66%)	128 (32.41%)	112 (28.35%)	87 (22.03%)	18 (4.56%)
	c) There is annual public/published Social Performance Report for industrial park	20 (5.06%)	107 (27.09%)	127 (32.15%)	93 (23.54%)	48 (12.15%)
III	**Occupational health and safety**	**59 (14.94%)**	**87 (22.03%)**	**132 (33.42%)**	**80 (20.25%)**	**37 (9.37%)**
	a) Percentage (%)of firms with OHSAS 18001/ ISO 45001 Certification in IP is	48 (12.15%)	54 (13.67%)	217 (54.94%)	54 (13.67%)	22 (5.57%)

No.	Indicators	5	4	3	2	1
	greater than % firms with Certification Nationally[2]					
	b) On-site hospital, clinic, or dispensary within industrial park	75 (18.99%)	112 (28.35%)	58 (14.68%)	95 (24.055)	55 (13.92%)
	c) The number of fire alarms/building is greater than the number Nationally	47 (11.90%)	106 (26.84%)	141 (35.70%)	66 (16.71%)	35 (8.86%)
	d)There is access to fire services in all parts of the Industrial Park	109 (27.59%)	131 (33.16%)	89 (22.53%)	57 (14.43%)	9 (2.28%)
	e) The number of Nurses per capita (Per 1000 people) is higher than the National per capita in 2023, ended July 7.	31 (7.85%)	45 (11.39%)	194 (49.11%)	74 (18.73%)	51 (12.91%)
	f) The mean e mergency (Police, Fire, Ambulance) response time in Industrial Park is lower (or swift) compared the national average	42 (10.63%)	73 (18.48%)	94 (23.80%)	132 (33.42%)	54 (13.67%)
IV	**Good labor relation and welfare**	**29 (7.34%)**	**81 (20.51%)**	**159 (40.25%)**	**91 (23.04%)**	**35 (8.86%)**
	a) An aggregated, publicly accessible labor complaints and measurement mechanisms related data are available	21 (5.32%)	73 (18.48%)	176 (44.56%)	97 (24.56%)	28 (7.09%)
	b) There are on-site Regulator, Operator or Third-Party Authorized Labor Inspectors or Counselors	41 (10.38%)	80 (20.25%)	168 (42.53%)	75 (18.99%)	31 (7.855)
	c) Average salary of employees in industrial park is higher compared to Average salary Nationally	33 (8.35%)	49 (12.41%)	124 (31.39%)	139 (35.19%)	50 (12.66%)
	d) The % of employees on term or open-ended contracts in industrial park is higher than % employees on term or open-ended contracts Nationally	19 (4.81%)	105 (26.58%)	166 (42.035)	75 (18.99%)	30 (7.59%)
	e)The % of employee annual turnover in industrial park is lower than the % of employees' annual turnover nationally	32 (10.85%)	99 (25.06%)	161 (40.76%)	70 (17.72%)	33 (8.35%)

No.	Indicators	5	4	3	2	1
V	**Social Inclusiveness**	**48 (12.15%)**	**90 (22.87%)**	**181 (45.82%)**	**54 (14.67%)**	**22 (5.57%)**
	a) The % of female workforce in industrial park to total workforce is higher than % of female workforce Nationally	77 (19.49%)	98 (24.81%)	167 (42.28%)	44 (11.14%)	9 (2.28%)
	b) Female wages as % of male wages in industrial park is higher than Female wages as % of male wages Nationally	16 (4.05%)	90 (22.78%)	190 (48.10%)	69 (17.47%)	30 (7.59%)
	c) The % of employees between ages of 16 and 30 in Industrial Park is higher than % employees between ages of 16 and 30 Nationally	68 (17.22%)	127 (32.15%)	137 (34.68%)	51 (12.91%)	12 (3.04%)
	d) Domestic MSME investment as a % total investment in Industrial Park is higher than MSME investment as a % total investment nationally	29 (7.34%)	46 (11.65%)	228 (57.72%)	53 (13.42%)	39 (9/87%)

Source: Own computation from survey data (2024)

Like other key social performance indicators discussed above, the cumulative average perception of respondents on the five quantitative inputs of good labor relations and welfare indicator is dismal, about 37 percent. For instance, only 23.8 percent of the sample responded very high and high to the question “An aggregated, publicly accessible labor complaints and measurement mechanisms related data are available”. This perception level reflects the low-level transparency of the concerned in disclosing data on labor complaints, which in turn have long-term adverse consequences on the labor relations and welfare of employees working in IPs. In addition, the level of agreement by respondents to the question “There are on-site regulator, operator or third-party authorized labor inspectors or counselors” was about 30.63 percent. Though, the presence of third-party authorized labor inspectors or counselors testifies Ethiopian industrial parks are not labor inspection free parks, the low perception of respondents towards it implies that verifying reliably whether the enterprises operating in the parks have complied with labor standards of the country or not is cumbersome as highlighted by Mehari (2018).

The respondents' reflection to the question whether the average salary of employees in industrial park is higher compared to average salary nationally was only 20.76 percent, indicating that the salary paid to employees is unattractive. Yet, about 31.39 percent of respondents responded very high and high to the question asking, "The percentage of employees on term or open-ended contracts in industrial park is higher than percentage of employees on term or open-ended contracts nationally". The low average salary of employees in IPs might be due to the fact that industrial parks are labor intensive, which implies that cost of labor is one of the major (if not the most) components in their cost break down (Mehari, 2018) and hence enterprises tend to pay low wages in order to minimize their production cost, given their profit maximization goal. Parallel to this, about 31.16 percent respondents responded very high and high to the question "The percentage of employee annual turnover in industrial park is lower than the percentage of employees' annual turnover nationally". In general, the cumulative average level of respondents towards the prevalence of good labor relation and welfare indicator in IPs (those who respond very high and high) was 27.84 percent.

The last key indicator of social performance is social inclusiveness indicator. Among the quantitative inputs under this indicator, about 44.3 percent of sample respondents responded very high and high to the question "The percentage of female workforce in industrial park to total workforce is higher than percentage of female workforce nationally". Though a higher share of female employment prevails in the Parks is not a matter of coincidence or favorable recruitment policy towards female employees of parks operators but rather associated with an economic rational and comparative advantage of women, particularly in textile/garment enterprises, only 26.83 percent of sample respondents believe that the percentage female wages to male wages in Ethiopian industrial parks is higher than the same ratio nationally. This implies that the majority of respondent believe that not only the percentage female wages to male wages in Ethiopian industrial parks is lower but also it is much lower than national average. In other words, gender wage gap in IPs is much higher than national average. This finding is consistent with the argument of Mehari (2018) that female labor force is more compliant and paid lower wages than their male counterparts in Ethiopian industrial parks.

Relative to the above sub-indicators, nearly 50 percent (about 49.37%) of the respondents believe that the percentage of employees in Ethiopian industrial parks are between ages of 16 and 30 (young) is higher than the same percentage at national level. This finding is in harmony with the fact that employment generation to the unemployed youth is one of the major objectives of establishing industrial parks in Ethiopia. because unemployment rate in Ethiopia was 24% in 2007, during the establishment of IPs and low incomes, unemployment, underemployment, and poor working conditions were the highest amongst young people (16-30 years of age) (World Bank, 2007). Nevertheless, the response of sample respondents indicates that only 19 percent responded very high and high to the question "Domestic MSME investment as a percentage of total investment in industrial parks is higher than the percentage of MSME investment to total investment nationally". The implication is thus the majority of enterprises operating in Ethiopian industrial parks are foreign enterprises.

The summary statistics for creating shared prosperity and its determinants is shown in Table 4.6. The perception of respondents on social indicators for 24 item questions with Likert scale type indicates all of the items were rated above the average of the five point Likert scale. Among the five main social indicators high mean score is rated for creating shared prosperity (M=3.21, SD=0.56) followed by occupational health and safety (M=3.12, SD=0.65). On the other hand, high mean score is rated for items like access to fire service (M=3.69, SD=1.09) and followed by power lines are buried for safety (M=3.6, SD=1.08). The lowest scored item is the one labeled as availability of faith and prayer facilities (M=2.57, SD=1.22), followed by the average salary of employees in IPs is greater than the national average (M=2.68 SD=1.11) and (M=2.79, SD=1.2) which is The mean emergency (Police, Fire, and Ambulance services) response time in IndustrialPark is lower (or swift) compared the national average.

Table 4. 6:Respondents' perception on creating shared prosperity and its determinants (N=395)

Variables	Mean	Std. Dev	Min	Max
SOCIAL INC & SHARED PROSPERITY	0.5418	0.4989	0	1
SOCIALY APP. SITE & INFRASTRACTURE	**3.0477**	**0.6054**	**1**	**4.67**
POWER LINE BURIED	3.6000	1.0838	1	5
CHILDREN FACILITIES	2.7038	1.3634,	1	5
FAITH AND PRAYER FACILITIES	2.5722	1.2244	1	5
ON-SITE INCID. RESP. CEN.	3.2319	1.2055	1	5
DISABLED INCLUSIVE BUIL.DESIGN	2.9924	1.2695	1	5
HIGHER AVE. COMMUTE TIME TO IPs	3.1848	0.9552	1	5
QUALITY SOCIAL MGT SYSTEM	**3.0616**	**0.8257**	**1**	**5**
SIMM SYSTEM	3.0253	1.3507	1	5
ERP SYSTEM	3.2658	1.0794	1	5
SOCIAL PERF REPORT	2.8937	1.0893	1	5
OCCUPATIONAL HEALTH & SAFTY	**3.1245**	**0.6506**	**1.33**	**5**
FIRMS WITH OHSAS18001/ISO45001 CERTI.	3.1316	0.9835	1	5
ERP SYSTEM ON-SITE HEALTH FACILITIES	3.1443	1.3507	1	5
FIRE ALARM PER BUILDINGS	3.1620	1.1148	1	5
ACCESS TO FIRE SERVICE	3.6937	1.0921	1	5
HIGHER NERSUS PER CAPITA	2.8253	1.0507	1	5
LOWER AVE EMERGENCY RESPONSE TIME	2.7900	1.2044	1	5
GOOD LAB. RELATION & WELFARE	**2.9484**	**0.6991**	**1.2**	**4.8**
DATA ON COMPLAINTS MEASURES	2.9038	0.9590	1	5
AUTHORIZED 3P LAB INSPECTORS ON SITE	3.0633	1.0585	1	5
HIGHER AVE SALARY	2.6861	1.1050	1	5
HIGHER EMP WITH OPEN-ENDED CONTRACTS	3.0203	0.9767	1	5
LOWER EMPLOYEES' TURNOVER	3.0684	1.0412	1	5
SOCIAL INCLUSIVNESS	**3.2177**	**0.5636**	**1.5**	**4.75**
HIGHER % FEMALE WORKFORCE	3.4810	1.0008	1	5
FEMALE WAGES TO MALE WAGES RATIO	2.9823	0.9329	1	5
PERCENTAGE OF EMP AGE 16 to 30	3.4760	1.0183	1	5
DOM. MSME INVST/TOTINVT.	2.9316	0.9680	1	5
Mean of 24 items	**3.0800**			

Source: Own computation from survey data (2024)

With 3.08 overall mean of 24 items or indicators for the achievement creating Shared prosperity objective through the construction of IPs, it can be concluded that the perception of sample management and technical staff towards the indicators is positive or above average. Mangers and technical staff perception is one of the inputs for IPs stakeholders such as IPDC to improve the social indicators and hence attract more enterprises to the IPs already constructed and under construction.

4.2.2.3. Description of variables used in safeguarding the Environment model

In order to investigate the impacts of environmental indicators on achieving environmental stewardship, twenty (20) quantitative environmental performance sub-indicators were selected from UNIDO (2019c) guideline for analysis purpose. Table 4.7 below summarizes the frequencies and percentages of respondents answer for the 5 Likert scale questions. The environmental performance indicators were categorized under four key indicators: industrial parks located in environmentally appropriate site (3); the presence of green Infrastructure (8); green system (5); and efficient and clean production, emission, and waste management (4).

The descriptive statistics on the three quantitative sub-indicators under industrial parks located in environmentally appropriate site indicators show that only 26.07 percent responded very high and high to the question about site compatibility of IPs with land use master plan as regards non-agricultural use. In this regard, Taleai, et al (2007) argue that compatibility of land use is a prerequisite for an aesthetic environment because an environment with incompatible land uses is set to produce a chaotic urban landscape with different conflict of interest among the various land uses. Hence, the low level of agreement by sample respondents to the compatibility of IPs location with land use master plan, particularly for non-agricultural use, implies that most IPs are sited in environmentally inappropriate site where development cannot be sustained.

Another concern is the percentage of plots actually allocated to non-polluting or light manufacturing activities in industrial park is greater than the contribution of light manufacturing activities to national Gross Domestic product (GDP), whereby only 21.77 percent of the respondents respond very high and high. This is main concern, since the ultimate goal of establishing IPs in Ethiopia from the outset was to make the country the hub of light and medium industries in Africa by 2025, it is unlikely that this objective will be met. This low-level perception of respondents on the percentage of plots actually allocated to non-polluting or light manufacturing activities in IPs coincides with similar level of perception on the domestic MSME investment in IPs, discussed in sub-section

4.2.2.2 above, both of which casts doubt on the possibility of becoming “the hub of light and medium industries in Africa by 2025”

Compared to the above environmentally appropriate site sub-indicators, however, slightly higher percentage of respondents (about 38 percent) respond very high and high to the question “Industrial parks situated on redeveloped brownfield site, with the effective possibility of reusing, repurposing and converting existing infrastructure or buildings”. According to Alpha-Omega Training and Compliance (AOTC, 2023), brownfield redevelopment is the process of reusing or redeveloping land previously abandoned, unused, or underutilized due to contamination of the environment, which may have occurred for use industries or factories, warehouses, and/or service stations uses. Besides, brownfield redevelopment offers numerous environmental and economic benefits. Importantly, the very act of rehabilitating and revitalizing these lands requires addressing the source of the pollution and mitigating (if not eliminating) future damage. Secondly, since many brownfields consist of abandoned industrial zones and structures, redeveloping these areas allows for renewed business activities, which spurs job creation and pumps money into the local economy. Therefore, this low level of agreement of respondents may imply that the majority of IPs are located in areas that can be used for other economic purposes and hence the country could not address the problem of contamination, which offers immediate benefits to the local environment from brownfield redevelopment. Overall, the cumulative average level of agreement of respondents on the prevalence of environmentally appropriate site indicator (those who respond very high and high) was 28.6 percent.

The other key environmental performance indicator is green infrastructure. In this study, the opinion of respondents with regards to the presence of on-site landfills, public wastewater sewerage system and/or wastewater treatment plant and the availability of segregated recycling reception bins and containers for different waste products in Ethiopian IPs were analyzed. In doing so, an alignment of the responses of respondents with the legal requirements for landfills, wastewater treatment and segregation of waste products was made.

In relation to these issues, Ethiopia has a policy and legal system in place for solid waste management that includes the national integrated urban sanitation and hygiene strategy, the SWM Proclamation No. 513/2007 and the Environment pollution Control Proclamation No. 300/2002. These two policies documents can be referred to as the resource and waste strategy (RWS) and the environment bill of the country. According to GIZ (2023), policies and regulations stipulated in the proclamation are also legal requirement to ensure on-site landfills, wastewater treatment plants treatment plants to treat industrial wastewater and sewage generated from the industrial parks and segregation of paper/card, plastics and glass recycling not be mixed with other waste materials in all industrial parks in Ethiopia.

One of the sub-indicators included in this dissertation among green infrastructure indicator was the presence of an off-site landfill for industrial park solid waste management for which about 30.38 percent of the respondents responded very high and high. This low-level agreement of respondents on landfill solid waste management in IPs is in harmony with the research output conducted by Global Methane Initiative (2011) that standardized and modern landfill management system in Ethiopia is in an infantile stage. There are currently no well managed landfill sites and almost all the current sites are non-engineered open dump sites. However, some municipalities, namely Dire Dawa, Awassa and Mekelle have managed to construct landfills with limited proper landfill features. The low performance of solid waste collection and landfill management is also associated with absence of skilled human power. Moreover, the findings of this study is in harmony with the observation of GIZ (2023) that most landfills in Ethiopia are open dumping and burning, despite being illegal, common practices without specific management systems. In connection to this, about 43.29 percent of sample respondents also believe that there is toxic and hazardous waste collection, storage, and treatment or disposal management system in IPs.

With regards to wastewater treatment practices in IPs, the result in Table 4.7 below shows that less than 50 percent of sample respondents (about 44.6%) believe the presence of wastewater sewerage system and wastewater treatment plant in Ethiopian IPs. This finding is somehow consistent with Monavari et al. (2008) study, which evaluated the environmental effects of industrial development in Iran and found that the numbers of industries equipped with appropriate wastewater treatment units were limited and they mainly discharged their wastewater without treatment. It is also in harmony with the findings of Fahiminia et al. (2015) in Iran, which found that some of the industries (31.8% of the evaluated industries) discharged their wastewater into the Shokoohieh industrial park wastewater treatment plant after performing pretreatment, while other industries (about 68.2%) discharge their wastewater without pretreatment. Thus, systematic approach towards the management of wastewater sewerage system and wastewater treatment plant in the industrial parks has paramount importance in Ethiopia for ensuring environmental performance objective.

This dissertation also attempted to capture the perception of sample respondents selected among management and technical staff with regards to the availability of segregated recycling reception bins and containers for different waste products. The responses indicate that only 39.27 percent of respond very high and high to the availability of segregated recycling reception bins, bells, and/or containers for paper and card, recyclable plastic containers, recyclable metals, and others within Ethiopian IPs; implying that most business in IPs may be combining recyclable materials as mixed recycling; but segregating waste into single material streams for recycling is the most effective way to make the most of recycling. In this regards, GIZ (2023) revealed that despite the existence of legal framework for businesses in Ethiopia to comply with segregation of waste products in different bins and container, there are only a few initiatives that implement the 3R (reduce, reuse, and recycle) and circular economy models are still evolving; mainly due to inefficient monitoring system to be put in place and shortage of human resource.

Today one of the series challenges the globe is facing is increasing water scarcity. As a result, societies increasingly turn to alternative water sources as a mechanism of reducing water consumption. One of such alternative sources of water is rainwater harvesting, which can provide reliable and cost-effective domestic water (Hammes et al., 2020).

Nevertheless, the presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and re-use systems in IPs responded very high and high was only by 29.36 percent of respondents. This might be due to the fact that about 67.34 percent of sample respondents expressed their agreement on the availability of good water supply with less hours of interruption, as discussed in sub-section 4.2.2.1.

One the lessons that can be drawn from the success stories of South Korea and China in developing Eco-friendly industrial parks is that the need to having buildings with environmental design related certificates. According to Lamy et al., (2021), green building certification system has long-lasting benefits by improving building efficiency and sustainability. The ultimate goal of which is ensuring a significant step towards a more sustainable and healthier built environment. Despite its vital importance, only about 25.83 percent of sample respondents believe that there are buildings with environmental design related certificates. This level of agreement is very low by any standard and implies that not all buildings in Ethiopian IPs have green building certification. Accordingly, in order to comply with the need for building green infrastructure in Ethiopian IPs, having environmental building certifications, which can be used as an effective environmental management tool to reduce resource consumption, such as water and energy in a building should be a mandatory requirement.

Table 4. 7:Descriptive statistics on the determinants of safeguarding the environmental (N=395)

No.	Indicators	5	4	3	2	1
I	**Environmentally appropriate site**	**30 (7.60%)**	**83 (21.00%)**	**176 (44.56%)**	**84 (41.27%)**	**22 (5.57%)**
	a) Site compatibility with Land Use Master Plan as regards non-agricultural use	29 (7.34%)	74 (18.73%)	136 (34.43%)	124 (31.39%)	32 (8.10%)
	b) The % of plots actually allocated to non-polluting or light manufacturing activities in Industrial Park is greater than % of GDP represented by non-polluting or light manufacturing activity nationally	32 (8.10%)	54 (13.67%)	229 (57.97%)	66 (16.71%)	14 (3.54%)
	c)Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing, and converting existing infrastructure or buildings	30 (7.59%)	120 (30.38%)	162 (41.01%)	63 (15.95%)	20 (5.06%)
II	**Green Infrastructure**	**39 (9.87%)**	**95 (24.05%)**	**133 (33.67%)**	**101 (25.57%)**	**27 (6.84%)**
	a) Presence of an off-site landfill for industrial park solid waste management	50 (12.66%)	70 (17.72%)	188 (47.59%)	66 (16.71%)	21 (5.32%)
	b) Presence of toxic and hazardous waste collection, storage and treatment or disposal management system	31 (7.85%)	140 (35.44%)	83 (21.01%)	124 (31.29%)	17 (4.30%)
	c) Presence of Public Wastewater Sewerage System, and/or Wastewater Treatment Plant (WWTP)	85 (21.52%)	90 (22.78%)	89 (22.53%)	105 (25.58%)	26 (6.58%)
	d) Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and re-use systems	30 (7.59%)	86 (21.77%)	114 (28.865)	117 (29.62%)	48 (12.15%)
	e) Segregated recycling reception bins, bells, and/or containers for paper & card; recyclable plastic containers, recyclable metals, and others	35 (6.86%)	128 (32.41%)	139 (35.195)	71 (17.79%)	22 (5.57%)
	f)There are buildings with environmental design related certificates	34 (8.61%)	68 (17.22%)	162 (41.01%)	108 (17.22%)	23 (5.82%)
	g)There are Solar Street lighting	27 (6.84%)	90 (22.78%)	120 (30.38%)	123 (31.14%)	35 (8.865)
	h) Presence of waste exchange clearinghouse, promoting industrial symbiosis andeconomic circularity	21 (5.32%)	92 (23.29%)	166 (42.03%)	91 (23.04%)	25 (5.58%)
III	**Green system**	**27 (6.84%)**	**78 (19.75%)**	**206 (52.15%)**	**73 (18.48%)**	**11 (2.78%)**
	a)Annual environmental audits performed on each firm	41 (10.38%)	143 (36.30%)	154 (38.99%)	27 (6.84%)	30 (7.59%)
	b)Presence of firms having obtained a "Green" certification at national level	24 (6.08%)	98 (24.81%)	212 (53.67%)	51 (12.91%)	10 (2.53%)
	c)Operator possesses UN Global Compact Registration[3]	16 (4.05%)	53 (13.42%)	230 (58.23%)	90 (22.78%)	6 (1.52%)

	d) Operator possesses ISO14001[4]	34 (8.61%)	45 (11.39%)	227 (57.46%)	88 (22.28%)	1 (0.255)
	e) Operator possesses International Sustainability and Carbon Certification (ISCC)	20 (5.06%)	53 (13.42%)	207 (52.41%)	105 (26.585)	10 (2.53%)
V	**Efficient and clean production, emission, and waste management**	**36 (9.11%)**	**103 (26.08%)**	**167 (42.28%)**	**74 (18.73%)**	**15 (3.80%)**
	a) Presence of solid waste collection service	71 (17.97%)	159 (40.25%)	107 (27.09%)	45 (11.39%)	13 (3.29%)
	b) The ratio of Efficient water use in m3/US$ Sales in Industrial Park is lower than water use in m3/US$ Sales nationally	14 (3.54%)	74 (18.73%)	165 (41.77%)	125 (31.65%)	17 (4.30%)
	c) Hazardous waste produced/US$ in Sales in Industrial Park is lower than Hazardous waste produced /US$ in Sales nationally	17 (4.30%)	67 (16.96%)	221 (55.95%)	69 (17.47%)	21 (5.325)
	d) Percentage (%) solid waste sent to landfills (store of garbage) in Industrial Park is lower than solid waste sent to landfills nationally	41 (10.38%)	112 (28.35%)	177 (41.51%)	55 (13.92%)	10 (2.53%)

Source: Own computation from survey data (2024)

The main rationale as to why there should be solar streetlights within industrial parks is that such lighting systems are energy efficient and provide consistent and reliable lighting, improving visibility on roadways and pedestrian paths. This visibility is crucial for preventing accidents, especially in areas without access to traditional power sources or where power outages are common (Arshad et al., 2017). However, despite the fact that solar streetlights use solar energy as the power supply to facilitate safe and pleasant nighttime activities and consists of security and street lighting, with no reliance on conventional energy sources, these lighting mediums operated in stand-alone mode, obviating the need for a general grid of any power requirements, only 29.62 percent of the respondents responded very high and high to the existence of solar streetlights in Ethiopian IPs.

Another very important sub-indicator of green infrastructure considered duly was the presence of waste exchange clearinghouse, promoting industrial symbiosis and economic circularity in Ethiopian IPs. With regards to its importance, Boom-Cárcamo and Peñabaena-Niebles (2022) argue that the need to reduce the environmental problems associated with the large amount of waste generated by industrial activity and the depletion of natural resources has created several global challenges. According to Ajwani-Ramchandani et al., (2021), the challenges necessitated the adoption of a take-make-waste perspective as the norm globally, wherein materials required for production are harvested, manufactured, and discarded in such a way that their intrinsic value is underutilized. Furthermore, Södergren and Palm (2021) noted that such a perspective allows companies to increase competitiveness, take advantage of waste or by-products, and reduce the environmental impact of waste. Similarly, Lim et al. (2022) highlighted the growing interest in circularity within and between resource and waste value chains, which makes the concepts of the circular economy and industrial symbiosis (IS) become relevant. Cognizant of the strong interrelationship among waste products, IS, and circular economy as well to importance in enhancing competitiveness of enterprises in Ethiopian IPs, sample respondents were asked to rate their level of agreement for the presence of waste exchange clearinghouse, promoting industrial symbiosis and economic circularity in IPs. What the responses indicate is that only 28.35 percent of them respond very high and high to the question; suggesting that a take-make-waste perspective does not seem well developed as the norm in Ethiopian IPs. In general, the cumulative average level of agreement of respondents on the eight environmental infrastructure (those who respond very high and high) was 33.9 percent, which is slightly higher than the environmentally appropriate site.

One of the most important environmental performance indicators required from industrial parks is the availability of green systems greening the industrial parks is one of Ethiopia's strategies to ensure sustainable development of the industrial sector. Greening industrial parks are also in full compliance with the 9th goal of SDGs, which is to promote inclusive and sustainable industrialization and foster innovation, while also addressing climate change (United Nations, 2015). Hence, one integral part of green systems indicator is performing annual environmental audits on each firm operating in IPs. In order to ensure whether such an audit is performed annually on each firm, respondents were asked to rate their level of agreement to the question "Annual environmental audits performed on each firm". The responses show that about 46. 68 percent of the respondents marked very high and high to the question; suggesting environmental audits have been made on selected enterprises by concerned authorities. Nevertheless, the Prevention of Industrial Pollution Regulation No.159/2008 issued in Negarit Gazeta (2008) indicates clearly that industrial companies are obliged to prepare environmental plan, monitoring system and observe general pollution control obligations, apply internal environmental inspection techniques, develop and keep written records of the contaminants generated and the disposal techniques, and submit to the competent environmental organ an annual report describing how it is complying with the provisions of this Regulation.

With regards to the question on the presence of firms having obtained a “Green” certification at national level, about 30.89 percent responded very high and high. This low level of agreement also indicates that there are also firms which didn’t obtain “Green” certification at national level. Thus, such irregularities in policy implementation need to be addressed in order to ensure Climate Resilient and Green Economy (CRGE) in Ethiopia.

The response of respondents to the question “Operator possesses UN Global Compact (UNGC) Registration” indicates that only 17.47 percent respondents responded very high and high. The main reason as to why UNIDO (2019c) included UNGC as one of the sub-indicators under green system indicator was to encourage the corporate world to strive for higher standards of ethical business and align their practices to a sustainable and inclusive future. United Nations (2021) defined the UN Global Compact registration principles as a company’s value system and approach to doing business. Hence, companies that join the compact, which is not legally binding or regulatory and is purely voluntary, are expected to integrate these principles into their corporate strategies, culture, and day-to-day operations. Though it is a voluntary endeavor to join the compact, the result indicate that most companies operating in Ethiopian IPs are not committing to upholding the UNGC principles implies that most companies are do not have corporate sustainability and responsible business practice.

Concerning the environmental performance indicators dimension, another variable analyzed in this dissertation is that operator possesses ISO1400. In this regard, Boiral et al. (2018) listed the six benefits of possessing ISO 14001 certificate as reduction and management of waste (EI01), air pollution (EI02), general environmental performance (EI03), consumption of energy and resources (EI04), issues related to environmental risks and safety (EI05), and water contamination (EI06). Alsulamy et al. (2022) also summarized the benefits of possessing ISO 14001 certification into three main categories: environmental management, environmental indicators, and environmental awareness and social aspects. Hence, cognizant of its importance to environment performance, respondents were asked to rate their agreement level to the question "Operator possesses ISO14001". The response of which revealed that only 20 percent of the respondents solely qualify very high and high responses. This low level of perception seems to reflect that most companies operating in Ethiopian IPs do not seem committed to adopt rigor and effectiveness of practices, regulatory compliance, greener supply chain, waste minimization and management, environmental risks and safety issues, image and stakeholders, employee and management involvement, employee training and knowledge.

Another important green system sub-indicator examined in this dissertation as part of environmental performance indicator was the perception of respondents about operator in IPs possesses International Sustainability and Carbon Certification (ISCC), which supports the principles of environmentally, economically, and socially sustainable production. Similar to the aforementioned green system sub-indicators, respondents' perception to the question "Operator possesses International Sustainability and Carbon Certification (ISCC)" was very low as measured by 18.48 percent level of agreement. Thus, concerned stakeholders of IPs need to be committed to apply ISCC principles, which are the most environmentally and socially sensitive activities in IPs. The overall cumulative average level of agreement of respondents on the five environmental green system indicators (those who respond very high and high) was 26.59 percent, which is relatively lower perception compared to environmentally appropriate site and infrastructure indicators.

The last environmental performance indicator suggested by UNDP (2019c) and included in this dissertation was efficient and lean production, emissions, and waste management indicators. One among them was the presence of solid waste collection service in Ethiopian IPs, which is one of the services essential for the smooth running of lean production, emissions, and waste management. The response of sample respondents regarding the availability of waste collection service indicates that about 58.22 percent of them agreed to the presence of the service in IPs. Hence, there is a need for identification of the main constraints (technical and/or institutional challenges) that hamper full scale provision of the service and taking corrective action.

As part of efficient and lean production, emissions and waste management indicators, water-use efficiency in IPs was analyzed using the question "The ratio of Efficient water uses in m3/US$ Sales in Industrial Park is lower than water use in m3/US$ Sales nationally", for which only 22.27 percent of respondents revealed their agreement. This low response rate also supports the findings of FAO (2018), which indicates that water-use efficiency in Ethiopia was 1.9 USD /m3; suggesting it is the lowest by even by sub-Saharan Africa standard[2], around USD 7/m3. This implies that there is a strong need to improve efficiency in the use of these scarce natural resources. The main reason is that though, water-use efficiency is strongly influenced by the country's economic structure, increasing water-use efficiency over time, at country level in general and in IPs in particular, means decoupling economic growth[3] from water use across the main water-using sectors, which are agriculture, industry, energy, and municipal water supply.

Cognizant of the fact that, minimizing hazardous waste production is the top priority of any small or large business organization, sample respondents were asked that "Hazardous waste produced/US$ in sales in industrial parks is lower than hazardous waste produced /US$ in sales nationally". The sample respondents who provided affirmative answer to this question were almost similar (21.26%) to that of water-use efficiency in IPs. The

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[2] *The results of the study conducted by FAO (2018) also indicate that water-use efficiency is a little over USD 15/m3 worldwide, though significant differences exist among countries and regions. The lowest regional water-use efficiencies was about USD 2/m3 in Central and Southern Asia; around USD 7/m3 in sub-Saharan Africa; and almost USD 8/m3 in Northern Africa and Western Asia.*

[3] *Decoupling refers to an economy that would be able to grow without corresponding increases in environmental pressure*

implication of this low level of agreement is that there is a need for appropriate public policy approaches that lower the actual costs of enterprises in IPs ion producing hazardous waste is very important in the near future. Particularly, by adopting effective waste management practices, businesses can reduce their environmental impact and protect their employees and surrounding communities, which lead to cost savings and improved sustainability practices.

The last sub-indicator analyzed in relation efficient and lean production, emissions and waste management indicators was the perception of respondents about “The Percentage of solid waste sent to landfills (store of garbage) in IPs is lower than solid waste sent to landfills nationally”. Again, with about 38.73 percent agreement level of respondents, it can be inferred that the percentage of solid waste sent to landfills (store of garbage) in IPs is not lower to the extent of satisfying all companies. This perception is also somehow closer to respondents’ level of agreement on the presence of an off-site landfill for industrial park solid waste management for which about 30.38 percent of the responded very high and high. The overall cumulative average level of agreement of respondents on the four Efficient and clean production, emission, and waste management indicators (those who respond very high and high) was 33.2 percent, which is relatively higher than all the other three environmental indicators.

Overall, the descriptive analyses conducted in this section indicate that Ethiopia is far from implementation of national and international environmentally, socially, and economically sustainable requirements or policies in IPs. The conclusion related to environmental sustainability supports the findings of Yechalework (2019) that selected industries of Industrial Park not only fail to implement their policies but also limited in implementing the government and other international policies. Besides, there was noncompliance of existing environmental management policy practices in the companies with the national and international standard.

Similarly, the summary statistics for environmental safeguarding and its determinants is shown in Table 4.8. The level of agreement or disagreement level on all of the items were rated above the average of the five point Likert scale. Moreover, among the four main social indicators high mean score is rated for Green System (M=3.09, SD=0.64) followed by Green infrastructure (M=3.04 SD=0.75). On the other hand, high mean score is rated for items like Presence of solid waste collection service (M=3.58, SD=1.02) and followed by annual environmental audits performed on each firm (M=3.35, SD=1.01). The lowest scored item is the one labeled as presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and re-use systems (M=2.83, SD=1.13), followed by the Site compatibility with Land Use Master Plan as regards non-agricultural use (M=2.86 SD=1.05) and (M=2.88, SD=1.07) which is there are Solar Street lighting throughout the in Industrial Park campus.

Unlike, economic and social indicators, with an overall mean of 4.03 for 20 items or indicators for the achievement of environmental safeguarding objective through the construction of IPs, it can also be concluded that the perception of sample management and technical staff towards the indicators is positive or above average. This perception of mangers and technical staff can be good feedback for the concerned, such as IPDC to identify indicators, which is not to the satisfaction level of enterprises operating in IPs and take action towards their improvement.

Table 4. 8:Respondents' perception on Environmental safeguarding and its determinants (N=395)

Variables	Mean	Std. Dev	Min	Max
ENVIRONMENTAL SAFEGUARDING	**0.8203**	**0.3845**	**0**	**1**
ENVIRONMENTALLY APPROPRIATE SITE	**3.0380**	**0.7761**	**1**	**5**
SITE COMP/ WITH LUMP	2.8582	1.0496	1	5
% OF PLOTS ALLOCATED TO LMA	3.0608	0.8763	1	5
IPs IN REDEVELOPED BROWNFIELD SITE	3.1949	0.9664	1	5
GREEN INFRASTRUCTURE	**3.0465**	**0.7470**	**1.5**	**5**
OFFSITE LANDFILL FOR IP SWM	3.1570	1.0204	1	5
TOXIC & HAZARDOUS MATERIALS CSTD MGT SYSTEM	3.1114	1.0700	1	5
WSS AND WWTP	3.2608	1.2465	1	5
SUSTAINABLE RAINWATER COLLECTION & REUSE SYS.	2.8304	1.1306	1	5
SEGREGATED RECYCLING RECEPTION BINS OR CONTAINERS	3.2101	1.0196	1	5
BUILDINGS WITH ENV DESIGN	2.9544	1.0116	1	5

CERTIFICATES				
SOLAR STREET LIGHTING	2.8760	1.0745	1	5
WASTE EXC CLEARINGHOUSE	2.9722	0.9647	1	5
GREEN SYSTEM	**3.0947**	**0.6365**	**1.4**	**5**
ANNUAL ENV AUDIT PERFORMED	3.3494	1.0148	1	5
FIRMS WITH "GREEN" CERTI. AT NATIONAL	3.1899	0.8290	1	5
OPERATOR POSSESSES UN COMPACT REGIS.	2.9570	07745	1	5
OPERATOR POSSESSES ISO14001	3.0582	0.8304	1	5
EFFICIENT & CLEAN PRODUCTION, EMISSION, & WASTE MGT.	**2.9190**	**0.8361**	**1.25**	**5**
OPERATOR POSSESSES ISCC	3.1785	0.6765	1	5
SEC SERVICE	3.5823	1.0152	1	5
EFFICIENT WATER USE IN m3/ USD SALES	2.8857	0.8982	1	5
HAZ. WASTE PRODUCED /US$ SALES	2.9747	0.8546,	1	5
% OF SOLIDE WASTE SENT TO LANDFILE.	3.3013	0.9223	1	5
Mean of 20 indicators	**3.0246**			

Source: Own computation from survey data (2024)

4.3. Binary logistic model regression results and discussion

4.3.1. Industrial parks and Economic competitiveness in Ethiopia

The logistic regression results presented in Table 4.9 show the comprehensive analysis conducted using all 395 observations in the survey data, with no missing values in any of the variables utilized in the Logit model. The rapid convergence of the model, as indicated by the iteration log likelihood value of -169.244881, when the second explanatory variables included, signifies the efficiency in comparing nested models. The Pearson chi-square value of 161.61 on 20 degrees of freedom, which is highly significant p-value of 0.0000, demonstrates the explanatory variables are jointly significant in influencing the economic competitiveness of Ethiopia through Industrial Parks (IPs) development.

The McFadden Pseudo R2 value of 0.3229 is acceptable coefficient of determination range suggested by Maydeu-Olivares and Garcia-Forero (2010) in social science research. The result also indicates that the relationship between advancing economic competitiveness and the 20 predictors (economic indicators) is average. The coefficients, standard errors, z-statistics, p-values, and 95% confidence intervals[4] presented in

[4] *The Pr(>|z|) column shows the two-tailed p-values testing the null hypothesis that the coefficient is equal to zero (i.e. no significant effect). The usual value is 0.05, by this measure none of the coefficients have a significant effect on the log-odds ratio of the dependent variable.*

columns 2 to 6 offer insights into the estimated effects of the variables on economic competitiveness. Additionally, columns 7 and 8 provide the odds ratios and marginal effects, showcasing the probability of Ethiopia achieving its economic competitiveness objectives through IPs development. The last row of column 7 of the table indicates that the overall marginal effect of the model is 0.7540, suggesting when all independent variables in the binary logistic regression model increase by one unit simultaneously, the probability of achieving for economic competitiveness objective of Ethiopia through establishment of private and public IPs also change or increase by 75.4 percent.

Among the 20 economic indicators analyzed, twelve were found to advance Ethiopia's economic competitiveness significantly. Notably, the presence of an open competitive tender system for private sector selection emerged as a key driver of economic competitiveness. That is, other things held constant, improving transparency in competitive tenders was associated with a 1.74 increase in the log odds of advancing economic competitiveness. Similarly, the marginal effect value indicates that a unit increase in bid submitted by private sectors to operate in private and public IPs will increase the probability of achieving economic competitiveness of the country by 10.3 percent, holding other independent variables constant at their reference points (mean). This result is consistent with the argument of Vîrjan et al. (2023) that competitiveness is a significant driving force for development and improving organizational performance, both at the macroeconomic level or national economy’s performance, and at microeconomic or individual level.

In the realm of advancing economic competitiveness analysis within the context of Ethiopia's IPs development, a detailed examination of the economically enabling services 'software' indicators reveals meticulous insights. Among the array of indicators scrutinized in the binary response regression models, only specific economically enabling site and infrastructure ‘hardware’ emerge as pivotal drivers of economic competitiveness for the country.

The analysis has signified that improving industrial parks proximity to main highway and power sources advance economic competitiveness significantly. That is, improving the proximity of IPs to the main highway and power station by one kilometer will increase the log odds of achieving economic competitiveness objective of Ethiopia (versus failure to achieve this objective) by a factor 1.33 and 1.61, respectively, ceteris paribus. The marginal effects also indicate that other things held constant a one kilo meter proximity of private and public IPs to the main highway and power sources will increase the probability of achieving advancing economic competitiveness of the country by 5.3 and 8.9 percent, respectively. This finding is synergistic with Marshal (1920) theoretical argument, where proximity of final goods and intermediate-input markets enables firms to reduce marketing and purchasing expenses. Moreover, it is inconsistent with the findings of Gakunu et al. (2015) study that delays in the development of infrastructure and utility services like access to power were the main factors that affect the performance of the Bole Lemi industrial park.

Furthermore, reliable connectivity to communication facilities and stable power supply, are other factors that play pivotal role in enhancing advancing economic competitiveness in Ethiopia significantly. That is, improvement in connectivity to telephone and internet services by 1% improve advancing economic competitiveness objective of Ethiopia by a factor 1.62. Whereas, minimizing the constraints for power reliability, the odd ratio of stable electricity supply in IPs is 1.83, ceteris paribus, which is higher compared to proximity of IPs to the main highway and power station. The marginal effects also show that, other things held constant, a percentage improvement in telephone and internet connectivity, which enhance integration to international trade, and stability/reliability of power supply in IPs will enhance the probability of achieving economic competitiveness of Ethiopia through establishment of private and public IPs by 9 and 11.2 percent, respectively. The latter finding is consistent with the study conducted by Bailey (2022) and Yoon (2022) that Stable and reliable electric power load data at the individual building level in industrial parks is essential as it offers valuable information on the specific operational schedules of the building.

The results related to proximity to main highway and power sources, connectivity to communication infrastructure and stability or reliability of electric supply reveal that advancing economic competitiveness of industrial parks relies heavily on the quality and functionality of its infrastructure facilities, connectivity, and access to stable power. The result is compatible with the conclusions Zajontz & Bagwandeen (2023) which asserts the quality of infrastructure, ease access to transportation, and suitable office arrangement are crucial variables that influence the quality of life for employees.

Moreover, it can be genuinely argued that the significant role of proximity to main highway and power sources, connectivity to communication infrastructure and stability or reliability of electric supply in enhancing economic competitiveness of Ethiopia is the outcome of their pivotal contribution in enhancing operational efficiencies of businesses in Ethiopian IPs significantly. That is, the IPDC strategically established industrial parks across diverse key locations in Ethiopia, namely in seven major and emerging cities of Dukem, Hawassa, Bahir Dar, Mojo, Dire Dawa, Adama, and Addis Ababa. Each site in these cities was meticulously chosen, offering optimal accessibility, well developed infrastructure, and strategic adjacency to major transportation networks or highways and power sources to enterprises/businesses operating in IPs. These in turn attributes to seamlessly provide businesses with unparalleled strategic leverage for their operations, thereby contribute to economic competitiveness of the country.

In line with the quantitative findings, the qualitative analysis also underscores the importance of infrastructure for enhancing the economic competitiveness of Industrial Parks (IPs). This includes factors such as the proximity of IPs to major highways, power transmission and distribution grids, telecommunication networks, and consistent water supply.

Besides, the presence of regular and scheduled maintenance for buildings and power sources, alongside dedicated rapid-response or emergency maintenance services, also stand out as catalysts for enhancing economic competitiveness within the Ethiopian landscape. The odds ratio results shed light on the magnitude of impact of these indicators. A 1% enhancement in the availability of regular and scheduled maintenance of buildings translates to a 1.51 increase in the odds favoring the achievement of economic competitiveness objectives, other things held constant. Similarly, improvements in dedicated rapid-response or emergency maintenance in IPs yield substantial gains, with odds ratios of 2.16, ceteris paribus. Their marginal effect results also show that, other things held constant, improvement in the regularity of scheduled maintenance of buildings and dedicated rapid-response or emergency maintenance services in IPs by one percent will promote the probability of achieving economic competitiveness objectives by 7.6 and 14.3 percent, respectively. These results also imply that improving dedicated rapid-response or emergency maintenance service has about twice impact in enhancing economic competitiveness than improving the regularity of scheduled maintenance of buildings service in IPs.

This study also underscores the substantial contributions of IPs in enhancing various economically impactful nature for employment, investment, and turnover such as the ratios of full-time to part-time employment in IPs and revenues derived from exports of processed or semi-processed goods play crucial roles in bolstering economic competitiveness. Particularly striking is the finding that a ratio greater than 1 for full-time to part-time employment, as well as high ratio of revenues from processed goods exports to total IPs exports compared to national exports, ceteris paribus, contribute significantly to economic competitiveness of Ethiopia, with corresponding increase in log odds of achieving economic competitiveness objectives by a factor of 2.51 and 2.75, respectively. These indicators, identified through the development and expansion of IPs, exhibit substantial impact in promoting economic competitiveness, underscored by their statistical significance at the 1% level significance. The marginal effect also show that the probability of achieving economic competitiveness objective of Ethiopia through establishment of IPs will increase by 17 and 18.8 percent for a one percent increase in full-time to par-time workers ratio and revenues (in US$) obtained from exports of processed or semi-processed goods to total IPs exports ratio, suggesting that their impact in promoting economic competitiveness of Ethiopia is the highest compared to all other economic performance indicators included in the binary response regression model.

Table 4. 9:Binary Logit Model Result for advancing economic competitiveness

Iteration 0: log likelihood = -249.98826 Iteration 1: log likelihood = -229.66446 Iteration 2: log likelihood = -169.44881 Iteration 3: log likelihood = -169.44881 Iteration 4: log likelihood = -169.44881 Iteration 5: log likelihood = -169.44881								
Logit Regression Log Likelihood = -169.44881				Number of obs. = 395 LR chi^2 (20) = 161.61 Prob. chi^2 = 0.0000 Pseudo R^2 = 0.3229				
Variables	**Logit Regression**						**Logistic**	**Mfx**
	Coeff.	**S.E**	**Z**	**P>⎮Z⎮**	**[95%conf. Inter.]**		**Odds Ratio**	**dy/dx**
COMP. TENDER	0.5545	0.1928	2.88	0.004**	0.1766	0.9324	1.7410	0.1028
MGTBOARD	-0.1565	0.1424	0.71	0.272	-0.4355	0.1225	0.8552	-0.0290
CRMSYSTEM	0.0679	0.1728	6.32	0.694	-0.2707	0.4066	1.0703	0.1260
PROX. HIGHWEY	0.2844	0.1624	1.75	0.080*	-0.0340	0.6027	1.3289	0.0527
PROX. POWER	0.4781	0.2131	2.27	0.025**	0.0604	0.8958	1.6130	0.0887
CONNECTIVITY	0.4832	0.1919	2.52	0.012**	0.1072	0.8592	1.6213	0.0896
STABLE ELEC. SS	0.6054	0.2019	3.00	0.003***	0.2098	1.0010	1.8320	0.1123
WATER SS	-0.5506	0.2242	-2.46	0.014**	0.9900	-0.1111	0.5766	-0.1021
BUIL.MAINTENANCE	0.4089	0.2054	1.99	0.046**	0.0064	0.8114	1.5051	0.0758
EMER.MAINT	0.7688	0.2758	2.79	0.005***	0.2283	1.3093	2.1572	0.1426
RRR.SERV.	-1.0642	0.3151	-3.38	0.001***	-1.6819	-0.4466	0.3450	-0.1974
BUSI.SUPP.	0.2020	0.1790	1.13	0.259	-0.1488	0.5527	1.2238	0.0375
FINC.SUPP.	-0.3458	0.1766	-1.96	0.050*	-0.6920	0.0004	0.7077	-0.0641
OSS.SERV.	0.1257	0.2304	0.55	0.585	-0.3259	0.5773	1.1340	0.0233
B2B.GATHER	-0.0031	0.1969	-0.02	0.987	-0.3890	0.3828	0.9969	-0.0006
HR.REC. SERV.	-0.5982	0.1729	-3.46	0.001***	-0.9371	-0.2592	0.5498	-0.1109
HIGH.PCI.	-0.9014	0.2341	-3.85	0.000***	-1.3602	-0.4426	0.4060	-0.1672
FTEQ.EMP.	0.9185	0.1832	5.01	0.000***	0.5595	1.2776	2.5056	0.1704
HFDI%GFCF	-0.5091	0.2496	-2.04	0.041**	-0.9983	-0.0198	0.6011	-0.0944
US$.EXSPG/IPEX	1.0126	0.3001	3.37	0.001***	0.4243	1.6009	2.7528	0.1878
Cons	-5.7647	1.0692	-5.39	0.000***	-7.8604	-3.6690	0.0031	
Marginal effects after logit			**Z=pr (Economic competitiveness) (predicted**					0.7540

*Note: Values in this table are rounded to 4 decimal place. ***, **, & * indicate significance at 1%, 5% & 10% level, respectively. The Z-value (in column 3) f is a test statistic or Wald tests that measures the ratio between the coefficient and its standard error. STATA uses the Z-value to calculate the p-value (column 4), which enable us make a decision about the statistical significance of independent variables in the binary logistic regression model.*

Source: Authors computation from survey data (2024)

The qualitative findings indeed suggest that Industrial Parks (IPs) play a significant role in creating substantial job opportunities. However, the respondents identified weak human resources agencies and recruiting services for IPs as a hindrance to their economic competitiveness. The demand for employees in IPs is considerable. Yet, access to trained and skilled workers can sometimes pose challenges. The respondents suggested that the presence of sufficient third-party private agencies, which could train and supply the required employees, would be beneficial. This would allow the IPs to focus on their roles in economic competitiveness and value addition. The respondents advised the implementation of a more robust human resources recruitment system to ensure that IPs reach their maximum operational capacity. This insight underscores the need for effective human resource strategies in Ethiopian IPs to enhance their economic competitiveness.

Thus, the study identifies the substantial contributions of IPs in enhancing various economically enabling factors, such as the establishment of open competitive tender systems, development of essential site infrastructure, creation of employment opportunities, and promotion of exports of processed goods. These findings support the previous research conducted by Pakdeenurit et al. (2014), which highlights the important role of industrial sector growth through IPs in strengthening key economic indicators such as proximity and access to basic infrastructure facilities, the ability to establish export processing arrangements, and the availability of skilled manpower. Thus, in contrast to the perspectives of Farole and Moberg (2014), who questioned the success of African IPs in fostering economic development, this study highlights the potential of IPs in Ethiopia to drive sustainable economic growth and competitiveness.

Conversely, the analysis also uncovers six economic factors within IPs that significantly impede Ethiopia's economic competitiveness. These include challenges related to water supply interruptions, irregularities in repair, rectification, and restoration services for utilities, access to financial support programs, insufficient human resources recruitment and training services, lower per capita income in IPs compared to national level, and lower FDI-to-investment ratio in IPs. The observed discrepancies in these factors highlight areas where improvements are imperative to bolster economic competitiveness, and hence underscore critical areas for policy intervention and strategic reform.

The statistically significant negative effect of challenges related to water supply interruptions (marginal effect of -0.1021, <0.05) is in harmony with the findings of Gakunu et al (2015) study that delays in the development of utility services like access to water supply was one of the factors that hamper the performance of the Bole Lemi industrial park. The policy implication of these results is that not only challenges related to the availability of water supply with less hours of interruption, irregularities in repair, rectification and restoration services for utilities; but also access to financial support were inadequate to enhance economic competitiveness of the country.

Therefore, the comprehensive analysis of these economically enabling indicators and deterrent factors provides a nuanced understanding of the dynamics influencing economic competitiveness within Ethiopia's industrial landscape. These findings offer valuable insights for policymakers, stakeholders, and investors seeking to foster sustainable economic growth and competitiveness in the region.

4.3.2. Industrial parks for creating shared prosperity

The logistic regression results, as shown at the top of Table 4.10, indicate that all 395 observations in our survey data were used in the analysis. The log-likelihood value was -79.343401, obtained at iteration 7. The likelihood ratio (LR) chi-square of 386.14 (on 24 degrees of freedom), which measures the overall goodness of fit or adequacy of the logistic regression, has a Prob. > chi2 = 0.0000, indicating high significance at the 1% significance level, and the explanatory variables are jointly significance for industrial parks to serve as vehicle for social inclusiveness and creating shared prosperity in Ethiopia (the dependent variable) in the binary logistic regression model. The McFadden Pseudo R2 value is 0.7087 is high, suggesting that multiple predictors explain more variation in the outcome than the model with only one explanatory variable or predictor. The lower panel of Table 4.10 presents the results of the Binary logistic regression. As can be seen in the last row of the table, the overall marginal effect of the model is 0.9073. The p-values of the coefficients included in the binary logistic regression model reveal that seventeen variables were found to be statistically significant at the 5% significance level.

The regression results inside the table, column 2 to 6 present the estimated coefficients, their standard errors, the z-statistic, associated p-values, and the 95% confidence interval of the coefficients for the logistic regression model used in this study. On the other hand, column 7 and 8 report the odds ratio and the probability of Ethiopia's achievement of social inclusiveness and creating shared prosperity objective through IPs development and marginal effects of each explanatory variables, respectively. Overall, when all independent variables in the binary logistic regression model increase by one unit simultaneously, the probability of achieving for social inclusiveness and shared prosperity of Ethiopia through establishment of private and public IPs also change or increase by 90.7 percent.

Table 4. 10: Binary Logit Model result for creating shared prosperity

Iteration 0: log likelihood = -272.41305 Iteration 1: log likelihood = -111.4838 Iteration 2: log likelihood = - 97.475588 Iteration 3: log likelihood = - 83.546056 Iteration 4: log likelihood = -79.721038 Iteration 5: log likelihood = -79.348848 Iteration 6: log likelihood = -79.343403 Iteration 7: log likelihood = -79.343401	
Logit Regression Log Likelihood = -79.343401	Number of obs. = 395 LR $chi^2(24)$ = 386.14 Prob. chi^2 = 0.0000 Pseudo R^2 = 0.7087

Variables	Logit Regression						Logistic	Mfx
	Coeff.	S.E	Z	$P>\lvert Z\rvert$	[95%conf. Inter.]		Odds Ratio	dy/dx
POWER LINE BURIED	3.5667	0.7539	4.73	0.000***	2.0891	5.0442	35.3984	0.2999
CHILDREN FACILITIES	-0.6234	0.2890	-2.09	0.036**	-1.2129	-0.0404	0.5345	-0.0527
FAITH AND PRAYER FACILITIES	1.4210	0.4160	3.42	0.002***	0.6057	2.2363	4.1414	0.1195
ON-SITE INCID. RESP. CEN.	1.1238	0.6207	1.81	0.070*	-0.0929	2.2403	3.0762	0.0945
DISABLED INCLUSIVE BUIL.DESIGN	-0.2742	0.3224	-0.85	0.395	-0.9061	0.3576	0.7602	-0.0231
HIGHER AVE.	-3.4353	0.9512	-3.61	0.000***	-5.2996	-1.5710	0.0322	-0.2889

COMMUTE TIME TO IPs								
SIMM SYSTEM	-4.0121	1.0036	-4.00	0.000***	-5.9792	-2.0451	0.0181	-0.3374
ERP SYSTEM	1.8122	0.5872	3.09	0.001***	0.6612	2.9612	6.1240	0.1524
SOCIAL PERF REPORT	4.1952	0.8002	5.24	0.000***	2.6969	5.7635	66.369	0.3528
FIRMS WITH OHSAS18001/ISO 45001 CERTI.	-4.1096	0.9360	-4.30	0.000***	-5.9442	-2.2751	0.0164	-0.3456
ERP SYSTEM ON-SITE HEALTH FAC.	0.0106	0.4363	0.02	0.981	-0.8445	0.8657	1.1006	0.0009
FIRE ALARM/ BUILDINGS	0.0814	0.5651	0.14	0.886	-1.0262	1.1889	1.0848	0.0068
ACCESS TO FIRE SERVICE	1.4633	0.4337	3.37	0.000***	0.6132	2.3133	4.3200	0.1231
HIGHER NERSUS PER CAPITA	-0.8239	0.7086	-1.16	0.245	-2.2127	0.5649	0.4387	-0.0693
LOWER AVE EMERGENCY RESPONSE TIME	-0.0209	0.3272	-0.06	0.949	-0.6621	0.6204	0.9793	-0.0018
DATA ON COMPLAINTS MEASURES	3.6090	1.1490	3.14	0.002***	1.3571	5.8608	36.9275	0.3035
AUTHORIZED 3P LAB INSPECTORS ON SITE	3.7315	0.8029	4.65	0.000***	2.1579	5.3050	41.7405	0.3138
HIGHER AVE SALARY	3.7467	0.9453	3.96	0.000***	1.8939	5.5995	42.3813	0.3151
HIGHER EMP WITH OPEN-ENDED CONTRACTS	-2.1637	0.6259	-3.46	0.000***	-3.3904	-0.9369	0.1149	-0.1820
LOWER EMPLOYEES' TURNOVER	4.2759	1.0804	3.96	0.000***	2.1582	6.3935	71.9433	0.3596
HIGHER % FEMALE WORKFORCE	1.4961	0.7761	1.93	0.054**	-0.0251	3.0172	4.4641	0.1258
FEMALE WAGES TO MALE WAGES RATIO	-1.5490	0.5763	-2.69	0.007**	-2.6785	-0.4195	0.2125	-0.1303
PERCENTAGE OF EMP AGE 16 to 30	-0.4714	0.3717	-1.27	-0.205	-1.1998	0.2571	0.6242	-0.0396
DOM. MSME INVST/TOTINVT.	5.4823	1.2632	4.34	0.000***	3.0065	7.9581	420.398	0.4610
Cons	-54.331	11.590	-4.69	0.000***	-77.049	-31.616	2.53e-2	
Marginal effect after logit		**Z=pr (social inclusiveness) (predicted)**						**0.9073**

*Note: Values in this table are rounded to 4 decimal places. ***, **, & * indicate significance at 1%, 5% & 10% level, respectively.*

Source: Author's computation from survey data (2024)

The study's findings suggest that IPs play significant role in promoting social inclusiveness and shared prosperity. However, the impact of different factors is multifaceted and complex. Therefore, a holistic approach that considers various aspects, from infrastructure and facilities to workforce policies and safety standards, is crucial in leveraging IPs for social inclusiveness and shared prosperity.

The regression results indicate that certain site and social infrastructure indicators significantly promote social inclusiveness and shared prosperity in Ethiopia. Specifically, burying power lines for safety, faith/prayer facilities, and on-site incident response centers were identified as key factors. The odds ratio suggests that, holding other variables constant, an additional unit of burying power lines increases the log odds of achieving social inclusiveness and shared prosperity in Ethiopia by a factor of 35.41. Similarly, a unit increase in faith facilities and on-site incident response centers in IPs increases the odds of achieving these objectives by factors of 4.1, and 3.1, respectively. The marginal effects reveal that an additional unit of burying power lines for safety increases the creation of shared prosperity objectives in Ethiopia by about 30 percent, while a unit increase in faith facilities and on-site incident response centers in IPs leads to about 12 and 9.5 percent increase, respectively.

The qualitative study participants clearly highlighted the importance of power lines in Industrial Parks (IPs) for ensuring worker safety. The majority of respondents noted that power lines in IPs are typically underground, which effectively enhances employee safety. They expressed confidence in the adherence of these recently constructed IPs to international standards and anticipate future IPs to follow suit. However, they observed that some businesses within the IPs have exposed electric cables, which could pose safety risks if not properly managed. The respondents suggested that park administrators should implement corrective measures and maintain diligent oversight to ensure employee safety. On the other hand, the respondents emphasized the role of faith and prayer facilities in promoting social inclusion within IPs. They noted a scarcity of such facilities in certain IPs and suggested that IP management should strive to expand access to these facilities.

Furthermore, the respondents highlighted the importance of childcare facilities in fostering social inclusion within IPs. They pointed out that low-income mothers employed at IPs often lack feasible options to ensure the safety and well-being of their children. Therefore, the respondents stressed the need for IPs to intensify efforts to expand and construct childcare facilities. Hence, the respondents underscored the importance of safety measures, social inclusion facilities, and diligent management in enhancing the effectiveness and competitiveness of Ethiopian IPs.

However, a kilometer increase in average commute time to industrial parks for employees and back home reduces the odds of achieving these objectives by a factor of 0.03, holding other variables constant. The marginal effect result also indicate that, other things kept constant, an increase in the time spend in commuting to industrial park for employees by one hour will reduce the probability of achieving social inclusiveness and shared prosperity objective of Ethiopia by performance objective by 28.9 percent. Thus, if 41% of sample respondents, who work in different managerial positions in companies within private and public IPs, perceive that that average commuting time[5] spent travelling from home to IPs workplace and back again to home for employees is higher than the national average, it implies that employees are traveling long distance and hence reduce social inclusiveness and shared prosperity objectives in Ethiopia. In general, the findings above suggest that policymakers should focus on improving workforce safety, faith facilities, and on-site incident response centers in order to realize tangibly the realization of social inclusiveness and shared prosperity of the country aspires to achieve through expansion of industrial parks. Moreover, the adverse effect of average commuting time coupled with the insignificance effect of on-site hospital, clinic, or dispensary within industrial park on social inclusiveness and shared prosperity objective of Ethiopia indicate that the main issues with regards to social inclusiveness of IPs are improving the quality of life and health care.

[5] *Commuting time is not covered by the labour law of Ethiopia.*

The presence of an emergency preparedness and response system and annually published social performance reports were among quality social management system and service dimensions found to significantly contribute to Ethiopia's social inclusiveness and shared prosperity. Holding other variables constant, an additional system and report increase the log odds of achieving these objectives by factors of 6.1 and 66.4, respectively. These results imply that despite marvelous contribution of emergency preparedness and response system in place, the availability of annual published social performance report for industrial parks, which enhances the accountability of firms operating within industrial parks has ten times more contribution to the achievement of social inclusiveness and shared prosperity objective of Ethiopia by improving the quality social management system and service than emergency preparedness and response system.

The qualitative findings suggest a scarcity of publicly available annual Social Performance Reports for the Industrial Parks (IPs). This indicates a limited practice and access to such reports. The respondents believe that these reports are crucial as they can help identify areas for action towards social inclusivity and shared prosperity. The respondents suggest that the availability of these annual reports should be expanded. They believe that these reports can provide valuable insights into the social performance of the IPs, including their impact on local communities, their contribution to social inclusivity, and their role in promoting shared prosperity. Hence, the respondents advocate for increased transparency and accountability in the operation of IPs. They suggest that this can be achieved through the regular publication and dissemination of Social Performance Reports. This would allow stakeholders to better understand the social impact of IPs and identify areas for improvement.

The marginal effects also show that an additional emergency preparedness and response system and annual published social performance report in industrial parks enhance the probability of achieving of social inclusiveness and shared prosperity objectives in Ethiopia by 15.24 and 35.3 percent, respectively. However, keeping other variables constant the social impact management and monitoring system (SMS) in place within industrial parks hampers the log odds and probability of achieving social performance objective significantly by a factor of 0.02 or 33.74 percent, possibly due to insufficient social policy related to IPs. Since a SMS is a framework of policies, processes and procedures used by an organization to ensure that all tasks required to achieve its social objectives, stability and consistency (San Pedro and Ballesteros, 2021), its adverse effect on social performance objective of Ethiopia might be due to the fact that the social policy related to IPs may not fulfil the minimum requirements for SMS to ensure social performance including labor relationships, human rights, health and safety and work and business ethics as many literature highlighted. This highlights the need for further investigation and potential policy interventions.

Among the six occupational health and safety indicators used in this study only access to fire services in all parts of the industrial parks plays positive and significant role in the achievement of social inclusiveness and shared prosperity objective of Ethiopia through IPs development. That is, a 1% increase in fire protection facilities so as to enhance access to fire services in all parts of the industrial parks increase the log odds and probability of achieving social inclusiveness and shared prosperity objective of Ethiopia by a factor of 4.3 or by 12.3 percent, keeping other variables constant.

Whereas the percentage of firms with OHSAS 18001/ ISO 45001 certification in industrial parks affects the achievement of social performance objective in Ethiopia through IPs development negatively and significantly. This is due to the fact that only 26.7% of the respondents expressed their agreement (very high and high) to the question greater percentage of firms operating in IPs have the aforementioned certification implies that most firms operating in Ethiopian IPs lack this international framework important to manage and continuously improve their occupational health and safety (OH&S) performance and social inclusiveness. That is, a one percent increase in the number of firms without OHSAS 18001/ ISO 45001 certification in IPs will reduce the log odds ratio and probability of achieving social inclusiveness and shared prosperity objective of Ethiopia by a factor of 0.02 or by 34.6 percent, keeping other variables constant. This result is also in harmony with the argument Maike (2022) that the complete requirements for an occupational health and safety management system are ensured when more firms have ISO 45001 certification. Thus, the result suggests for the need for firms to have ISO 45001 certificate to operate in Ethiopian IPs to ensure both suggesting more efforts are needed to ensure achieving social inclusiveness and shared prosperity objective in Ethiopia.

Moreover, among the five indicators of good labor relations and welfare included in the binary response regression models, four variables, namely the availability of an aggregated, publicly accessible labor complaints and measurement data, the presence of on-site regulator or third-Party authorized labor inspectors or counselors, the average salary of employees, and the lower percentage of employee annual turnover in industrial park contributed significantly to the achievement of social performance in Ethiopia through IPs development positively. Particularly, the odd ratio results show that keeping other variables constant, the odds ratio in favor of achieving the social inclusiveness and shared prosperity objective of Ethiopia increases by a factor of 36.9 and 41.7, respectively, for a one unit increase in the number of aggregated and publicly accessible labor complaints data and on-site third-Party authorized labor inspectors. The marginal effect values also indicate that the partial increase or change in social performance for a one unit increase in the number of aggregated and publicly accessible labor complaints data and on-site Third-Party authorized labor inspectors or counselors were 30.4 and 31.4 percent, respectively.

In a similar vein, a 1% increase in the average salary and reduction in the percentage of employee annual turnover in industrial parks increase the log odds of achieving social inclusiveness and shared prosperity objective of Ethiopia by a factor of 42.4 and 71.9, respectively, keeping other variables constant. The positive and significant impact of average salary of workers in IPs in achieving social inclusiveness and shared prosperity objective of Ethiopia in harmony with the study conducted by Meyer et al (2021), which indicates that wages in industrial parks compares favorably to the local cost of basic needs, and is in line with pay in other sectors of the local economy (though only 20.76% of sample respondents respond very high and high to the question related to it in this study). Moreover, not only base pay at most industrial park firms exceeds the cost of basic needs in the nearby urban areas but also the median monetary value of the total compensation package is roughly fourfold of the local cost of basic needs as measured by the local poverty line. This in turn increased the number of workers employed in industrial centers from year to year and made labor turn over to be very low.

However, the variable that states the percentage of employees on term or open-ended contracts in industrial parks is higher than the percentage of employees with the same contract nationally affected the achievement of social performance in Ethiopia adversely and significantly. In essence, a 1% increase in the percentage of employees with open-ended contracts in IPs reduces the odd ratios and probability of achieving social inclusiveness and creating shared prosperity objective in Ethiopia by a factor of 0.12 and 18.2 percent, keeping other variables constant. Thus, the implications of the results related to good labor relations and welfare is that though improving all the four variables with positive impacts is critical, greater attention should be paid on the reduction of employee turnover, increase in salary of employees, and reducing the contract period of employees in industrial parks so as to strengthen the social performance of Ethiopia through the expansion of industrial parks.

Last but not least, the impact of four social inclusiveness indicators on the achievement of social performance in Ethiopia through IPs development was examined thoroughly. The Binary logistic regression results indicate that the higher percentage of female workforce in industrial park to total workforce and domestic micro, small, and medium enterprises (MSME) investment to total investment in industrial parks enhanced achieving social inclusiveness and creating shared prosperity objective of Ethiopia. Since both the ratio of female to male employment and domestic MSME investment to total investment do not reach the required level, a 1% increase in the percentage of female to total workforce and MSME investment to total investment in industrial parks will enhance the probability of achieving social inclusiveness and creating shared prosperity objective in Ethiopia by 12.6 and 46.1 percent, respectively, keeping other variables constant.

The significant contribution of female to male workforce and the ratio of domestic MSME investment to total investment in IPs have important policy implications in achieving the social performance objective. Particularly, the higher odd ratio of female to male workforce in industrial parks supports that argument of Adekunle et al. (2023) that IPs in Ethiopia, particularly those with labor-intensive factories such as Bole Lemi and Hawassa IPs, has created a large number of job opportunities for low-skilled workers, particularly women, in recent years. On the other hand, since only 19% of the respondents expressed their agreement (respond very high and high) to the question that "Domestic MSME investment as a percentage total investment in industrial parks is higher than MSME investment as a percentage total investment nationally", and the majority of firms operating in Ethiopian IPs are foreign, policymakers should design mechanisms that enhance Domestic MSMEs investment in IPs for advancement of indigenous handcraft and cottage industries in order to ensure technological transformation in the manufacturing sector and industrial parks are serving as vehicle for social inclusiveness and shared prosperity objective of Ethiopia.

The presence of a significant proportion of female workers in Ethiopian Industrial Parks (IPs) indeed plays an important role in promoting social inclusion and shared prosperity, as corroborated by the quantitative data. The respondents confirmed the prevalence of low-skill job prospects in IPs, which are often filled by women. One of the participants highlighted that improving employment opportunities for women not only contributes to their individual well-being but also fosters social inclusivity and benefits families as a whole. However, it was noted that women are predominantly found in low-skilled occupations within these IPs.

Therefore, it is essential to create opportunities and provide support for women to advance and contribute at the managerial and technical levels. This could involve providing training and development programs, creating inclusive workplace policies, and promoting gender equality at all levels of the organization. Such initiatives could help to ensure that women are not only present in IPs but are also empowered to make valuable contributions to their growth and success.

Nevertheless, the higher average wage differentials between female and male workers in industrial parks affected the social performance of the country adversely and significantly. The odd ratio result shows that keeping other variables constant, the odds ratio in favor of achieving social performance objective reduces by a factor 0.21, for a 1% increase in gender wage gap in industrial park. Notably, a 1% increase in gender wage gap in industrial park, other variables held constant, reduces the probability of achieving social inclusiveness and shared prosperity by about 13 percent. This finding is consistent with the survey of Kehinde et al. (2021), who noted that not only the ratio of female wages to male wages in IPs are lower but also the average wages women received was lower than women's wage expectations for factory jobs at baseline. As a result, the lower realized wages of women compared to expectations appears to be the major factor in voluntary quits or turnover. Besides this finding supports that of Abegaz and Nene (2023) findings which exhibit significant gender wage gap, with a gross gender wage gap of 49 % and an unconditional within firm gap of 39%. This result indicates that a segregation of women workers into low-wage corporations accounts for about 10% of the gender wage gap.

On the other hand, the other six social indicators were statistically insignificance in their contribution to the achievement of social inclusiveness and shared prosperity. These include disabled-inclusive building design (i.e., access ramp and elevator in each building); availability of on-site hospital, clinic, or dispensary within industrial park; fire alarms per buildings; nurses per capita (per 1000 people); the mean emergency (police, fire and ambulance) response time; and the percentage of employees between ages of 16 and 30 to total employees within industrial parks.

4.3.3. Industrial parks for Safeguarding the Environment

As presented at the commencement of Table 4.11 the logistic regression results reveal that the analysis incorporated all 395 observations from the survey data, indicating an absence of missing values across all variables employed in our Logit model. The iteration log-likelihood value of -165.1867 indicates how quickly the model convergence when the third independent variable included compared to nested models. The Pearson chi-square value for the likelihood ratio Chi-Square, which stands at 41.72 (on 20 degrees of freedom), gauges the overall goodness of fit or adequacy of the logistic regression, with a Prob. > chi2 = 0.0030 is highly significant at the 1% significance level, suggesting that the explanatory variables collectively contribute significantly to environmental stewardship in Ethiopian IPs (the dependent variable). Conversely, the McFadden Pseudo R2 is 0.1121. Given that the majority of the explanatory variables in our logistic regression model are statistically significant, the coefficient of determination (R2) value, which lies between 0.10 and 0.50, is deemed acceptable as per the guidelines proposed by Maydeu-Olivares and Garcia-Forero (2010) for social science research.

Further, the estimated coefficients, their standard errors, the z-statistic, associated p-values, and the 95% confidence interval of the coefficients for the logit model used in this study are shown in Table 4.8 On the other hand, columns 7 and 8 report the odds ratio that shows the probability of Ethiopia’s achievement of environmental stewardship in Ethiopia's objective through IPs development and the marginal effects of each explanatory variable, respectively. Overall, when all independent variables in the logit model increase by one unit, the probability of achieving the environment stewardship objective by Ethiopia through the expansion of IPs also changes or increases by 86.26 percent, which is higher compared to economic competitiveness and social inclusiveness models.

The regression coefficients indicate that among the 20 environmental safeguarding indicators fitted in the logistic regression model, seven indicators enhanced the achievement of environmental stewardship objective in Ethiopia significantly, at least at 5% level significance. The results revealed that site compatibility with land use master plan (LUMP) as regards for non-agricultural use and plots actually allocated to non-polluting or light manufacturing activities in IPs were the two environmentally appropriate site indicators that promote environment stewardship objective by Ethiopia significantly. Furthermore, the odd ratios indicate that the selection of one more non-agricultural use land and plots allocated to non-polluting or light manufacturing activities in IPs increases the log odds of achieving environmental stewardship objective by Ethiopia by a factor 1.8 and 1.7, respectively, keeping other variables constant. On the other hand, the marginal effect results indicate that everything else held constant, a one percent increase in the use of non-agricultural use land and plots allocated to non-polluting or light manufacturing activities in IPs increases will increase the probability of achieving environmental performance by 7 and 63.8 percent, respectively.

Among green infrastructure indicators the presence of wastewater treatment plant (WWTP); sustainable rain and storm water collection/ harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, water hyacinth) and re-use systems; and segregated recycling reception bins and/or containers for recyclable and non-recyclable byproducts in IPs contributed significantly to the achievement of environmental protection (Safeguarding the Environment) objective of Ethiopia. More specifically, ceteris paribus, a one percent increase in standard wastewater treatment plant; rain and storm water collection/ harvesting, management, treatment; and the availability of recycling reception bins and containers in IPs will increase the log odd ratios of achieving environmental protection objective of the country by 2.5, 1.4, and 1.6, respectively. Expressing their contributions in percentage, the probability of achieving environmental protection (Safeguarding the Environment) objective of Ethiopia by about 10.7, 4.5, and 7.6 percent, respectively for one unit increase in the presence of public wastewater sewerage system, and/or of wastewater treatment plant and segregated recycling reception bins, bells and/or containers for paper/ card, recyclable plastic containers, and recyclable metals, ceteris paribus, as shown by the marginal effects results.

On the contrary, the presence of off-site landfill for solid waste management; and toxic and hazardous waste collection, storage and treatment or disposal management system as well as solar street lighting were green infrastructure indicators that affect the achievement of environmental protection (safeguarding the environment) objective of Ethiopia adversely and significantly. The adverse effect the aforementioned facilities might be due to shortage of these three facilities within IPs than they are required, which in turn can restrict firms to comply with environmental protection codes of practices. That is, other things being constant, the log odds of achieving of environmental stewardship objective of the country reduce by 0.44 and 0.50 when open space off-site landfill solid waste management and toxic and hazardous waste management system increase by one unit, respectively. These might be due to that fact that the presence of landfills containing toxic and hazardous materials in an open space might lead to evaporation of polluting particles to the environment due to sun light. This in turn leads to adverse impact off-site landfill for solid waste management on environmental safeguarding of Ethiopia. This finding is also consistent with previous study conducted by Daniel et al. (2011), which concluded that there are no well managed landfill sites and almost all the current sites are non-engineered open dump site because standardized and modern landfill management system in Ethiopia is in an infantile. This low performance of solid waste collection and landfill management is associated mainly with absence of skilled human power and shortage of the required facilities.

With regards to the adverse impact of industrial toxic and hazardous waste, Ezeala et al (2023) noted that industrial hazardous wastes and their sources/health hazards may contribute to climate change, pollution of surrounding air as well as being toxic to humans. They also suggested mitigation measures concerning the generation of industrial hazardous wastes and reduction of health hazards through waste minimization; waste recovery and reuse; and waste treatment and disposal. This result also implies that though the Hazardous Waste Management and Disposal Control Proclamation No. 1090, implemented in 2018 prohibits unsafe disposal of hazardous waste by stipulating penalties for individuals and businesses, there is no proper industrial solid waste management in IPs and is one of the proxies for absence of good governance. Moreover, this finding is consistent with the argument of Firdissa and Soromessa (2016) that improper management of vast amounts of industrial waste is one of Ethiopia's most critical environmental problems, especially in Addis Ababa.

The qualitative analysis, in line with the quantitative findings, highlights the presence of systems for the collection, storage, treatment, and disposal of toxic and hazardous waste in Ethiopian Industrial Parks (IPs). The respondents noted that these moderate waste management systems are a significant step towards ensuring environmental protection.

However, the respondents also pointed out the limited number of firms that have obtained "Green" certifications at the national level or possess other globally recognized certifications such as the UN Compact Registration, ISO14001, or the International Sustainability and Carbon Certification (ISCC). These certifications are crucial in maintaining global standards for environmental protection, ensuring quality and safety.

Despite some firms in the IPs operating in accordance with globally accepted standards and possessing relevant certifications, the majority appear to be unconcerned about obtaining these certifications. The respondents strongly advocate for encouraging more enterprises and IPs to adhere to globally accepted environmental standards and obtain relevant certifications. This would not only enhance their reputation but also contribute significantly to environmental protection.

Similarly, only about 29 percent of the respondents agree to the presence of solar street lighting in IPS, implies shortage in IPs compared to the required level. Thus, increase in the shortage of solar street lighting in IPs by one percent reduce the log odds and probability of achieving environmental stewardship objective by 0.51 and 8 percent, respectively. This result implies that the streetlights in industrial parks use mainly hydroelectric power. Thus, not deploying or installing solar street lighting system solutions in IPs as required in the face of rising urbanization in the country, which has resulted in an increase in energy demand nationally, mean increase in light pollution problem. Thus, it can be inferred from the results related to green infrastructure that availing enough protected (not open) off-site landfill for waste management as well as improving toxic and hazardous waste collection, storage, and treatment management system; and solar street lighting in industrial parks should be the three areas whereby policymakers should focus aggressively in order to realize tangibly the realization of environmental performance of IPs in Ethiopia.

With regards to, green system indicators that are suggested by UNIDO (2019c) and included in this study only the requirement for the operator in IPs to possess ISO 14001 certificate enhances environmental protection objective of Ethiopia through IPs development significantly. Since it is an international standard that specifies the requirements for an environmental management system (EMS), which provides a framework that firms can follow to establish and maintain an EMS that helps them manage their environmental responsibilities in a systematic and effective manner, a one percent increase in firms with ISO14001 certificate and operating in IPs not only will enhance environmental responsibilities of firms but also increase the log odd and probability of environmental performance achievement by 3.05 and 13.2 percent, respectively, other things being constant. This magnitude of odd ratio also indicates the relevance of the requirement to achieve environmental performance of the country. The positive and significant impact of ISO 14001 on environmental protection and safeguard objective of Ethiopia is consistent with the argument of ISO (2011) that the standard is seen as a tool enabling an organization of any size or type to identify and control the environmental impact of its activities, products or services; improve its environmental performance continually; and implement a systematic approach to setting environmental objectives and targets thereby contributing to national environmental protection efforts.

Table 4. 11:Binary Logit Model result for environmental safeguarding

Iteration 0: log likelihood = -186.04871
Iteration 1: log likelihood = -168.18513
Iteration 2: log likelihood = -165.24866
Iteration 3: log likelihood = -165.18673
Iteration 4: log likelihood = -165.18673

Logit Regression	
Log Likelihood = -165.1867	Number of obs. = 395 LR chi^2 (20) = 41.72 Prob. chi^2 = 0.0030 Pseudo R^2 = 0.1121

Variables	**Logit Regression**						**Logistic**	**Mfx**
	Coeff.	**S.E**	**Z**	**P>⎮Z⎮**	**[95%conf. Inter.]**		**Odds Ratio**	**dy/dx**
SITE COMP/ WITH LUMP	0.5873	0.2487	2.36	0.018**	0.0998	1.0718	1.7992	0.0696
% OF PLOTS ALLOCATED TO LMA	0.5379	0.2383	2.26	0.024**	0.0709	1.0049	1.7124	0.6375
IPs IN REDEVELOPED BROWNFIELD SITE	-0.3643	0.2397	-1.52	0.129	-0.8341	0.1056	0.6947	-0.0432
OFFSITE LANDFILL FOR IP SWM	-0.8310	0.2170	-3.83	0.000***	-1.2562	-0.4057	0.4356	-0.0985
TOXIC &	-	0.2209	-3.06	0.002***	-	-0.2433	0.5085	-0.0801

HAZARDOUS MATERIALS CSTD MGT SYSTEM	0.6763				1.1092			
WSS AND WWTP	0.9006	0.3753	3.27	0.001***	0.3609	1.4403	2.4611	0.1067
SUSTAINABLE RAINWATER COLLECTION & REUSE SYS.	0.3679	0.2140	1.72	0.086*	-0.0515	0.7872	1.4447	0.0436
SEGREGATED RECYCLING RECEPTION BINS OR CONTAINERS	0.4818	0.2360	2.04	0.041**	0.0193	0.9443	1.6190	0.0571
BUILDINGS WITH ENV DESIGN CERTIFICATES	0.0038	0.2002	0.02	0.985	-0.3886	0.3961	1.0038	0.0004
SOLAR STREET LIGHTING	-0.6720	0.2412	-2.79	0.005***	-1.1447	-0.1993	0.5107	-0.0796
WASTE EXC CLEARINGHOUSE	0.3519	0.2662	1.32	0.186	-0.1698	0.8737	1.4218	0.0417
ANNUAL ENV AUDIT PERFORMED	-0.6379	0.2537	-2.51	0.012**	-1.1351	-0.1407	0.5284	-0.0756
FIRMS WITH “GREEN” CERTI. AT NATIONAL	-0.3653	0.2422	-1.51	0.131	-0.8400	0.1094	0.6940	-0.0433
OPERATOR POSSESSES UN COMPACT REGIS.	-0.6100	0.4729	-1.29	0.197	-1.5368	0.3169	0.5434	-0.0723
OPERATOR POSSESSES ISO14001	1.1138	0.4481	2.49	0.013**	0.2356	1.9920	3.0459	0.1320
OPERATOR POSSESSES ISCC	-0.7382	0.3570	-2.07	0.039**	-1.4379	-0.0385	0.4780	-0.0875
SWC SERVICE	-0.7243	0.2499	-2.90	0.004***	-1.2141	-0.2346	0.4846	-0.0858
EFFICIENT WATER USE IN m3/ USD SALES	-0.3788	0.2872	-1.32	0.178	-0.9418	0.1842	0.6847	-0.0449
HAZARDOUS WASTE PRODUCED /US$ SALES	0.2061	0.2641	0.78	0.435	-0.3116	0.7237	1.2288	0.0244
% OF SOLIDE WASTE SENT TO LANDFILE.	0.7339	0.3278	2.24	0.025**	0.0915	1.3763	2.0832	0.0870
Cons	4.2491	1.0171	4.18	0.002***	2.2551	6.2431	70.0417	
Marginal effect after logit	**Z=pr (social inclusiveness) (predicted)**							**0.8626**

*Note: Values in this table are rounded to 4 decimal place. ***, **, & * indicate significance at 1%, 5% & 10% level, respectively. The explanation about Z-value (in column 3) is similar to the explanation above.*
Source: Authors computation from survey data (2024)

Nevertheless, the annual environmental audits performed on each firm and operators possess International Sustainability and Carbon Certification (ISCC) had negative and statistically significant effect on the achievement of environmental protection objective of Ethiopia. This is because the response of respondents revealed that annual environmental audit was not conducted on each firm and very few firms possess. As a result, ceteris paribus, a one percent increase in the number of firms covered with annual environmental audits without corrective measures and operators that possess International Sustainability and Carbon Certification (ISCC) in IPs will reduce the log odds of achieving environmental performance of IPs in Ethiopia by a factor of 0.53 and 0.48, respectively. Expressing the impacts in percentage, similar percentage change in the number of firms covered with annual environmental audits and with ISCC in IPs will reduce the probability of achieving environmental stewardship objective by will reduce by 7.6 and 8.8 percent, respectively.

These results are expectable because, first many environmentalists such as Nacanieli (2009) argued that it is not the existence of annual environmental audit on each firm compliance to statutory and internal requirements parse that is important, but initiating corrective actions, which ensure compliance with applicable environmental laws and regulation, internal management policies and practices that improve the quality of existing environmental management system in IPs and improve environmental performance. Second, ISCC System GmbH (2020, pp7) makes it clear that the objective of the International Sustainability and Carbon Certification (ISCC) certification system is to contribute to the sustainable cultivation, processing and use of different kinds of biomass and their products. Hence, the implication of this is that the certification is more important for agro-processing industries within IPs, which also own farmlands and produce inputs for their industries. However, the majority of promoters in industrial parks of Ethiopia are engaged in non-agro-processing business. Hence, the suitability of such a requirement for promoters that produce metal and engineering products, chemical and chemical products, textile and leather industries, which are not engaged in biomass production is very minimal. The implication is thus, the requirement for promoters need to possess International Sustainability and Carbon Certification (ISCC) while operating in Ethiopian IPs cannot contribute to the achievement of environmental performance of IPs in Ethiopia. Reconsider the importance of the highlighted to keep or delete it

On the other hand, among the four indicators of efficient and clean production, emissions and waste management included in the binary response regression models, the lower percentage of solid waste sent to landfills (store of garbage) from IPs compared to the national average was the only indicator that contributes to the achievement of environmental performance significantly. The odd ratio value show that, keeping other thongs constant a percentage reduction of solid waste sent to landfills from IPs compared to the national average will increase the log odds and probability of achieving environmental performance objective of IPs by log odd of 2.1 and 8.7 percent, respectively. The implication of this result is that there is proper industrial solid waste management in IPs and is one of the effective proxies for good governance.

However, the variable that states the presence of solid waste collection services in IPs affected the achievement of environmental performance in Ethiopia through IPs development adversely and significantly. An increase in the current solid waste collection service in IPs by 1% reduces the log odds and probability of achieving the environmental protection objective of Ethiopia by a factor of 0.5 and 8.7 percent, keeping other variables constant. Thus, the implications of this result related to solid waste collection service in industrial parks are that though the presence of the service is critical, greater attention should be paid to the timing and effectiveness of the service, not to the mere existence of the service in IPs to achieve the environmental performance of Ethiopia through the expansion of industrial parks.

4.4. Diagnostics tests

4.4.1. Multicollinearity tests

Prior to performing logistic regression, pairwise correlation test among explanatory variables was conducted to check whether there is high correlation (above 0.7) so that there is multicollinearity problem. The Pearson correlation test performed for independent variables used in economic competitiveness model indicate that the maximum correlation is the higher correlation exists between the percentage of FDI to total investment (or GFCF) in industrial Park is higher than FDI as percentage of total investment (or GFCF) Nationally in 2023 and US$ exports of processed or semi-processed goods as a percentage of total Industrial ParkUS$ exports is higher than US$ exports of processed or semi-processed goods as a percentage of total national exports in US$ in 2023, which was 0.6779 followed by building maintenance and the existence of dedicated rapid-response or emergency maintenance, which is 0.6324. Among independent variables used in social inclusiveness and shared prosperity model, the highest correlation of 0.5577 exists between the existence of emergency preparedness and response system and on site health facilities. On the other hand, with the maximum of 0.6122 correlation coefficient between the presence of segregated recycling reception bins and/or containers and the presence of waste exchange clearinghouse, promoting industrial symbiosis and economic circularity among independent variables used in environmental stewardship. Therefore, analysis of the magnitudes of the maximum correlation coefficients (r values) of the independent variables included in the analysis economic competitiveness, social inclusiveness, and environmental stewardship models show that absence of multicollinearity problem for none of the correlation values is greater than 0.7 (for details of correlation coefficients in the three models see Appendix E 1; 5.1.1 Multicollinearity tests).

Furthermore, the residual was saved after running the Binary logistic models for economic competitiveness, social inclusiveness, and environmental stewardship including the constant term (see Model 3.14 to 3.16) using the command in equation (3.19) in order to examine whether multicollinearity problem exists among the independent variables included in the estimation of three Binary logistic models. Then, three separates pairwise correlation tests were performed by including the residual as additional independent variable indicate that all the correlation coefficient (r) between independent variables and residual are very low, below 0.1. As shown in Table 4.9 below, the maximum correlation coefficient value for both economic competitiveness as well as social inclusiveness and shared prosperity were 0.0642 and 0.0566, respectively. These correlations were observed between financial support variable and residual in economic competitiveness model and between the mean emergency (Police, Fire, and Ambulance) response time in IPs and residual in social inclusiveness and shared prosperity mode. Whereas the maximum correlation coefficient value in environmental stewardship model was 0.0332 that exists between Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing, and converting existing infrastructure or buildings and residual. Therefore, the maximum correlation coefficient between a variable and the residual, below 0.6, suggest absence of multicollinearity problem and hence the results of three binary logistic models displayed in Table 4.9 to 4.11 are stable and hence there is no difficulty to interpret the results, draw meaningful conclusions, and make reliable inferences about the effects of the predictor variables on the response variable can be made.

Visual examination of the results obtained from regression of the three binary logit models including the constant and presented in Table 4.6 to 4.8 also show that none of the correlations affected the results because of the standard errors (SEs) of coefficients are greater than 5.0 or less than 0.001. These results also signify that the results of binary logistic regression for economic competitiveness, social inclusiveness, and environmental stewardship including the constant term and displayed in Table 4.6 to 4.8 above are correct.

Moreover, it is shown in Table 4.12 that the mean VIF of economic competitiveness, social inclusiveness, and environmental stewardship models were less than 3. Moreover, the VIF and tolerance scores computed for the independent variables used in the three Binary logit models were lower than 10 and greater than 0.1, confirming absence of multicollinearity problem. Therefore, it can be concluded that since the lower pairwise correlation coefficients among time-variants explanatory variables and with model residual, SEs between 0.1 and 5; and VIF as well as tolerance values within the acceptable margin indicating that there is no multicollinearity problem among independent variables used in the three binary logistic models. As a result, there is no need for dropping some independent variables or use another method.

Table 4. 12: Summary of Diagnostics test results for Binary logit models

Diagnostic tests	Economic competitiveness	Social inclusiveness	Environmental stewardship
Multicollinearity test			
Max. correlation coefficient -Without residual -With residual	0.6779 0.0642	0.5577 0.0566	0.6122 0.0332
Mean, Variance inflation factor (VIF)	2.40	2.22	2.99
Hosmer-Lemeshow goodness of fit Chi2 ($\widehat{H}\ \chi 2$ (8)) Prob > chi2	7.79 [0.4546]	5.56 [0.6964]	4.03 [0.8542]
Correctly classified	82.28%	93.67%	82.53%
Area under ROC curve	0.8538	0.9853	0.7233

Source: Own computation from survey data (2024)

4.4.2. Hosmer-Lemeshow goodness of fit

The Hosmer-Lemeshow goodness of fit statistics ($\widehat{H}$) computed from the frequencies of the Tables under Logistic model for economic competitiveness, Social inclusiveness, and Environmental stewardship indicate that goodness of fit are $\widehat{H}\ \chi 2$ (8) = 7.79, 5.56, and 4.03, respectively. And the corresponding P-value computed from the chi square distribution with 8 degree of freedom are 0.4546, 0.6964, and 0.8542, respectively (see Table 4.9). These results indicate that the binary logistic models seem to fit quit well.

Because the distribution of $\widehat{H}$ is depends on m-asymptotic, the appropriateness of the p-value depends on the validity of the assumption that the estimated expected frequencies are large. When we look at the Table under Logistic model for economic competitiveness only one of the estimated expected frequency is 12, suggesting that all the other expected frequencies must be greater than 12. Therefore, there is good reason to believe that the P-value is accurate enough to support the hypothesis that the model fits. Similarly, for social inclusiveness only one of the estimated expected frequencies is zero, suggesting that all the other expected frequencies must be greater than that and hence there is good reason to believe that the P-value is accurate enough to support the hypothesis that this model also fits. Finally, for environmental stewardship it is observed that only one of the estimated expected frequencies is 23 and all others are greater than 23, suggesting the acceptance of the null hypothesis that the model fits based on the P-value is correct. In general, since, the Hosmer-Lemeshow goodness of fit chi2 (8) statistics for the three binary logistic models are insignificant, the models fit the data well because there is no significant difference between the observed and expected data. Moreover, it can be concluded that the results of Hosmer –Lemeshow goodness of Fit tests for the three models revealed that all the three models are fit to predict the binary outcome variables (for details see Appendix E 1; 5.1.2, A).

4.4.3. Classification tests

The classification test approach estimated probabilities are used to predict group membership. The classification Test based on the Binary Logistic regression model for economic competitiveness (Model 3.14) using a cut-point 0.5 indicates that the overall rate of correct classification is estimated 82.28%=100 [(245+80)/395]% with 61.54%(80/130) of achieving economic competitiveness objective (specificity) and 92.45% (245/265) not achieving economic competitiveness objective (sensitivity) being correctly specified. Thus, of the total 265 respondents who reported Ethiopia indeed achieves economic competitiveness objective through expansion of IPs about 245 of them were correctly predicted (i.e. sensitivity =245/265=92.45%).

Moreover, the classification Test results for social inclusiveness and shared prosperity objective (Model 3.15) using similar cut-point (0.5) indicates that the overall rate of correct classification is estimated 93.67%=100[(204+166)/395]% with 91.71%(166/181) of achieving economic competitiveness objective (specificity) and 95.33% (204/214) not achieving economic competitiveness objective (sensitivity) being correctly specified. From this, it is clear that among 214 respondents who perceived Ethiopia achieved social inclusiveness objective through expansion of IPs about 204 of them were correctly predicted, which give us sensitivity value of 95.33%. Finally, the classification test results for environmental stewardship (model 3.16) revealed that the overall rate of correct classification is estimated 82.53% =100[(320+6)/395] % with 8.45% (6/71) of realizing environmental stewardship objective (specificity) and 98.77% (320/324) not achieving the objective (sensitivity) being correctly specified. The implication is thus, among 320 respondents who agree that Ethiopia achieved environmental stewardship objective through expansion of IPs about 324 of them were correctly predicted (i.e. sensitivity is 98.77%) (for details of values see Appendix E 1, 5.1.2, B).

The sensitivity of the models show that the probability of the cases that are correctly classified for those respondents who perceive/believe that Ethiopia has achieved economic, social, and environmental objectives through development of IPs (i.e., Z=1) are 92.5%, 95.3%, and 98.8%, respectively. On the other hand, the Specificity of the models show the percentage of the cases that were incorrectly classified for those respondents who do not perceive/believe that Ethiopia has achieved economic, social, and environmental objectives through development of IPs (i.e., Z=0) are 61.54%, 91.71%, and 8.45%, respectively.

4.4.4. Plot of Sensitivity versus 1- specificity for all possible cut-point (Area under the ROC curve)

The receiver-operating characteristic (ROC) curve is used to assess the model discrimination, which is an indication of the accuracy of logistic regression model. The area under the curve (ROC) provides a measure of discrimination, which is the likelihood that Ethiopia's achievement of economic competitiveness via IPs will be higher $Pr(Z = 1)$ than the country failed to achieve the objective $(Z = 0)$. It has been mentioned in section 4.1 that 395 of the 412 sample respondents (96%) returned the questionnaire used in this dissertation. When we consider the economic competitiveness objective through expansion of IPs of Ethiopia, 265 respondents believe the country achieved this objective and 130 did not believe. Accordingly, a total of 265 x 130 =34,450 comparisons are made, and we count the number of times that the probability of being optimism that Ethiopia has achieved this objective is higher for those respondents who believe this than those who did not. For economic competitiveness data, the count of the number of times that Ethiopia with Z=1 had a higher probability than Ethiopia with Z=0 was about 29,413 (also called Mann-Whiteny U statistic for these data). Thus, as shown in Figure 4.1 below (at the bottom of the Figure) the ratio 29,413/34, 450 =0.8538 is the area under the curve, which is an excellent model for prediction.

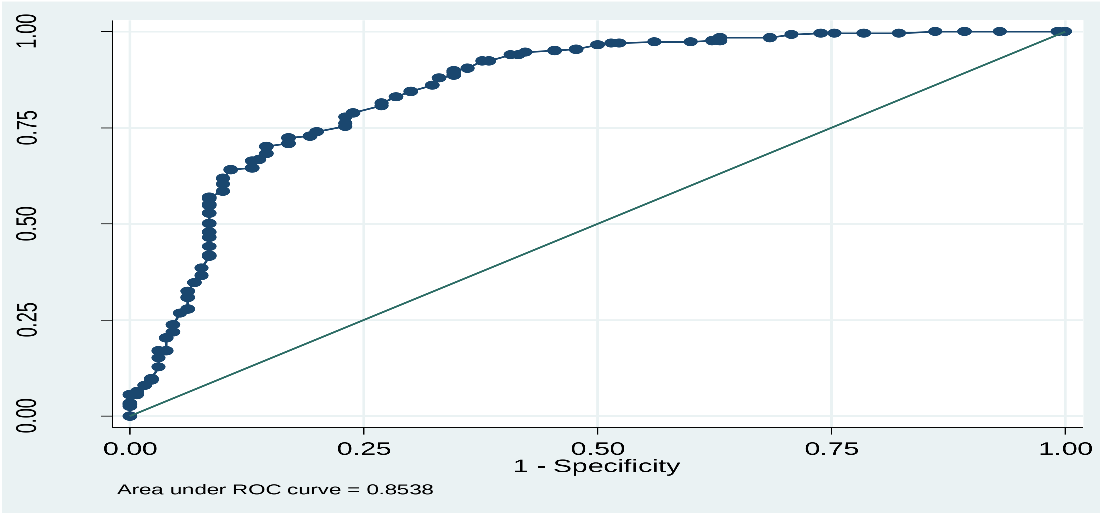


Figure 4. 1:Plot of Sensitivity versus 1- specificity for all possible cut-point for economic competitiveness objective (Area under ROC curve)

Source: Computed from survey data (2024)

In the case of achieving the social inclusiveness objective of Ethiopia, respondents who believe the country achieved this objective and not are 54.18% and 45.82%, respectively. This in turn give us a total of 214 x 181 =38,734 comparisons are made and we count the number of times that the probability of being optimism that Ethiopia has achieved this objective is higher for those respondents who believe this than those who did not. That is, the count of the number of times that Ethiopia with Z=1 had a higher probability than Ethiopia with Z=0 was about 38,165 (also called Mann-Whiteny U statistic for these data). Thus, the ratio 38,165/38.734 =0.9853 is the area under the curve. Figure 4.2 generated by the command shown in (3.21), shows that the area under the curve is 0.9853 (at the bottom of Figure 4.2). Since the value is between 0.8-0.9, it is an excellent model for prediction.

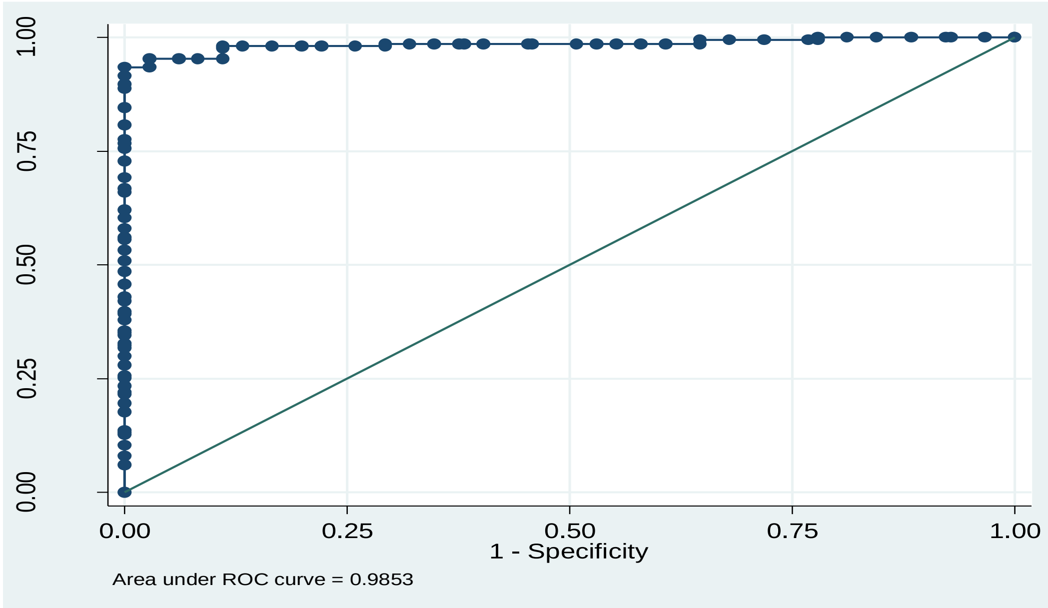


Figure 4. 2:Plot of Sensitivity versus 1- specificity for all possible cut-point for Social inclusiveness and shared prosperity objective (Area under ROC curve)

Source: Computed from survey data (2024)

Last but not lease, with 324 optimistic and 71 pessimist respondents with regards to achieving the environmental stewardship objective of Ethiopia through the expansion of IPs or not, the count of the number of times that Ethiopia with Z=1 had a higher probability than Ethiopia with Z=0 was about 16,839, Thus, the ratio 16,839/23,004=0.7233 is the area under the curve as obtained using STATA software, which is of course acceptable discrimination.

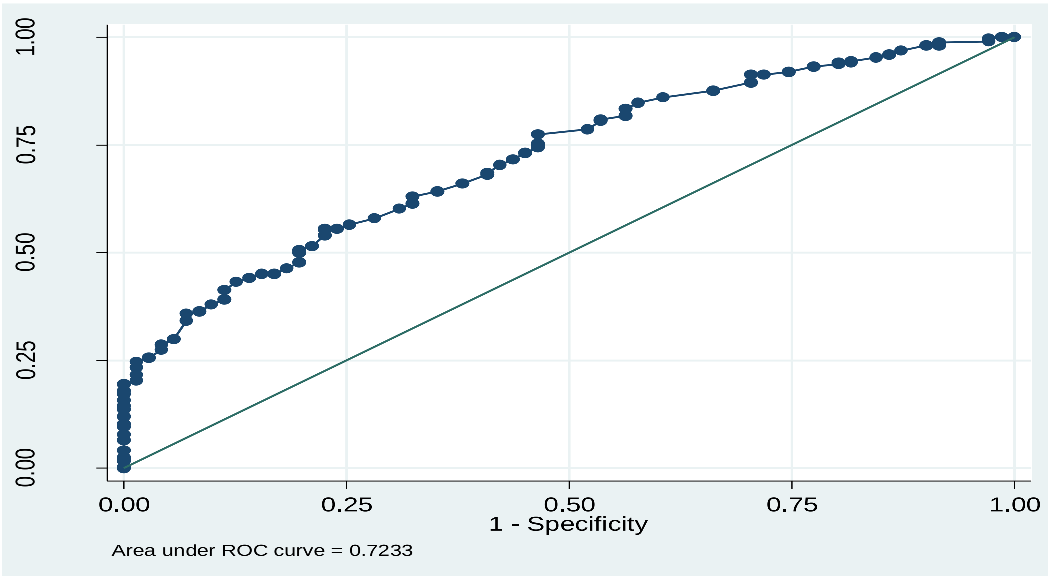


Figure 4. 3:Plot of Sensitivity versus 1- specificity for all possible cut-point for environmental stewardship objective (Area under ROC curve)

Source: Computed from survey data (2024)
Note: The Likert scale numbers at the top of the Table indicate that 5= Very high; 4=High; 3=Neutral; 2=Very low; and 1=Low

4.5. Measuring the performance of Industrial Parks in Ethiopia

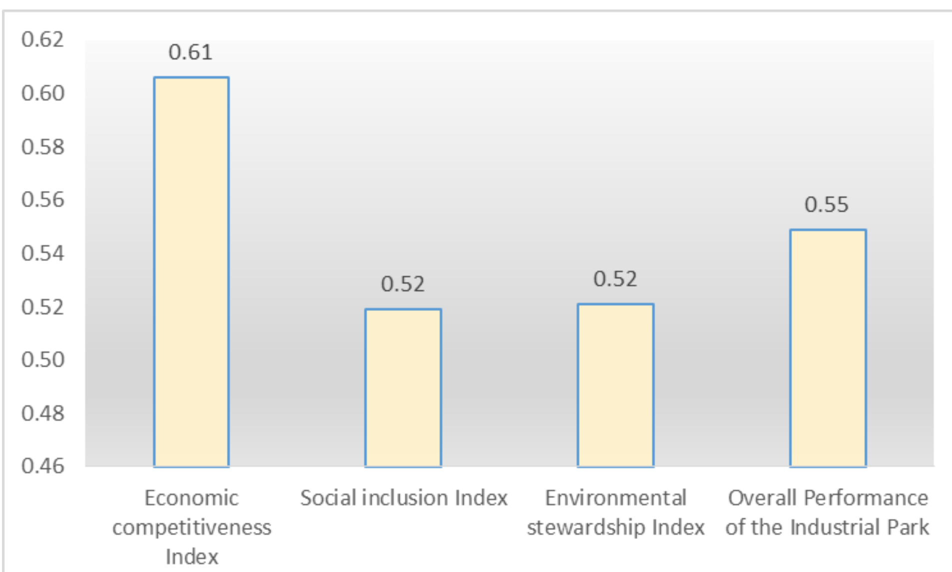
This section presents the industrial park performance index for Ethiopia. The Industrial Park Performance Index (IPPI) serves as a comprehensive assessment tool that examine the performance of industrial parks across various metrics, including their economic, social, and environmental roles. This index generates valuable insights into the extent to which industrial parks are propelling economic development, promoting shared prosperity, and embracing environmentally sustainable practices. Indicators are meticulously chosen based on the UNIDO (2019c) framework. The index uses three dimensions, sixty-four indicators. Cronbach alpha reliability tests are calculated for all dimensions. The Cronbach alpha for all dimensions is higher than 0.7, signifying that all dimensions are pertinent and have no inconsistency issues.

The scores for each indicator, dimension, and overall Industrial Park Performance Index are measured out of 1. A score above 0.5 indicates accomplishment or fulfillment of certain performance indicators. Conversely, a score below 0.5 implies a deficiency in attaining performance indicators. The estimated result is presented in four major sections: the Industrial Park Performance Index (IPPI), economic competitiveness index (ECI), social inclusion Index (SII), and Environmental safeguarding Index (ESI)

4.5.1. Industrial Park Performance Index

The Industrial Park Performance Index is a comprehensive measurement tool specifically created to examine the performance of industrial parks within a given geographic area. It encompasses a wide array of economic, social, and environmental indicators, allowing for a holistic assessment of the environment in which businesses operate. This index serves as a crucial instrument in gauging the overall business landscape while also highlighting potential risks associated with industrial park operations. By delving into various economic, social, and environmental factors, this index provides crucial insights to businesses, investors, policymakers, and other stakeholders, empowering them to make well-informed decisions. Moreover, it enables the identification of both opportunities and challenges, thereby aiding businesses in navigating the complex landscape of industrial park operations.

Figure 4. 4: Industrial Park Performance Index



Source: Own computation from survey data (2024)

Based on the information presented in the figure 4.4 above, Ethiopia's efforts to develop an industrial park with exceptional features have been examined as moderate, receiving a score of 0.55. This assessment indicates that there is considerable scope for improvement in this specific area. The performance of the industrial park needs to catch up to the expected score by 0.45, highlighting a significant gap between the current and desired performance levels.

In the figure provided, it is evident that industrial parks have exhibited noteworthy economic competitiveness, achieving a commendable score of 0.61. This outstanding performance is a testament to their strong dedication to promoting income generation and facilitating economic progress. Nevertheless, it is crucial to acknowledge that they have garnered ratings of 0.52 in both the environmental and social dimensions. These scores signify significant room for enhancements in environmental preservation and social inclusivity within these domains. These conclusions highlight the imperative nature of prioritizing endeavors geared towards elevating these industrial parks' social and environmental facets to foster a more well-rounded and sustainable approach to development.

4.5.2. Economic competitiveness Index

The Economic Competitiveness Index highlights the significance of encouraging domestic investment as a key development driver. This involves ensuring financial stability, incentivizing the retention of capital within the country, and strengthening the negotiating power of local businesses. Additionally, it underscores the importance of generating both direct and indirect employment opportunities and fostering connections between firms located in industrial parks and small and medium enterprises (SMEs) in nearby regions. Among the twenty indicators, 11 have scored higher than 0.6, indicating a positive evaluation of economic competitiveness. The evidence strongly suggests that eleven key indicators have significantly contributed to improving Ethiopia's industrial parks' economic competitiveness.

First, availability of efficient telephone and internet connectivity services. For companies to effectively deliver their services, it is crucial for them to establish and maintain a reliable telephone and internet connectivity infrastructure. This infrastructure is critical in enabling continuous, seamless communication with customers and internal teams, facilitating the smooth operation of various business processes, such as customer support, sales, and information sharing. This ensures that the company can meet the needs of their customers and maintain operational efficiency. According to the findings of the study, the telephone and internet access in the surveyed areas has been consistently rated as very good, indicating a strong foundation for businesses to operate and serve their clientele effectively.

Second, reliable water supply with minimal disruptions. A consistent and reliable water supply is of paramount importance within the industrial park as it is essential for sustaining day-to-day operations, supporting the personal needs of individuals, and facilitating various industrial processes. In addition to its operational significance, the presence of dependable water services serves as a compelling factor in creating a conducive environment for attracting foreign direct investment to the industrial park.

Third, stable electric power supply with minimal outages. The industrial park is predominantly reliant on electricity to fuel its daily activities. The availability of hydroelectric power is particularly prized due to its eco-friendly nature. Despite the country facing challenges in electric power supply, the government has ensured that industrial parks receive ample electricity to meet their needs.

Fourth, proximity to power transmission or distribution grid. The majority of industrial parks are strategically located in close proximity to the power transmission grid. This deliberate positioning streamlines maintenance procedures and minimizes the overall cost of powering these industrial areas.

Five, access to Repair, Rectification & Restoration (RRR) Services for utilities. Industrial parks are designed to be highly conducive for the process of repair, renovation, and restoration (RRR). If unforeseen damage occurs, the cost of carrying out these activities will be significantly lower if the parks are easily accessible and properly equipped for such purposes. Easy access to repair and restoration services within the industrial parks is essential in minimizing downtime and ensuring quick recovery from any damage, ultimately contributing to the overall efficiency and sustainability of these facilities.

Six, implementation of Dedicated Rapid-Response or Emergency Maintenance. The implementation of a dedicated rapid-response or emergency maintenance plan involves the development of specific strategies and protocols to address unforeseen issues or emergencies that may arise in a maintenance context. This plan should include detailed procedures for assessing and prioritizing maintenance needs, establishing communication channels for rapid response, and coordinating resources for efficient and effective resolution of maintenance-related emergencies.

Seven, connectivity to an appropriate highway. Industrial parks play a pivotal role in the efficiency of production and distribution processes. It is essential that industrial parks are strategically located near highways to ensure seamless transportation of raw materials to the manufacturing facilities and the subsequent distribution of finished products to the market. The proximity to highways significantly reduces the transit time for raw materials, which in turn minimizes production downtime and streamlines the entire manufacturing process. Additionally, this connectivity enhances product safety by facilitating quicker and more reliable transportation of goods, ultimately contributing to customer satisfaction and loyalty.

Eight, existence of a Dedicated One-Stop Shop/Single-Window service. Industrial parks should consider incorporating a dedicated One-Stop Shop that offers a wide range of goods and services for both the companies within the park and their customers. By centralizing various products and services in one location, this approach fosters synergies among the businesses in the industrial park, promotes collaboration, and facilitates easy access to a variety of offerings for customers. This not only enhances the convenience for customers but also enables businesses to create a unified presence, thereby strengthening the overall industrial park ecosystem.

Nine, utilization of an open competitive tender system to select private sector services. To enhance the economic competitiveness of industrial parks, one effective approach is to implement a competitive tender system through which private sector services can be selected. This process can help ensure that the most qualified and capable service providers are engaged, ultimately contributing to the overall success and efficiency of the industrial park.

Ten, regular and Scheduled Buildings Maintenance. Regular and scheduled building maintenance is essential for industrial parks to ensure the upkeep and safety of the infrastructure. This maintenance includes regular inspections, repairs, and upgrades to ensure that the buildings meet safety standards and remain in good condition. Routine maintenance also helps prevent larger issues from arising, saving time and money in the long run.

Eleven, provision of Dedicated or Localized IP Business Support. Dedicated or localized industrial parks provide businesses with tailored spaces and resources to meet their specific needs. These parks offer specialized infrastructure, services, and support tailored to the needs of the businesses operating within them. This includes access to industry-specific facilities, specialized workforce training programs, networking opportunities, and other resources designed to help businesses thrive within the industrial park environment.

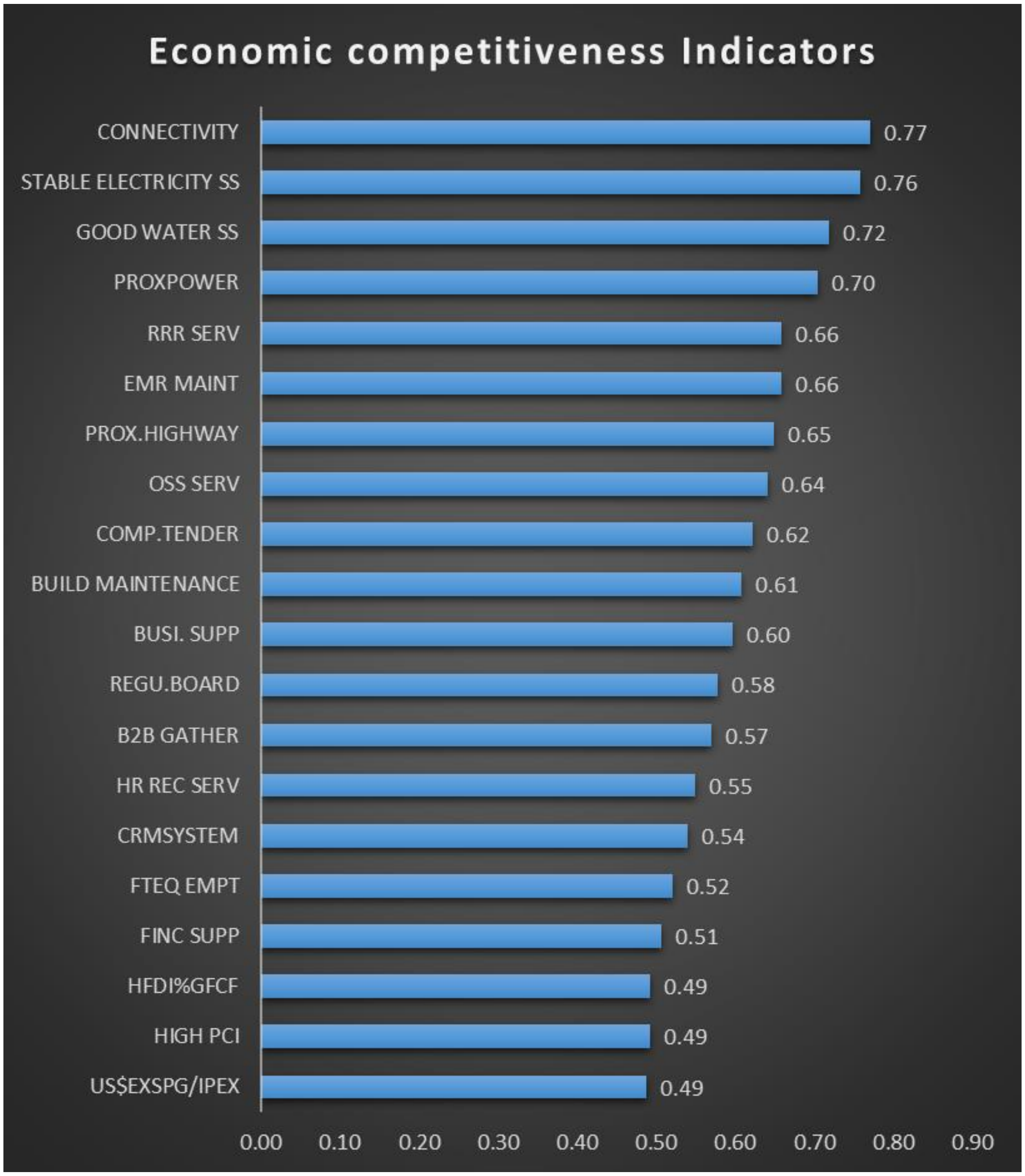
On the other hand, the industrial parks scored a lower result in three indicators in the process of bringing economic competitiveness: attracting foreign direct investment, improving incomes, and exports. For industrial parks to play a critical role in enhancing economic competitiveness, they should improve on the following three indicators.

First, Foreign direct investment (FDI) plays a crucial role in providing foreign currency and capital to developing countries. Given the limited availability of capital in these nations, FDI effectively bridges the gap by bringing in much-needed capital, advanced technology, and skilled expertise. To attract foreign direct investment, creating a favorable business environment for growth and expansion is essential. This can involve implementing policies and regulations that are conducive to foreign investment, ensuring political stability, offering incentives, and establishing infrastructure to support business operations.

Second, industrial parks contribute to increasing the Per Capita Income by creating employment opportunities and fostering economic development within the region. Industrial parks are strategically designed areas aimed at fostering economic development by promoting productivity and driving the country's Gross Domestic Product (GDP). The overarching goal is stimulating economic growth and prosperity by creating a supportive environment for thriving businesses. This is achieved by establishing well-equipped facilities and infrastructure, which in turn encourages innovation, trade, and investment, ultimately leading to higher per capita income and increased employment opportunities.

Third, they contribute to improving the total exports of processed or semi-processed goods, thus bolstering the economy through international trade and market expansion. Industrial parks contribute to the export market and are crucial for a country's economy. Companies operating in these industrial parks need to focus on producing high-quality products that can compete internationally. Companies in the industrial park not only produce but also export finished or semi-processed goods. This strategy allows them to thrive in the global market by meeting the demand for high-quality products. Additionally, companies should identify and focus on products with a comparative advantage, optimizing their resources and expertise for a more competitive presence internationally.

Figure 4. 5: Economic Competitiveness Index Indicators



Source: Own computation from survey data (2024)

4.5.3. Social inclusion and shared prosperity Index

The Social Inclusive Index is a comprehensive assessment tool designed to measure and examine the extent to which industrial parks are creating an enabling environment that impartially serves all stakeholders. The social performance dimension of industrial park is measured using social inclusiveness, socially appropriate site and social infrastructure, quality social management system, and occupational health and safety. This involves various vital aspects, including enhancing the utilization of local resources, transitioning towards strategic human resource management practices, providing vocational training opportunities, promoting social inclusion, strengthening the skills of the workforce, facilitating technology and knowledge transfer, improving social infrastructure, supporting the well-being of the local community, enhancing occupational health and safety standards, and implementing measures for better security and crime prevention within the industrial park. Based on the assessment of 24 indicators, it was found that only four indicators had scored above 0.6. This indicates that there is a significant deficiency in the ability of industrial parks to promote social inclusiveness. The social performance of industrial parks is positively influenced by the following four indicators: access to fire service, burying power, and higher representation of females and youth.

First, ensuring that fire services have unrestricted access to all areas of the industrial park can significantly enhance safety and emergency response capabilities. Providing unimpeded access for fire services to all areas of the industrial park is crucial for enhancing safety and improving emergency response capabilities. This unrestricted access enables firefighters to effectively respond to incidents, access critical infrastructure, and mitigate potential hazards throughout the entire industrial park.

Second, burying power lines within the industrial park is a critical safety measure that greatly enhances the well-being of our workforce. By undergrounding the power lines, we are effectively minimizing the risk of electrical accidents, thus ensuring a safer work environment for our employees. This initiative exemplifies our strong commitment to social responsibility and underscores our dedication to prioritizing the safety and security of our workforce.

Third, fostering a higher representation of women within the industrial park is crucial for promoting diversity and gender equality in the workforce. By actively recruiting and supporting female talent, we aim to diversify our team's skill set and perspective, creating a more inclusive and dynamic work environment. This commitment is not only aligned with our values, but it also brings a wealth of unique perspectives and skills to our workforce, contributing significantly to the success and innovation of our industrial park.

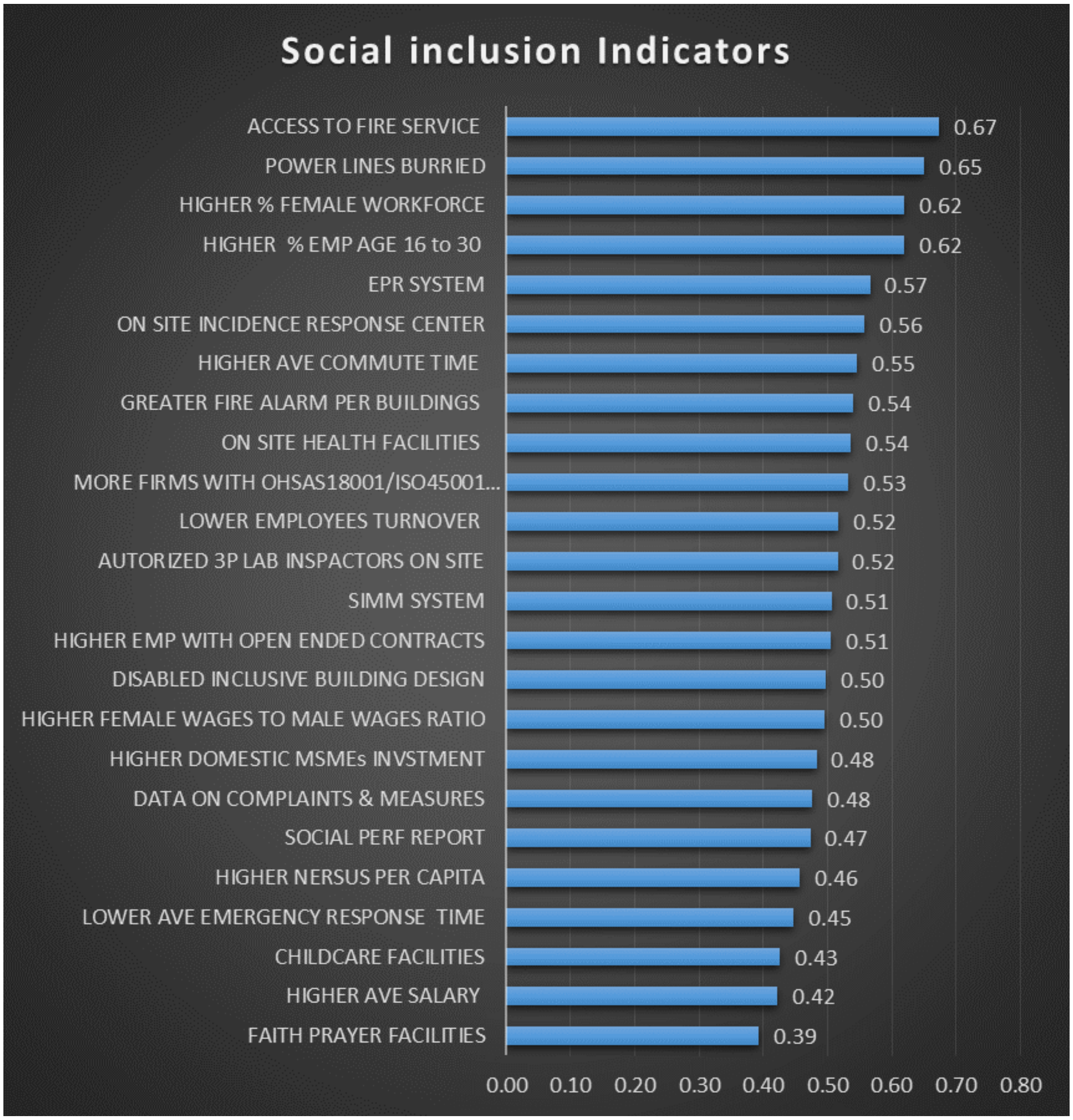
Finally, Encouraging the recruitment and retention of a higher percentage of young employees, particularly individuals between the ages of 16 and 30, can play a vital role in shaping the future of the industrial park. By tapping into this demographics' fresh perspectives, innovative ideas, and boundless enthusiasm, there is the potential for a notable transformation in the work environment. These young employees can infuse the workplace with new energy, creativity, and forward-thinking approaches, ultimately contributing to enhanced productivity and a more vibrant, dynamic atmosphere.

The assessment of the 24 indicators also revealed that eight of them scored below 0.5, indicating a significant deficiency in achieving social inclusiveness in industrial parks. The specific areas of concern are as follows:

First, the proportion of Domestic MSME investment in the industrial parks is notably low. Fostering social inclusiveness in industrial parks involves focusing on the improvement and development of medium and small micro-enterprises. These enterprises play a significant role in the economic activities of individuals from underprivileged backgrounds. Therefore, it is crucial for industrial parks to create an environment that accommodates and supports the growth of these small and micro-enterprises to ensure that they are socially included in the economic landscape.

Second, there is limitation associated with handling of complaints and reporting of measures in industrial parks. The availability of an aggregated, publicly accessible labor complaints and measurement mechanisms related data are very essential for good labour relation and welfare of workforce in the industrial parks. This lower index value of this variable (0.48) supports the lower perception of respondents (about 28.6 percent) about its development within IPs. As a result, verifying reliably whether the enterprises operating in industrial parks have complied with labor standards of the country or not is cumbersome as highlighted by Mehari (2018).

Figure 4. 6: Social Inclusiveness and shared prosperity Indicators Index Indicators



Source: Own computation from survey data (2024)

Three, there is a scarcity of annual public/published Social Performance Reports in the industrial parks. The regular annual social performance report serves as a crucial component of the comprehensive social management system. It provides a comprehensive overview of an organization's social activities and their impact within industrial parks. Unfortunately, the prevailing trend among operators in industrial parks fails to align with social inclusion principles, resulting in infrequent and insufficient reporting of their activities. This deficiency in evidencing an inclusive strategy has the potential to significantly impede their day-to-day operations and broader organizational objectives.

Four, the ratio of nurses per capita (per 1000 people) in the industrial parks is insufficient. The provision of comprehensive and readily accessible healthcare services within the industrial park is essential due to the potentially hazardous nature of the work. Employees may be at risk of sustaining injuries, and having on-site healthcare facilities or easy access to medical care can significantly contribute to the well-being and safety of the workforce.

Five, the average emergency (police, fire, and ambulance) response time in the industrial parks is notably slow. Industrial parks play a crucial role in hosting numerous businesses and industries, and thus must prioritize the provision of adequate police, fire, and ambulance services. These services are necessary not only to safeguard the thousands of employees working within the industrial park but also to guarantee the smooth and uninterrupted operation of the facilities. Additionally, these emergency services are vital for promptly addressing and managing any unforeseen emergency situations that may occur within the industrial park.

Six, there is a notable absence of childcare facilities in the industrial parks. In order to create an inclusive and supportive environment for women in industrial parks, it is imperative to have well-equipped childcare facilities within the premises. This measure holds significant relevance in the Ethiopian context, where women predominantly bear the responsibility of tending to their children. The absence of accessible childcare services within industrial parks may place women in the challenging position of having to decide between staying in their jobs and providing care for their children. Such a predicament could detrimentally affect their economic empowerment and overall engagement in the workforce, contributing to broader implications for gender equality and societal progress. Thus, the provision of childcare facilities within industrial parks is not only vital for women's ability to participate in the workforce but also a crucial step toward fostering gender equality and sustainable development.

Seven, the average salary of employees in the industrial parks falls below the national average. The industrial park currently offers wage rates that are below the national average. This disparity in compensation has the potential to result in a higher turnover of experienced employees. Consequently, company owners must place significant emphasis on the development and implementation of comprehensive strategies aimed at elevating employee compensation. By prioritizing wage increases, businesses can effectively work towards retaining their skilled workforce, diminishing turnover rates, and cultivating a stable and experienced team.

Eight, faith and prayer facilities for religious groups are limited within the industrial parks. Religion holds significant importance as a form of social capital for the majority of Ethiopians. It serves as a fundamental pillar of their identity, providing a space for individuals to gather, worship, and connect with their faith. However, in the absence of accessible religious facilities within the workplace, individuals may encounter challenges in practicing their beliefs, potentially leading to disruptions in their work schedules as they seek out alternative places for religious observance. Thus, offering dedicated religious facilities within the company's premises can play a pivotal role in fostering a more inclusive and supportive work environment. By affording employees the opportunity to engage in religious practices on-site, the company demonstrates its commitment to accommodating diverse cultural and religious needs. This, in turn, can contribute to a more cohesive and harmonious workplace, ultimately enhancing overall employee satisfaction and productivity.

4.5.4. Environmental safeguarding Index

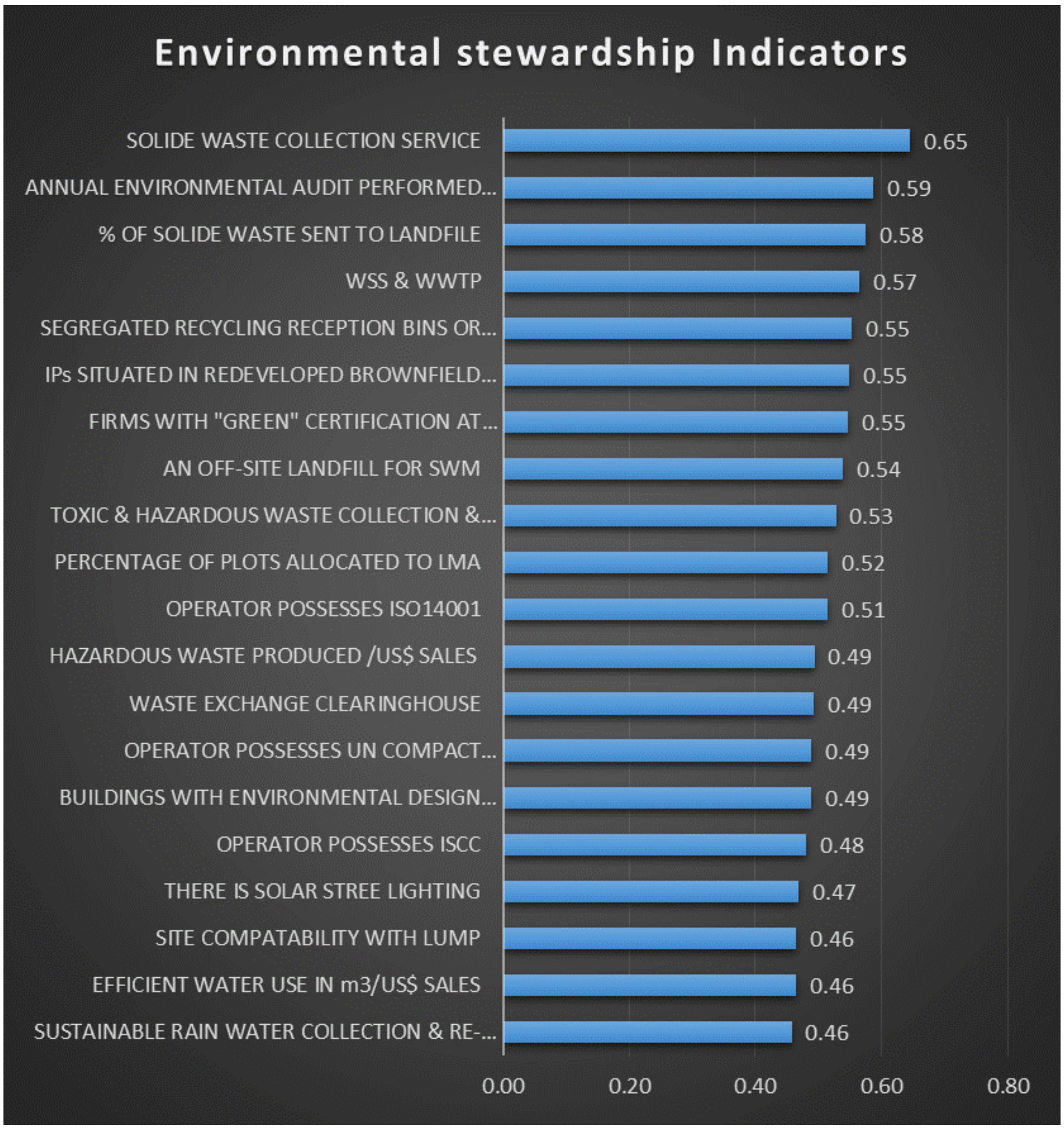
Achieving sustainable development is not only an aspiration but an achievable goal, especially when companies prioritize environmentally friendly practices. Industrial parks are pivotal in the effort to reduce environmental pollution and degradation. The effectiveness of industrial parks in preserving the environment can be measured through a variety of approaches. These include implementing a comprehensive environmental impact assessment framework that takes into account factors like land use, water resources, air quality, and biodiversity. Socio-ecological aspects must be integrated to ensure that the societal impacts of industrial activities are carefully considered. Furthermore, aligning with climate change commitments at all levels of government is imperative to ensure that industrial parks are contributing to global efforts to combat climate change. To further the cause of environmental preservation, adopting circular economy practices to green the supply chain is necessary. This involves reusing, recycling, and reducing waste in the production and distribution processes. In addition, the construction of cost-effective infrastructure that is resilient to climate change impacts is crucial. Industrial parks must also focus on implementing efficient power supply and management systems, utilizing green manufacturing technologies, establishing effective water supply and wastewater management systems, and preserving natural areas and indigenous vegetation. These measures collectively contribute to the sustainability and environmental responsibility of industrial parks.

Based on an assessment of 20 environmental indicators, it was discovered that only a single indicator scored above 0.6. Industrial parks are typically successful only when it comes to providing efficient and effective solid waste collection services. An important objective for industrial parks should be the provision of dependable and top-notch solid waste collection services that are not only efficient and effective but also prioritize the proper disposal of waste in a manner that is environmentally sustainable and ecologically responsible. Of course, the index of ten other indicators range between 0.51 and 0.59, implying moderate development within IPs. These include

- Annual environmental audits performed on each firm
- Percentage (%) solid waste sent to landfills (store of garbage) in IPs
- Presence of Public Wastewater Sewerage System and Wastewater Treatment Plant (WWTP)
- Availability of segregated recycling reception bins, bells and/or containers for recyclable and non-recyclable products
- Industrial Park situated on redeveloped brownfield site,
- Presence of firms having obtained a “Green” certification at national level
- Presence of an off-site landfill for IPs solid waste management

- Presence of toxic and hazardous waste collection, storage and treatment or disposal management system
- The percentage of plots actually allocated to non-polluting or light manufacturing activities, and
- Operator possesses ISO14001.

Figure 4. 7: Environmental safeguarding Index Indicators



Source: Own computation based on survey data (2024)

On the contrary, nine indicators scored below 0.5. This suggests a significant lack of diligence by industrial parks in safeguarding the environment. The indicators with a low performance are given as follows:

First, excessive production of hazardous waste. The excessive generation of hazardous waste, such as toxic chemicals, heavy metals, and other harmful substances, poses a significant threat to the environment. These hazardous wastes can contaminate soil, water, and air, leading to long-term ecological damage and adverse health effects for both humans and wildlife. Furthermore, the improper disposal of hazardous waste can result in contamination of local ecosystems and drinking water sources, posing serious risks to public health. In addition, the accumulation of hazardous waste can have detrimental effects on the productivity of industrial parks, as it may lead to increased regulatory scrutiny, costly clean-up efforts, and potential legal liabilities. Therefore, it is crucial for industries to adopt responsible waste management practices to mitigate the adverse impacts of hazardous waste production.

Second, lack of a waste exchange clearinghouse. The lack of a waste exchange clearinghouse hinders the exchange of recyclable waste. Establishing a waste exchange system would enable companies to minimize waste volume and reduce the costs associated with waste disposal. The fundamental principle of waste exchange lies in the notion that what is considered waste by one company could serve as a valuable raw material for another. This concept promotes a more sustainable approach to waste management while creating opportunities for resource utilization and cost savings.

Third, limited adoption of the UN Global Compact Registration by operators. It has been noticed that there has been a limited uptake of the UN Global Compact registration by business operators. The United Nations Global Compact is a voluntary initiative that encourages businesses and firms all over the world to incorporate sustainable and socially responsible policies into their operations. It also requires them to report on their progress in implementing these policies.

Four, inadequate adherence to environmental design related certificates by buildings. Numerous industrial park buildings are currently falling short of the essential requirements and standards stipulated in environmental design certifications. This failure to comply with these certifications could potentially result in adverse environmental effects and jeopardize the long-term sustainability of the constructed environment.

Five, insufficient possession of the International Sustainability & Carbon Certification (ISCC) by operators. The International Sustainability and Carbon Certification (ISCC) presents a comprehensive system that offers global, practical, and transparent certification for the sustainability of agricultural, industrial, and food products. This certification system encompasses a diverse array of products and is applicable across various markets, facilitating its seamless integration throughout the entirety of the supply chain. The certification of sustainability plays a pivotal role in fortifying one's position within the market. Every entity operating within the agricultural supply chain, ranging from farmers and agricultural traders to oil and sugar mills, biodiesel and ethanol plants, as well as biofuels traders and independent warehouses, is required to demonstrate the sustainability of their practices. ISCC is aligned with the principles of environmentally, economically, and socially sustainable production.

Six, shortage of solar street lighting. The shortage of solar street lighting in urban areas presents a significant challenge in terms of sustainable energy usage. Unlike traditional streetlights that rely on fossil fuels, solar streetlights utilize photovoltaic panels to convert solar energy into electricity. This renewable energy source reduces the reliance on non-renewable energy, leading to a substantial decrease in greenhouse gas emissions and overall pollutant output, thereby contributing to a greener and more environmentally friendly urban environment.

Seven, site incompatibility with the Land Use Master Plan. According to the Land Use Master Plan, the development of industrial parks should strictly adhere to the designated areas. As land is a finite resource, it is imperative to ensure the efficient use of land for the establishment of industrial parks to maximize productivity while minimizing the environmental impact.

Eight, misuse of water resources. Excessive and inappropriate utilization of water resources can lead to the depletion and wastage, which in turn can have far-reaching and detrimental effects on the environment and human populations. For example, over-irrigation in agriculture can lead to soil erosion and reduced water quality, while industrial pollution of water sources can have significant impacts on aquatic ecosystems and human health. Inefficient domestic water usage, such as prolonged water running while performing daily tasks, can also contribute to the overall strain on water resources and exacerbate the issue of water scarcity.

Nine, inadequate sustainable rain and storm water collection/harvesting practices. Insufficient infrastructure and inadequate collection and utilization methods for rainwater and storm water are hindering sustainable water management and conservation practices. Properly designed systems for capturing and utilizing rainwater and storm water can play a crucial role in mitigating water scarcity and promoting efficient use of water resources.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

This final chapter provides a comprehensive summary of the study's findings, which aimed to explore the role of Ethiopia's Industrial Parks (IPs) in advancing economic competitiveness, creating social inclusiveness & shared prosperity, and environmental stewardship. The study, conducted from the inception of the IPs to the present day, was underpinned by the principles of 'Inclusive and Sustainable Industrial Development' (ISID).

Data was collected from a diverse sample of 395 respondents through structured questionnaires distributed across selected Ethiopian business enterprises operating in IPs. These business enterprises, a mix of 138 privately owned and 65 publicly owned entities, span a variety of manufacturing sectors. They are located in seven cities: Dukem, Hawassa, Bahir Dar, Mojo, Dire Dawa, Adama, and Addis Ababa.

The collected data underwent rigorous analysis using descriptive statistics and Binary logistic regression methods. Additionally, qualitative data was gathered through interviews with key informants, 14 interviewees, and analyzed using content analysis, providing a robust validation of the quantitative findings which are enhanced by method triangulation.

The first part of this chapter presents the conclusions of the dissertation, meticulously aligned with the specific objectives and corresponding research questions. Following this, the chapter delves into potential recommendations derived from the study's findings, offering valuable insights for future research and policymaking. This comprehensive approach ensures a holistic understanding of the role of IPs in Ethiopia's socio-economic landscape.

5.1. Conclusions

5.1.1. On economic competitiveness

The findings of the study highlight the pivotal role that IPs have in bolstering economic competitiveness in Ethiopia. Through a comprehensive and triangulated mixed-method data analysis, the study has identified some key indicators that demonstrate the influence of IPs in this regard.

These indicators serve as tangible evidence of the IPs' contribution to the economic landscape of Ethiopia, reinforcing their importance in the country's industrial development strategy. The IPs' role extends beyond mere economic growth, fostering a competitive environment that drives innovation, efficiency, and productivity in various manufacturing sectors.

In essence, the study's findings not only underscore the significant role of IPs in promoting economic competitiveness but also shed light on the mechanisms through which they contribute to Ethiopia's broader economic development objectives. This comprehensive understanding of IPs' role is crucial for policymakers and stakeholders in their ongoing efforts to optimize the benefits of industrial parks in Ethiopia. The following indicators are notably showing the roles of IPs in advancing economic competitiveness:

Open Competitive Tender for Operator Sourcing: This practice guarantees the selection of the most skilled and efficient operators, thereby boosting the productivity and competitiveness of the Industrial Parks (IPs).

Location near Essential Infrastructure: The strategic positioning of IPs in close proximity to vital infrastructure such as roads, electricity, and water supply can markedly enhance operational efficiency, thereby fostering economic competitiveness.

Improved Maintenance Services: The implementation of regular and scheduled maintenance for buildings and power sources, complemented by dedicated rapid-response or emergency maintenance services, also acts as a driving force for enhancing economic competitiveness in Ethiopia.

However, the study also identified some variables that pose challenges to achieving advancing economic competitiveness. These are:

1. Unreliable water sources: There is poor water supply with less hours of interruption
2. Weak Repair, Rectification & Restoration Service: There are irregularities in repair services for utilities.
3. Limited access to specific financial support programs: The demand of operators for credit from Development Bank of Ethiopia not yet met.
4. Limited human resources agency & recruiting services: Agencies operating in Ethiopian IPs are not capable of meeting both the recruitment and training services need of enterprises in IPs.
5. Lower Per Capita Income (PCI) in Industrial Park: The PCI in IPs is lower compared to the national average.
6. Lower FDI to total investment (or GFCF) in IPs: Though the development of IPs is expected to attract more FDI and ensure higher FDI to total investment in IPs compared to FDI to total investment in the country. However, this has not materialized yet.

These findings highlight the need for a holistic approach in leveraging IPs for economic competitiveness. It is crucial to capitalize on the identified indicators that foster economic competitiveness while addressing the challenges that hinder it.

5.1.2. On social inclusiveness and shared prosperity

The study's findings suggest that IPs contribute significantly to social inclusiveness and shared prosperity; the key positive indicators identified are:

1. Workforce Safety Measures: The implementation of safety measures for the workforce within the IPs.
2. Availability of Religious Facilities: The presence of facilities for religious practices within the IPs.
3. On-Site Incident Response Center: The establishment of a dedicated center for responding to incidents on-site.

4. Emergency Preparedness and Response System: The presence of a system for preparing and responding to emergencies.
5. Annual Social Performance Reports: The regular publication of reports detailing the social performance of the IPs.
6. Ease of Access to Fire Services: The easy accessibility of fire services within the IPs.
7. Availability of Aggregated Labor Complaints Data: The availability of data on labor complaints within the IPs.
8. On-Site Labor Inspectors: The presence of labor inspectors on-site within the IPs.
9. Average Employee Salary: The average salary of employees within the IPs.
10. Low Employee Turnover: The low rate of employee turnover within the IPs.
11. Proportion of Female Workforce: The proportion of female employees within the IPs.
12. Domestic MSME Investment in IPs: The level of investment by domestic Micro, Small, and Medium Enterprises (MSMEs) in the IPs.

The study also unveiled some counterintuitive negative associations, which highlight the intricate nature of these relationships and the potential influence of other factors that were not measured in this study. In light of these the challenges to achieve social inclusiveness and shared prosperity identified are:

1. High Average Commute Time to IPs: The long average commutes time to the IPs.
2. Weak Social Role Management System: The inadequacy of the social role management system within the IPs.
3. Low Certification Rates: The low rates of certification within the IPs.
4. High Percentage of Employees with Open-Ended Contracts: The high percentage of employees with open-ended contracts within the IPs.
5. Wage Disparity Between Genders: The disparity in wages between different genders within the IPs.

These findings underscore the necessity for a comprehensive strategy when leveraging IPs for social inclusiveness and shared prosperity. This approach should consider all the positive factors while addressing the complexities and potential negative associations.

In summary, the study concludes that a holistic approach, considering all the identified factors, is crucial for leveraging the potential of IPs in promoting social inclusiveness and shared prosperity.

5.1.3. On environmental safeguarding dimension

The study offers insightful perspectives on the role of IPs in advancing environmental stewardship in Ethiopia. The findings indicates that IPs can significantly contribute to environmental sustainability when developed in alignment with local land use plans and when a higher percentage of plots are allocated to Local Manufacturing Activities (LMA). However, it could be inferred from the findings that there is a need of enhancement on some areas, including the management of toxic and hazardous materials, the reliance on off-site landfills for waste disposal, and the implementation of solar street lighting systems. In general, the positive environmental performance indicators towards the achievement of environmental performance objectives are:

1. Site Compatibility with Land Use Master Plan (LUMP): IPs developed for non-agricultural use in harmony with LUMP.
2. Plots Allocated to Non-Polluting or Light Manufacturing Activities: Allocation of plots to activities that have minimal environmental impact.
3. Presence of Public Wastewater Sewerage System, STP and/or Wastewater Treatment Plant (WWTP): Effective wastewater management systems in place.
4. Segregated Recycling Reception Bins, Bells and/or Containers: Facilities for segregating recyclable and non-recyclable byproducts.
5. Requirement for Firms to Possess ISO 14001 Certificate: Ensuring firms adhere to international environmental management standards.
6. Lower Percentage of Solid Waste Sent to Landfills: IPs manage waste effectively, resulting in less solid waste sent to landfills compared to the national average.
7. Sustainable Rain and Storm Water Collection / Harvesting, Management, Treatment and Re-use Systems: Presence of sustainable water management systems.

However, the study also identified six factors that adversely and significantly affected the achievement of environmental performance objectives:

1. Presence of an Off-Site Landfill for IP Solid Waste Management: Reliance on open off-site landfills for waste disposal.
2. Toxic and Hazardous Waste Collection, Storage and Treatment or Disposal Management System: Need for improvement in the management of toxic and hazardous waste.
3. Solar Street Lighting: Need for the implementation of solar street lighting systems.
4. Annual Environmental Audits Performed on Each Firm: Regular environmental audits not being conducted on each firm.
5. Requirement for Operators to Possess International Sustainability and Carbon Certification (ISCC): Operators not possessing ISCC.
6. Presence of Solid Waste Collection Service in IPs: Need for effective solid waste collection services in IPs. These findings underscore the need for a comprehensive approach in leveraging IPs for environmental safeguarding.

Industrial park performance index (IPPI) constructed to assess the overall business landscape and challenges related to IPs in Ethiopia revealed that Ethiopia's efforts to develop an industrial park with exceptional features have been examined as moderate, receiving a score of 0.55. Moreover, the indices show that industrial parks have exhibited noteworthy in advancing economic competitiveness, achieving a commendable score of 0.61 compared to 0.52 for creating shared prosperity and safeguarding the environment. This assessment indicates that there is significant gap between the current and desired performance levels and considerable scope for improvement in some of the indicators with scores below 0.5. These conclusions highlight the imperative nature of prioritizing endeavors geared towards elevating these industrial parks' social and environmental facets to foster a more well-rounded and sustainable approach to development.

5.2. Recommendations

5.2.1. On economic competitiveness

For Policy Makers and Private stakeholders

a) Promote Competitive Tendering: Encourage the sourcing of operators based on an open competitive tender to increase the likelihood of economic competitiveness.

b) Improve Infrastructure: Enhance the proximity to appropriate infrastructure such as highways, power transmission or distribution grids, and operational public ports or airports.

c) Enhance Facilities and Services: Regularly maintain facilities and provide emergency maintenance services. Also, consider implementing a dedicated one-stop shop or single-window in industrial parks.

d) Address Challenges: Address the identified challenges such as the representation of the private sector on the Board of Regulator, interruptions in water supply, the presence of a repair, rectification, and restoration service, access to specific financial support programs, the presence of human resources agencies and recruiting services, and the percentage of foreign direct investment (FDI) in total investment.

5.2.2. On social inclusiveness and shared prosperity analysis:

For Policymakers and private stakeholders

a) Invest in Infrastructure and Facilities: Enhance the quality of infrastructure within IPs, including power lines, faith and prayer facilities, and on-site incident response centers. Also, consider implementing an ERP system to streamline operations and improve efficiency.

b) Promote Transparency: Encourage IPs to be transparent about their social performance, this could be achieved through regular social performance reporting and audits.

c) Improve Workforce Policies: Promote gender diversity and offer competitive salaries to attract and retain a diverse and talented workforce. This could involve implementing policies that encourage the hiring and promotion of women and offering wages that are competitive with other sectors and regions.

d) Review Safety Standards: Conduct a thorough review of safety standards within IPs, particularly those related to OHSAS18001/ISO45001 certification. The negative association found in the study warrants further investigation to understand the underlying reasons and address any potential issues.

5.2.3. On environmental safeguarding

For Policy Makers and Private stakeholders

a) Improving land use compatibility: IPs should be developed in line with local land use plans to ensure environmental sustainability. This requires close collaboration between IP developers and local planning authorities.

b) Local Manufacturing Activities: A higher percentage of plots should be allocated to LMA. This could be achieved through policies that encourage local manufacturers to set up operations in IPs.

c) Waste Management: IPs should prioritize the development of effective on-site waste management strategies to reduce reliance on off-site landfills. This could include the implementation of waste segregation and recycling practices, as well as the establishment of a waste exchange clearinghouse.

d) Management of Toxic and Hazardous Materials: IPs need to improve their management systems for toxic and hazardous materials. This could involve regular training for staff and the implementation of stringent safety measures.

e) Water Management: IPs should continue to invest in Water Supply Systems (WSS) and Wastewater Treatment Plants (WWTP). Additionally, the implementation of sustainable rainwater collection and reuse systems should be encouraged.

f) Solar Street Lighting: IPs should address the issues related to the implementation or maintenance of solar street lighting systems to ensure their effectiveness.

g) Conducting environmental audits on each firm: IPs should conduct regular environmental audits on each firm. However, these audits should not just identify areas for improvement, but also provide guidance and support to help firms implement necessary changes.

h) Environmental design certificates: While buildings with environmental design certificates did not show a significant effect on environmental stewardship, IPs should still strive to meet environmental design standards as part of their commitment to sustainability.

These recommendations aim to leverage the potential of IPs in promoting economic, social and environmental contributions in the future. However, they should be considered in conjunction with other relevant factors and tailored to the specific context and needs of each IP.

5.2.4. Recommendations on future research

The authors acknowledge that, despite a pioneer study in the area, this study is limited in the sense that it only used 64 out of 191 sub-indicators of UNIDO recommendation. Detailed and comprehensive study is warranted, not only on covering of these indicators but also employing role assessment techniques, such as Difference-in-Difference (DID) method to assess tangibly the social, economic and environmental impacts of private and public industrial parks.

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SUPPORTING APPENDENCES

Appendix A 1: Data Collection Instrument

PART I: Demographic Information

Please Answer the Following Questions correctly.

1. Your Gender: 1. Male____2. Female ____________
2. Age (in years): ____________
3. Educational Qualification:

   1. Certificate_______2.College_______3.BA/BSc Degree_______4.Master's____5. Ph.D.___________6. Other_____
4. Number of years you have worked in your current position________________
5. Do you have an experience of working in manufacturing sector? Yes…….No .... (if yes how many years……………....)
6. What is the business form of your company (choose from the list below)?

   a. Public or state owned ………. If so, Ethiopian ……Foreign……….specify the country……………

   b. Private ………... if so, Ethiopian………...Foreign investor………..Specify the country………….

   c. Joint Venture ………..if so between Private to Private……..Private to Public…… Public to Public…… Please specify if the Partners in the Joint venture are from different countries below…………………………………………………

   ……………………………………………………………………

   d. Public Private Partnership (PPP)

   ……………………………………………………………………

   ……………………………………………………………………

   please specify the particulars of the partners

   …………………………………………………………………………

   …………………………………………………………………………

PART II: Questionnaire on the role of industrial parks in Ethiopia

General Instruction

Kindly answer the following questions under (Part II - Part IV) using 1 to 5 scales, where ***1=Very low ; 2=Low ;3=Neutral; 4=High; and 5=Very high***(Please use ticks (√) mark in each question provided below)

You can also fill the online version or the hard copy by hand-writing then attach its scanned copy to: Ethio-IPstudy@gmail.com

Questionnaire for Economic Role of Industrial Parks (Advancing Economic Competitiveness)

No.	Indicators	5	4	3	2	1
1.	**Good Economic Governance**					
	a) There is an open competitive tender system to select the private sector					
	b) The Private sector is represented in the Management Board of industrial Parks					
	c) Operator Customer Relationship Management (CRM) system is in place					
2.	**Economically Enabling site & Infrastructure 'hardware'**					
	a) It is connected to an appropriate highway					
	b) It is in a proximity to power transmission or distribution grid					
	c) There is both telephone and internet connectivity service					
	d) There is a stable electric power supply with less hours of outage					
	e)There is a good water supply with less hours of interruption					
3.	**Economically Enabling Services 'software' for ….**					
	a) Regular and Scheduled Maintenance of Buildings					
	b) Dedicated Rapid-Response or Emergency Maintenance					
	c) Repair, Rectification and Restoration Services for utilities					
	d) Dedicated or Localized Industrial Park Business Support					
	e) Industrial Park user have access to specific financial support Programs					
	f)Dedicated One-Stop Shop/Single-Window service is present for Industrial Parks					
	g) Business-to-business (B2B) gatherings are being held on regular basis					
	h) There is Human Resources Agency, for Recruiting and Training services					

	4. Economically Impactful Nature: Employment, Investment, Turn-over					
	a) The Per Capita Income in the Industrial Park higher than the National Per CapitaIncome in 2023 ended July 7					
	b) The ratio of Full-time employment to par-time employment in Industrial Park is greater than 1					
	c) FDI % to total investment (or GFCF)[6] in industrial Park is higher than FDI % of total investment (or GFCF) Nationally in 2023 ended July 7					
	d) US$ exports of processed or semi-processed goods as % of total Industrial ParkUS$ exports is higher than US$ exports of processed or semi-processed goods as % of total national exports in US$ in 2023 ended July 7					

Industrial Parks: As a vehicle for Social Inclusiveness and Creating Shared Prosperity in Ethiopia

No.	Indicators	5	4	3	2	1
1.	**Socially Appropriate Site and Social Infrastructure**					
	a) Power lines in Industrial Park are buried, for workforce safety					
	b) Presence of Childcare facilities					
	c) Faith and prayer facilities for religious groups are prevalent					
	d) Presence of on-site Incident Response Centre					
	e) Disabled-inclusive building design (i.e., access ramp and elevator in each building)					
2.	**Quality Social Management System and Service**					
	a) The is a Social impact management & monitoring system (SMS)					
	b) There is Emergency Preparedness and Response system					
	c) There is annual public/published Social Performance Report for industrial park					
3.	**Occupational Health and Safety**					
	a) Percentage (%)of firms with OHSAS[7] 18001/ ISO 45001 Certification In industrial park is greater than % firms with Certification					

[6] *Gross fixed capital formation (GFCF) is a measure of investment in fixed assets such as machinery, buildings, and infrastructure. The percentage of GFCF to GDP is an indicator of how much a country is investing in its economy. On the other hand, FDI in industrial parks is the total amount of money invested by foreign companies within an industrial park. The percentage of FDI to GFCF in industrial parks indicates how much foreign investment is being made in fixed assets relative to the national FDI/GCFG. If the percentage of FDI/GFCF in industrial parks is higher than the percentage of FDI/GFCF nationally, it could mean that more investment is being made in industrial parks relative to outside industrial parks*

[7] *OHSAS 18001 is an international standard for occupational health and safety management systems. It provides a framework that organizations can use to control and improve their health and safety performance. However it is replaced by ISO 45001 that was published in March 2018 by the International Organization for Standardization (ISO).*

	Nationally[2]					
	b) On-site hospital, clinic, or dispensary within industrial park					
	c) The number of Fire alarms/building is greater than the number Nationally					
	d) There is access by fire services to all parts of the Industrial Park					
	e) The number of nurses per capita (per 1000 people) is higher than the numberthe National per capita in 2023 ended July 7					
1.	**Good Labor Relations and Welfare**					
	a) An aggregated, publicly accessible labor complaints and its measurementmechanism related data are available					
	b) There are on-site Regulator, Operator or Third-Party Authorized Labor Inspectors or Counselors					
	c) Average Salary of employees in industrial park is higher compared to Aver. Salary Nationally					
	d) The % of employees on term or open-ended contracts in industrial park is higher than % employees on term or open-ended contracts Nationally					
	e)The % of employee annual turnover in industrial park is lower than the %of employees annual turnover nationally					
5.	**Social Inclusiveness**					
	a) The % of female workforce in industrial park to total workforce is higher than % of female workforce Nationally					
	b) Female wages as % of male wages in industrial park is higher than Femalewages as % of male wages Nationally					
	c) The % of employees between ages of 16 and 30 in Industrial Park is higher than % employees between ages of 16 and 30 Nationally					
	d) Domestic MSME investment as a % total investment in Industrial Park is higher than MSME investment as a % total investment nationally					

Industrial Parks for Environmental Protection (Safeguarding the Environment) in Ethiopia

No.	Indicators					
	1. Environmentally Appropriate Site					
	a) Site compatibility with Land Use Master Plan as regards non-agricultural use					
	b) The % of plots actually allocated to non-polluting or light manufacturing activities in Industrial Park is greater than % of GDP represented by non-polluting or light manufacturing activity nationally					
	c) Industrial Park situated on redeveloped brownfield site, with the effective possibility of reusing, re-purposing, and converting existing infrastructure or buildings					
	2.Green Infrastructure					
	a) Presence of an off-site landfill for industrial park solid waste management					
	b) Presence of toxic and hazardous waste collection, storage and treatment ordisposal management system					
	c) Presence of Public Wastewater Sewerage System, STP and/or of WastewaterTreatment Plant (WWTP)					
	d) Presence of sustainable rain and storm water collection / harvesting (i.e., culverts/drains, cisterns/tanks), management, treatment (e.g., filter, waterhyacinth) and re-use systems					
	e) Segregated recycling reception bins, bells and/or containers for: paper &card; recyclable plastic containers; recyclable metals and others.					
	f)There are buildings with environmental design related certificates					
	g)There are Solar Street lighting					
	h) Presence of waste exchange clearinghouse, promoting industrial symbiosis andeconomic circularity					
	3.Green Systems					
	a) Annual environmental audits performed on each firm					
	b) Presence of firms having obtained a "Green" certification at national level					
	c) Operator possesses UN Global Compact Registration[8]					
	d) Operator possesses ISO14001[94]					

[8] The UN Global Compact is a voluntary initiative launched by the United Nations in 2000 to encourage businesses and organizations worldwide to adopt sustainable and socially responsible policies and practices. The initiative is based on ten principles in the areas of human rights, labor, environment, and anti-corruption.

[9] ISO 14001 is an international standard that specifies the requirements for an environmental management system (EMS). The standard provides a framework that organizations can follow to establish and maintain an EMS that helps them manage their environmental responsibilities in a systematic andeffective manner.

	e) Operator possesses International Sustainability and Carbon Certification (ISCC)					
4.Efficient and Clean Production, Emissions						
	a) Presence of solid waste collection service					
	b) The ratio of Efficient water use in m3/US$ Sales in Industrial Park is lowerthan water use in m3/US$ Sales nationally					
	c) Hazardous waste produced/US$ in Sales nationally in Industrial Park is lowerthan Hazardous waste produced /US$ in Sales nationally					
	d) Percentage (%) solid waste sent to landfills (store of garbage) in Industrial Parkis lower than solid waste sent to landfills nationally					

Part III: Achievement of the three objectives of Industrial Parks

1. The role of industrial parks in Ethiopia has led to an improvement in economic competitiveness. .**1=Yes ……. 0=No …….**

2. As a result of the role of industrial parks, Ethiopia has experienced social inclusiveness and shared prosperity. **1=Yes ……. 0=No …….**

3. Industrial parks have contributed to the enhancement of environmental stewardship in Ethiopia **1=Yes ……. 0=No …….**

Appendix A 2: Qualitative Interview Guide

Interview Guide for the Study on the Role of Industrial Parks in Ethiopia

Introduction

My name is Mengistu Walelegn, and I am a PhD student at AAU. I am conducting a study on the role of Industrial Parks (IPs) in promoting economic competitiveness, social inclusiveness, shared prosperity, and environmental protection in Ethiopia. I appreciate your willingness to participate in this interview.

Before we begin, I would like to assure you that:

1. Your participation in this interview is entirely voluntary.
2. You may choose not to answer any question or withdraw from the interview at any time.
3. Your responses will be kept confidential and will be used only for the purpose of this research.
4. The interview will be recorded for accuracy, but the recording will be destroyed once it has been transcribed.

Do you have any questions before we begin? Do I have your permission to proceed?

(The interview proceeds upon the consent of the interview)

(*The UNIDO performance evaluation guideline was given to the respondents)*

Interview Questions

1. Could you please share your experience with industrial parks in Ethiopia?
2. How do you see the IPs role in fostering economic competitiveness in line with UNIDO's performance framework? Which indicators are crucial elements to create economic competitiveness?
3. What economic benefits have you observed from the industrial parks? Which indicators are indispensable to promote social inclusion and shared prosperity?
4. Could you discuss the environmental benefits of industrial parks? How do you examine the prevalence of environmental protection efforts in line with UNIDO's indicators?
5. How do you think industrial parks can be improved to better serve the needs of the community?
6. How do you examnie the environmental suitability of IPs operation in Ethiopia?
7. What are your suggestions or ideas for improving the performance of industrial parks in Ethiopia?

Thank you for your time and for sharing your insights. Your input is invaluable to this research. If you have any further questions or comments, please feel free to contact me.

Mengistu Walelegn Worku

Email: mengistu.walelegn@gmail.cpm

Appendix B 1: Reliability Test Results

Reliability test after Principal component analysis for items under

Economic competitiveness

Good Economic Governance indicators

```
. pca comptender mgtboard crmsystem

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =          3
                                                 Trace            =          3
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.1394	1.54522	0.7131	0.7131
Comp2	.594179	.327763	0.1981	0.9112
Comp3	.266417	.	0.0888	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
comptender	0.5130	0.8567	0.0527	0
mgtboard	0.6027	-0.4032	0.6886	0
crmsystem	0.6112	-0.3216	-0.7232	0

```
. alpha comptender mgtboard crmsystem

Test scale = mean(unstandardized items)

Average interitem covariance:     .540613
Number of items in the scale:           3
Scale reliability coefficient:     0.7981
```

Economically Enabling site & Infrastructure 'hardware' (Appropriate site selection)

```
. pca proxhighway proxpower connectivity stableelectricss goodwaterss

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =          5
                                                 Trace            =          5
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.19402	2.19338	0.6388	0.6388
Comp2	1.00064	.583471	0.2001	0.8389
Comp3	.417169	.149074	0.0834	0.9224
Comp4	.268095	.148016	0.0536	0.9760
Comp5	.120079	.	0.0240	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
proxhighway	0.4422	0.5617	0.0376	-0.0574	0.6959	0
proxpower	0.4522	0.5304	-0.1108	0.0148	-0.7083	0
connectivity	0.4473	-0.3780	-0.5382	0.5979	0.0992	0
stableelec~s	0.4533	-0.4138	-0.1862	-0.7672	-0.0073	0
goodwaterss	0.4408	-0.2985	0.8136	0.2246	-0.0647	0

```
. alpha proxhighway proxpower connectivity stableelectricss goodwaterss

Test scale = mean(unstandardized items)

Average interitem covariance:      .712069
Number of items in the scale:            5
Scale reliability coefficient:      0.8556
```

Economically Enabling Services or ‘software’

```
. pca builmaintenance emermaint rrrserv busisupp fincsupp ossserv b2bgather hrrecserv

Principal components/correlation                Number of obs    =        30
                                                Number of comp.  =         8
                                                Trace            =         8
    Rotation: (unrotated = principal)           Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.48403	2.10207	0.4355	0.4355
Comp2	1.38196	.45284	0.1727	0.6082
Comp3	.929121	.2286	0.1161	0.7244
Comp4	.700521	.190881	0.0876	0.8120
Comp5	.50964	.0787429	0.0637	0.8757
Comp6	.430897	.03984	0.0539	0.9295
Comp7	.391057	.21829	0.0489	0.9784
Comp8	.172767	.	0.0216	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Unexplained
builmainte~e	0.4023	-0.0858	-0.2328	-0.2854	-0.6106	0.4672	0.2746	-0.1691	0
emermaint	0.3422	-0.4703	0.2524	-0.3875	0.3230	0.1778	-0.0807	0.5527	0
rrrserv	0.3743	0.4003	-0.2984	0.0071	-0.2845	-0.3271	-0.4657	0.4536	0
busisupp	0.4298	0.2511	0.0281	-0.3139	0.4293	0.0386	-0.3325	-0.5971	0
fincsupp	0.3878	-0.0693	-0.4520	0.1791	0.3504	-0.3486	0.6028	0.0283	0
ossserv	0.3201	-0.3339	-0.0237	0.7618	0.0235	0.3023	-0.3226	-0.0955	0
b2bgather	0.1802	0.6434	0.4027	0.2273	0.1440	0.3908	0.3231	0.2487	0
hrrecserv	0.3331	-0.1338	0.6521	0.0763	-0.3369	-0.5253	0.1371	-0.1785	0

```
. alpha builmaintenance emermaint rrrserv busisupp fincsupp ossserv b2bgather hrrecserv

Test scale = mean(unstandardized items)

Average interitem covariance:     .4423235
Number of items in the scale:            8
Scale reliability coefficient:      0.8027
```

Economically Impactful Nature: Employment, Investment, and Turn-over

```
. pca highpci fteqempt hfdigfcf usexspgipex

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         4
                                              Trace            =         4
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.46911	1.42243	0.6173	0.6173
Comp2	1.04667	.729814	0.2617	0.8789
Comp3	.316861	.149502	0.0792	0.9582
Comp4	.167358	.	0.0418	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
highpci	0.5805	-0.2458	-0.1578	-0.7600	0
fteqempt	0.5539	0.2753	-0.6331	0.4655	0
hfdigfcf	0.4089	0.6657	0.6233	-0.0324	0
usexspgipex	0.4347	-0.6485	0.4310	0.4524	0

```
. alpha highpci fteqempt hfdigfcf usexspgipex

Test scale = mean(unstandardized items)

Average interitem covariance:     .6545977
Number of items in the scale:            4
Scale reliability coefficient:      0.7890
```

Sub-Total for Advancing Economic Competitiveness

```
. pca goodeconomicgovernance economicenablinginfra economicenablingservice economicalyimpactfulnature

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         4
                                              Trace            =         4
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.31094	1.38288	0.5777	0.5777
Comp2	.928062	.388035	0.2320	0.8098
Comp3	.540028	.319056	0.1350	0.9448
Comp4	.220972	.	0.0552	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
goodeconom~e	0.5494	-0.0023	-0.6814	0.4835	0
economicen~a	0.6075	-0.0939	-0.0675	-0.7858	0
economicen~e	0.5018	-0.3910	0.6733	0.3768	0
economical~e	0.2779	0.9156	0.2789	0.0815	0

```
. alpha goodeconomicgovernance economicenablinginfra economicenablingservice economicalyimpactfulnature

Test scale = mean(unstandardized items)

Average interitem covariance:     .2766966
Number of items in the scale:            4
Scale reliability coefficient:      0.7460
```

Social inclusiveness and shared prosperity

Socially Appropriate Site and Social Infrastructure

```
. pca powerlinesburried childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledinclusivebuildingdesign highe
> ravecommutetime

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =          6
                                                 Trace            =          6
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.62367	.906439	0.4373	0.4373
Comp2	1.71723	1.11842	0.2862	0.7235
Comp3	.598812	.102333	0.0998	0.8233
Comp4	.496479	.154261	0.0827	0.9060
Comp5	.342218	.12062	0.0570	0.9631
Comp6	.221598	.	0.0369	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
powerlines~d	0.4180	-0.4319	-0.0538	-0.1723	0.7638	0.1509	0
childcaref~s	0.4805	-0.2713	-0.1553	-0.4749	-0.5945	0.3040	0
faithpraye~s	0.2806	0.4952	0.7509	-0.1792	0.0857	0.2695	0
onsiteinci~r	0.3610	-0.4294	0.3896	0.6768	-0.2309	-0.1490	0
disabledin~n	0.3629	0.4549	-0.4822	0.4851	0.0477	0.4374	0
higheravec~e	0.5036	0.3215	-0.1575	-0.1387	0.0166	-0.7738	0

```
. alpha powerlinesburried childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledinclusivebuildingdesign hig
> heravecommutetime

Test scale = mean(unstandardized items)

Average interitem covariance:     .3314943
Number of items in the scale:            6
Scale reliability coefficient:      0.7280
```

Quality Social Management System and Service

```
. pca simmsystem eprsystem socialperfreport

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         3
                                              Trace            =         3
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.06923	1.56767	0.6897	0.6897
Comp2	.501555	.072338	0.1672	0.8569
Comp3	.429217	.	0.1431	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
simmsystem	0.5818	-0.4650	0.6673	0
eprsystem	0.5859	-0.3294	-0.7404	0
socialperf~t	0.5641	0.8217	0.0808	0

```
. alpha simmsystem eprsystem socialperfreport

Test scale = mean(unstandardized items)

Average interitem covariance:     .5463602
Number of items in the scale:            3
Scale reliability coefficient:      0.7667
```

Occupational Health and Safety

```
. pca morefirmswithohsas18001iso45001c onsitehealthfacilities  greaterfirealarmperbuildings accesstofireservice highernersuspercapita
>  loweraveemergencyresponsetime

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         6
                                              Trace            =         6
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.96384	1.82678	0.4940	0.4940
Comp2	1.13706	.230279	0.1895	0.6835
Comp3	.906786	.331276	0.1511	0.8346
Comp4	.57551	.308647	0.0959	0.9305
Comp5	.266863	.116931	0.0445	0.9750
Comp6	.149932	.	0.0250	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
moref~45001c	0.4750	0.1367	0.0464	0.5974	-0.6078	-0.1652	0
onsiteheal~s	0.4458	0.1993	0.1473	-0.7163	-0.3781	0.2893	0
greaterfir~s	0.4391	-0.1890	-0.5728	0.1851	0.2830	0.5736	0
accesstofi~e	0.5292	0.0890	-0.1568	-0.1817	0.4294	-0.6856	0
higherners~a	-0.0370	0.9099	0.0855	0.1754	0.2977	0.2100	0
loweraveem~e	0.3184	-0.2647	0.7850	0.1789	0.3668	0.2142	0

```
. alpha morefirmswithohsas18001iso45001c onsitehealthfacilities  greaterfirealarmperbuildings accesstofireservice highernersuspercapi
> ta loweraveemergencyresponsetime

Test scale = mean(unstandardized items)
Reversed item:  highernersuspercapita

Average interitem covariance:     .3619923
Number of items in the scale:            6
Scale reliability coefficient:      0.7221
```

Good Labor Relations and Welfare

```
. pca dataoncomplaintsmeasures autorized3plabinspactorsonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         5
                                              Trace            =         5
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.55962	1.38161	0.5119	0.5119
Comp2	1.17801	.560519	0.2356	0.7475
Comp3	.617492	.177607	0.1235	0.8710
Comp4	.439885	.234898	0.0880	0.9590
Comp5	.204987	.	0.0410	1.0000

```
Principal components (eigenvectors)
```

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
dataoncomp~s	0.4644	-0.1170	0.7267	-0.4889	-0.0599	0
autorized3~e	0.4864	-0.4678	-0.1908	0.2067	0.6822	0
higheraves~y	0.5528	-0.0907	-0.0645	0.5286	-0.6345	0
higherempw~s	0.2247	0.7986	0.2520	0.3539	0.3508	0
loweremplo~r	0.4379	0.3485	-0.6065	-0.5600	-0.0732	0

```
. alpha dataoncomplaintsmeasures autorized3plabinspactorsonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnove
> r

Test scale = mean(unstandardized items)

Average interitem covariance:     .3465517
Number of items in the scale:            5
Scale reliability coefficient:      0.7231
```

Social Inclusiveness

```
. pca higherfemaleworkforce higherfemalewagestomalewagesrati higherempage16to30 higherdomesticmsmesinvstment

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         4
                                              Trace            =         4
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.23732	1.33815	0.5593	0.5593
Comp2	.899165	.347635	0.2248	0.7841
Comp3	.551529	.239542	0.1379	0.9220
Comp4	.311987	.	0.0780	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
higherfema~e	0.4382	0.7055	0.3298	0.4489	0
higherfema~i	0.5750	-0.1178	0.4256	-0.6888	0
higheremp~30	0.5133	0.1455	-0.8380	-0.1141	0
higherdome~t	0.4625	-0.6835	0.0886	0.5577	0

```
. alpha higherfemaleworkforce higherfemalewagestomalewagesrati higherempage16to30 higherdomesticmsmesinvstment

Test scale = mean(unstandardized items)

Average interitem covariance:     .5034483
Number of items in the scale:            4
Scale reliability coefficient:      0.7331

.
```

Sub-total for social inclusiveness and shared prosperity categories

```
. pca sociallyapprosite qualitysms occupationalhealthandsafty goodlabrelationandwelfare socialinclusivness

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =          5
                                                 Trace            =          5
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.3083	2.29113	0.6617	0.6617
Comp2	1.01718	.552125	0.2034	0.8651
Comp3	.465052	.315335	0.0930	0.9581
Comp4	.149718	.0899694	0.0299	0.9881
Comp5	.0597484	.	0.0119	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
sociallyap~e	0.4408	-0.1500	0.8308	0.2954	0.0756	0
qualitysms	-0.0444	0.9794	0.1956	0.0177	-0.0175	0
occupation~y	0.5111	0.1136	-0.4190	0.3000	0.6785	0
goodlabrel~e	0.5185	0.0322	0.0341	-0.8538	0.0026	0
socialincl~s	0.5232	0.0666	-0.3078	0.3057	-0.7305	0

```
. alpha sociallyapprosite qualitysms occupationalhealthandsafty goodlabrelationandwelfare socialinclusivness

Test scale = mean(unstandardized items)
Reversed item:  qualitysms

Average interitem covariance:     .2649065
Number of items in the scale:            5
Scale reliability coefficient:      0.8066
```

For environment safeguarding

Environmentally Appropriate Site Indicators

```
. pca sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinredevelopedbrownfie

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         3
                                              Trace            =         3
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.97099	1.32324	0.6570	0.6570
Comp2	.647752	.266494	0.2159	0.8729
Comp3	.381258	.	0.1271	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
sitecompat~p	0.5296	0.8053	0.2666	0
percentage~a	0.6207	-0.1537	-0.7688	0
ipssituate~e	0.5781	-0.5727	0.5812	0

```
. alpha  sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinredevelopedbrownfie

Test scale = mean(unstandardized items)

Average interitem covariance:     .4823755
Number of items in the scale:            3
Scale reliability coefficient:      0.7343
```

Green Infrastructure Indicators

```
. pca anoffsitelandfillforswm toxichazardouswastecollectiondmg wsswwtp sustainablerainwatercollectionre segregatedrecyclingreceptionb
> ins buildingswithenvironmentaldesign thereissolarstreelighting wasteexchangeclearinghouse

Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         8
                                              Trace            =         8
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.59299	2.00609	0.4491	0.4491
Comp2	1.5869	.649264	0.1984	0.6475
Comp3	.937636	.328319	0.1172	0.7647
Comp4	.609317	.158441	0.0762	0.8409
Comp5	.450876	.0347971	0.0564	0.8972
Comp6	.416079	.10513	0.0520	0.9492
Comp7	.310949	.215698	0.0389	0.9881
Comp8	.0952516	.	0.0119	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Unexplained
anoffsitel~m	0.1704	0.6345	-0.0980	0.2341	0.5050	0.4808	0.0835	-0.1039	0
toxichazar~g	0.3412	0.4097	-0.0827	-0.4882	-0.2971	-0.2234	0.5760	0.0245	0
wsswwtp	0.4480	0.0883	-0.0302	-0.0076	-0.5535	0.3045	-0.4897	-0.3895	0
sustainabl~e	0.4218	0.2227	-0.1767	0.2959	0.0976	-0.5691	-0.3714	0.4270	0
segregated~s	0.3563	-0.3292	0.0268	0.6515	-0.2072	0.1374	0.5229	0.0647	0
buildingsw~n	0.1497	0.1302	0.9739	-0.0034	0.0469	-0.0507	-0.0430	0.0739	0
thereissol~g	0.4142	-0.3428	-0.0109	-0.1529	0.5045	-0.2868	0.0414	-0.5907	0
wasteexcha~e	0.3938	-0.3595	-0.0454	-0.4140	0.2029	0.4456	-0.0805	0.5441	0

```
. alpha anoffsitelandfillforswm toxichazardouswastecollectiondmg wsswwtp sustainablerainwatercollectionre segregatedrecyclingreceptio
> nbins buildingswithenvironmentaldesign thereissolarstreelighting wasteexchangeclearinghouse

Test scale = mean(unstandardized items)

Average interitem covariance:     .3302956
Number of items in the scale:            8
Scale reliability coefficient:      0.8101
```

Green systems Indicators

```
. pca annualenvironmentalauditperforme firmswithgreencertificationatnat operatorpossessesuncompactregist operatorpossessesiso14001 op
> eratorpossessesiscc
```

```
Principal components/correlation              Number of obs    =        30
                                              Number of comp.  =         5
                                              Trace            =         5
    Rotation: (unrotated = principal)         Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.76583	1.8124	0.5532	0.5532
Comp2	.953432	.24782	0.1907	0.7439
Comp3	.705612	.322889	0.1411	0.8850
Comp4	.382724	.190321	0.0765	0.9615
Comp5	.192403	.	0.0385	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
annualenvi~e	0.4997	-0.2350	0.4454	0.3332	-0.6210	0
firmswithg~t	0.5138	-0.3520	-0.1092	0.3826	0.6736	0
operatorpo~t	0.5047	-0.1295	0.0576	-0.8507	0.0400	0
operat~14001	0.3942	0.3418	-0.7850	0.1139	-0.3140	0
operatorpo~c	0.2760	0.8290	0.4126	0.0771	0.2457	0

```
. alpha annualenvironmentalauditperforme firmswithgreencertificationatnat operatorpossessesuncompactregist operatorpossessesiso14001
> operatorpossessesiscc

Test scale = mean(unstandardized items)

Average interitem covariance:     .3766667
Number of items in the scale:            5
Scale reliability coefficient:      0.7761
```

Efficient and Clean Production, Emissions and Waste Management Indicators

```
. pca solidewastecollectionservice efficientwateruseinm3ussales hazardouswasteproducedussales ofsolidewastesenttolandfile

Principal components/correlation                 Number of obs    =        30
                                                 Number of comp.  =         4
                                                 Trace            =         4
    Rotation: (unrotated = principal)            Rho              =    1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.53435	1.75565	0.6336	0.6336
Comp2	.7787	.35553	0.1947	0.8283
Comp3	.42317	.159392	0.1058	0.9341
Comp4	.263778	.	0.0659	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
solidewast~e	0.5136	-0.3222	0.7255	0.3257	0
efficientw~s	0.5570	-0.2350	-0.1472	-0.7829	0
hazardousw~s	0.5418	-0.0676	-0.6505	0.5280	0
ofsolidewa~e	0.3641	0.9146	0.1697	-0.0474	0

```
. alpha solidewastecollectionservice efficientwateruseinm3ussales hazardouswasteproducedussales ofsolidewastesenttolandfile

Test scale = mean(unstandardized items)

Average interitem covariance:     .4722222
Number of items in the scale:            4
Scale reliability coefficient:      0.8012
```

Sub-total for environmental Safeguarding categories

```
. pca environmentalyappsites greeninfrastructure greensystem efficientandclearproduction

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =          4
                                                 Trace            =          4
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.0983	2.5199	0.7746	0.7746
Comp2	.578395	.345576	0.1446	0.9192
Comp3	.23282	.142331	0.0582	0.9774
Comp4	.0904887	.	0.0226	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
environmen~s	0.4854	-0.6411	-0.0550	0.5920	0
greeninfra~e	0.5327	-0.3025	0.2828	-0.7381	0
greensystem	0.5019	0.3669	-0.7785	-0.0865	0
efficienta~n	0.4783	0.6024	0.5577	0.3120	0

```
. alpha environmentalyappsites greeninfrastructure greensystem efficientandclearproduction

Test scale = mean(unstandardized items)

Average interitem covariance:     .3651245
Number of items in the scale:            4
Scale reliability coefficient:      0.8959

.
```

Overall Cronbach's alpha for Economic, social, and environmental dimensions

```
. pca goodeconomicgovernance economicenablinginfra economicenablingservice economicalyimpactfulnature sociallyapprosite qualitysms
>  occupationalhealthandsafty goodlabrelationandwelfare socialinclusivness environmentalyappsites greeninfrastructure greensystem
> efficientandclearproduction

Principal components/correlation                 Number of obs    =         30
                                                 Number of comp.  =         13
                                                 Trace            =         13
    Rotation: (unrotated = principal)            Rho              =     1.0000
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.40237	.195184	0.2617	0.2617
Comp2	3.20718	.665496	0.2467	0.5084
Comp3	2.54169	1.12584	0.1955	0.7039
Comp4	1.41585	.736229	0.1089	0.8129
Comp5	.679619	.125318	0.0523	0.8651
Comp6	.554301	.0911888	0.0426	0.9078
Comp7	.463112	.182599	0.0356	0.9434
Comp8	.280513	.0997893	0.0216	0.9650
Comp9	.180724	.0755511	0.0139	0.9789
Comp10	.105173	.0287746	0.0081	0.9870
Comp11	.0763979	.0118923	0.0059	0.9928
Comp12	.0645056	.0359349	0.0050	0.9978
Comp13	.0285708	.	0.0022	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11
goodeconom~e	-0.1556	-0.0598	0.4952	-0.0720	-0.3474	-0.3096	0.4967	-0.0608	0.2206	0.1460	-0.4239
economicen~a	-0.1386	-0.0283	0.5347	-0.1849	0.2139	-0.2811	-0.0878	0.2258	-0.4694	-0.4455	0.1838
economicen~e	-0.1091	0.0219	0.4030	-0.4543	0.2583	0.5452	-0.1454	0.1651	0.2347	0.3711	0.0182
economical~e	-0.1165	-0.1720	0.2751	0.5464	0.4178	0.3176	0.0577	-0.4702	-0.0308	-0.1218	-0.2073
sociallyap~e	0.4076	-0.1872	-0.0340	0.0821	0.1360	0.2835	0.6517	0.4023	0.0900	-0.2538	0.1650
qualitysms	-0.1585	-0.1584	0.2891	0.5072	-0.5125	0.1866	-0.2155	0.2911	0.0602	0.0992	0.4005
occupation~y	0.4289	-0.2199	0.2131	-0.0662	0.0159	-0.0749	-0.3497	-0.1132	0.2468	-0.2899	-0.1007
goodlabrel~e	0.4420	-0.2492	0.1096	0.0218	0.0340	-0.0796	0.0422	-0.0597	-0.5714	0.5997	0.0209
socialincl~s	0.4749	-0.1806	0.1254	-0.0093	-0.1109	-0.1509	-0.2488	-0.0716	0.3148	-0.0232	-0.0342
environmen~s	0.1162	0.4245	0.1198	0.3871	0.2703	-0.2650	-0.0255	0.1781	0.0676	0.2353	-0.0395
greeninfra~e	0.1656	0.4778	0.1429	0.1008	0.2416	-0.1824	0.0141	0.1162	0.2633	0.0835	0.1886
greensystem	0.2340	0.4302	0.0544	0.0657	-0.2950	0.3772	-0.1462	0.2186	-0.3072	-0.1933	-0.5579
efficienta~n	0.1983	0.4109	0.1872	-0.1497	-0.2812	0.1768	0.2042	-0.5796	-0.0919	-0.0970	0.4421

Variable	Comp12	Comp13	Unexplained
goodeconom~e	-0.0562	-0.0435	0
economicen~a	0.0784	0.1328	0
economicen~e	0.1134	-0.0210	0
economical~e	-0.0662	0.1404	0
sociallyap~e	0.0660	-0.0361	0
qualitysms	-0.0688	-0.0419	0
occupation~y	-0.1885	-0.6216	0
goodlabrel~e	-0.1720	-0.0319	0
socialincl~s	0.3222	0.6476	0
environmen~s	0.5630	-0.2967	0
greeninfra~e	-0.6692	0.2206	0
greensystem	-0.0613	0.0876	0
efficienta~n	0.1642	-0.0789	0

```
. alpha goodeconomicgovernance economicenablinginfra economicenablingservice economicalyimpactfulnature sociallyapprosite qualitys
> ms occupationalhealthandsafty goodlabrelationandwelfare socialinclusivness environmentalyappsites greeninfrastructure greensyste
> m efficientandclearproduction

Test scale = mean(unstandardized items)
Reversed items:  goodeconomicgovernance economicenablinginfra economicenablingservice economicalyimpactfulnature qualitysms

Average interitem covariance:     .1079885
Number of items in the scale:           13
Scale reliability coefficient:      0.7445
```

Appendix C 1: Descriptive statistics (Multiple one-way Tables)

Dependent variables

"Do you think that Ethiopia has achieved economic competitiveness objective through development of IPs?"

-> tabulation of ecompobjs

ECOMP.OBJs	Freq.	Percent	Cum.
0	130	32.91	32.91
1	265	67.09	100.00
Total	395	100.00	

"Do you think that Ethiopia has achieved social inclusiveness and shared prosperity?

-> tabulation of socialinclusivness

SOCIAL INCLUSIVNESS	Freq.	Percent	Cum.
0	181	45.82	45.82
1	214	54.18	100.00
Total	395	100.00	

"Do you think that Ethiopia has achieved environmental stewardship?

-> tabulation of environmentalstewardship

ENVIRONMENTAL STEWARDSHIP	Freq.	Percent	Cum.
0	166	42.03	42.03
1	229	57.97	100.00
Total	395	100.00	

Independent variables used in

Economic competitiveness Model

Good economic governance

-> tabulation of comptender

COMP.TENDER	Freq.	Percent	Cum.
1	20	5.06	5.06
2	44	11.14	16.20
3	125	31.65	47.85
4	136	34.43	82.28
5	70	17.72	100.00
Total	395	100.00	

-> tabulation of mgtboard

MGTBOARD	Freq.	Percent	Cum.
1	61	15.44	15.44
2	42	10.63	26.08
3	90	22.78	48.86
4	117	29.62	78.48
5	85	21.52	100.00
Total	395	100.00	

-> tabulation of crmsystem

CRMSYSTEM	Freq.	Percent	Cum.
1	42	10.63	10.63
2	60	15.19	25.82
3	148	37.47	63.29
4	84	21.27	84.56
5	61	15.44	100.00
Total	395	100.00	

.

Economically Enabling site & Infrastructure 'hardware' (Appropriate site selection)

-> tabulation of proxhighway

PROX.HIGHWAY	Freq.	Percent	Cum.
1	27	6.84	6.84
2	53	13.42	20.25
3	76	19.24	39.49
4	135	34.18	73.67
5	104	26.33	100.00
Total	395	100.00	

-> tabulation of proxpower

PROX.POWER	Freq.	Percent	Cum.
1	7	1.77	1.77
2	31	7.85	9.62
3	86	21.77	31.39
4	175	44.30	75.70
5	96	24.30	100.00
Total	395	100.00	

-> tabulation of connectivity

CONNECTIVITY	Freq.	Percent	Cum.
1	16	4.05	4.05
2	18	4.56	8.61
3	55	13.92	22.53
4	134	33.92	56.46
5	172	43.54	100.00
Total	395	100.00	

```
-> tabulation of stableelectricss
```

STABLE ELECTRIC SS	Freq.	Percent	Cum.
1	29	7.34	7.34
2	22	5.57	12.91
3	36	9.11	22.03
4	128	32.41	54.43
5	180	45.57	100.00
Total	395	100.00	

```
-> tabulation of goodwaterss
```

GOOD WATER SS	Freq.	Percent	Cum.
1	25	6.33	6.33
2	25	6.33	12.66
3	79	20.00	32.66
4	112	28.35	61.01
5	154	38.99	100.00
Total	395	100.00	

Economically Enabling Services or ‘software’

```
-> tabulation of builmaintenance
```

BUIL. MAINTENANCE	Freq.	Percent	Cum.
1	35	8.86	8.86
2	64	16.20	25.06
3	94	23.80	48.86
4	99	25.06	73.92
5	103	26.08	100.00
Total	395	100.00	

```
-> tabulation of emermaint
```

EMER. MAINT.	Freq.	Percent	Cum.
1	8	2.03	2.03
2	49	12.41	14.43
3	124	31.39	45.82
4	113	28.61	74.43
5	101	25.57	100.00
Total	395	100.00	

```
-> tabulation of rrrserv
```

RRR.SERV.	Freq.	Percent	Cum.
1	8	2.03	2.03
2	50	12.66	14.68
3	104	26.33	41.01
4	150	37.97	78.99
5	83	21.01	100.00
Total	395	100.00	

```
-> tabulation of busisupp
```

BUSI.SUPP.	Freq.	Percent	Cum.
1	29	7.34	7.34
2	38	9.62	16.96
3	155	39.24	56.20
4	97	24.56	80.76
5	76	19.24	100.00
Total	395	100.00	

-> tabulation of fincsupp

FINC.SUPP.	Freq.	Percent	Cum.
1	41	10.38	10.38
2	79	20.00	30.38
3	149	37.72	68.10
4	81	20.51	88.61
5	45	11.39	100.00
Total	395	100.00	

-> tabulation of ossserv

OSS.SERV.	Freq.	Percent	Cum.
1	6	1.52	1.52
2	76	19.24	20.76
3	99	25.06	45.82
4	118	29.87	75.70
5	96	24.30	100.00
Total	395	100.00	

-> tabulation of b2bgather

B2B.GATHER	Freq.	Percent	Cum.
1	14	3.54	3.54
2	83	21.01	24.56
3	136	34.43	58.99
4	102	25.82	84.81
5	60	15.19	100.00
Total	395	100.00	

-> tabulation of hrrecserv

HR.REC.SERV .	Freq.	Percent	Cum.
1	32	8.10	8.10
2	86	21.77	29.87
3	123	31.14	61.01
4	80	20.25	81.27
5	74	18.73	100.00
Total	395	100.00	

.

Economically Impactful Nature: Employment, Investment, and Turn-over

-> tabulation of highpci

HIGH.PCI.	Freq.	Percent	Cum.
1	23	5.82	5.82
2	75	18.99	24.81
3	209	52.91	77.72
4	68	17.22	94.94
5	20	5.06	100.00
Total	395	100.00	

-> tabulation of fteqempt

FTEQ.EMPT	Freq.	Percent	Cum.
1	40	10.13	10.13
2	67	16.96	27.09
3	168	42.53	69.62
4	60	15.19	84.81
5	60	15.19	100.00
Total	395	100.00	

-> tabulation of hfdigfcf

HFDI%GFCF	Freq.	Percent	Cum.
1	23	5.82	5.82
2	75	18.99	24.81
3	200	50.63	75.44
4	85	21.52	96.96
5	12	3.04	100.00
Total	395	100.00	

-> tabulation of usexspgipex

US$.EXSPG%I PEX	Freq.	Percent	Cum.
1	31	7.85	7.85
2	45	11.39	19.24
3	232	58.73	77.97
4	87	22.03	100.00
Total	395	100.00	

.

Social inclusiveness and shared prosperity model

Socially Appropriate Site and Social Infrastructure

```
. use "C:\Users\mengi\Desktop\Zero draft docs\Stata14\0.Best data for Article 2.dta", clear

. tab1 powerlinesburried childcarefacilities faithprayerfacilities

-> tabulation of powerlinesburried
```

POWER LINES BURRIED	Freq.	Percent	Cum.
1	18	4.56	4.56
2	49	12.41	16.96
3	87	22.03	38.99
4	160	40.51	79.49
5	81	20.51	100.00
Total	395	100.00	

```
-> tabulation of childcarefacilities
```

CHILDCARE FACILITIES	Freq.	Percent	Cum.
1	96	24.30	24.30
2	96	24.30	48.61
3	90	22.78	71.39
4	55	13.92	85.32
5	58	14.68	100.00
Total	395	100.00	

```
-> tabulation of faithprayerfacilities
```

FAITH PRAYER FACILITIES	Freq.	Percent	Cum.
1	102	25.82	25.82
2	88	22.28	48.10
3	104	26.33	74.43
4	79	20.00	94.43
5	22	5.57	100.00
Total	395	100.00	

-> tabulation of onsiteincidenceresponsecenter

ON SITE INCIDENCE RESPONSE CENTER	Freq.	Percent	Cum.
1	51	12.91	12.91
2	47	11.90	24.81
3	107	27.09	51.90
4	139	35.19	87.09
5	51	12.91	100.00
Total	395	100.00	

-> tabulation of disabledinclusivebuildingdesign

DISABLED INCLUSIVE BUILDING DESIGN	Freq.	Percent	Cum.
1	61	15.44	15.44
2	77	19.49	34.94
3	120	30.38	65.32
4	78	19.75	85.06
5	59	14.94	100.00
Total	395	100.00	

-> tabulation of higheravecommutetime

HIGHER AVE COMMUTE TIME	Freq.	Percent	Cum.
1	11	2.78	2.78
2	92	23.29	26.08
3	130	32.91	58.99
4	137	34.68	93.67
5	25	6.33	100.00
Total	395	100.00	

Quality Social Management System and Service

```
-> tabulation of simmsystem
```

SIMM SYSTEM	Freq.	Percent	Cum.
1	40	10.13	10.13
2	68	17.22	27.34
3	160	40.51	67.85
4	96	24.30	92.15
5	31	7.85	100.00
Total	395	100.00	

```
-> tabulation of eprsystem
```

EPR SYSTEM	Freq.	Percent	Cum.
1	18	4.56	4.56
2	87	22.03	26.58
3	112	28.35	54.94
4	128	32.41	87.34
5	50	12.66	100.00
Total	395	100.00	

```
-> tabulation of socialperfreport
```

SOCIAL PERF REPORT	Freq.	Percent	Cum.
1	48	12.15	12.15
2	93	23.54	35.70
3	127	32.15	67.85
4	107	27.09	94.94
5	20	5.06	100.00
Total	395	100.00	

Occupational Health and Safety

-> tabulation of morefirmswithohsas18001iso45001c

MORE FIRMS WITH OHSAS18001/ ISO45001 CERTIFICATION	Freq.	Percent	Cum.
1	22	5.57	5.57
2	54	13.67	19.24
3	217	54.94	74.18
4	54	13.67	87.85
5	48	12.15	100.00
Total	395	100.00	

-> tabulation of onsitehealthfacilities

ON SITE HEALTH FACILITIES	Freq.	Percent	Cum.
1	55	13.92	13.92
2	95	24.05	37.97
3	58	14.68	52.66
4	112	28.35	81.01
5	75	18.99	100.00
Total	395	100.00	

-> tabulation of greaterfirealarmperbuildings

GREATER FIRE ALARM PER BUILDINGS	Freq.	Percent	Cum.
1	35	8.86	8.86
2	66	16.71	25.57
3	141	35.70	61.27
4	106	26.84	88.10
5	47	11.90	100.00
Total	395	100.00	

-> tabulation of accesstofireservice

ACCESS TO FIRE SERVICE	Freq.	Percent	Cum.
1	9	2.28	2.28
2	57	14.43	16.71
3	89	22.53	39.24
4	131	33.16	72.41
5	109	27.59	100.00
Total	395	100.00	

-> tabulation of highernersuspercapita

HIGHER NERSUS PER CAPITA	Freq.	Percent	Cum.
1	51	12.91	12.91
2	74	18.73	31.65
3	194	49.11	80.76
4	45	11.39	92.15
5	31	7.85	100.00
Total	395	100.00	

-> tabulation of loweraveemergencyresponsetime

LOWER AVE EMERGENCY RESPONSE TIME	Freq.	Percent	Cum.
1	54	13.67	13.67
2	132	33.42	47.09
3	94	23.80	70.89
4	73	18.48	89.37
5	42	10.63	100.00
Total	395	100.00	

Good Labor Relations and Welfare

-> tabulation of dataoncomplaintsmeasures

DATA ON COMPLAINTS & MEASURES	Freq.	Percent	Cum.
1	28	7.09	7.09
2	97	24.56	31.65
3	176	44.56	76.20
4	73	18.48	94.68
5	21	5.32	100.00
Total	395	100.00	

-> tabulation of autorized3plabinspactorsonsite

AUTORIZED 3P LAB INSPACTORS ON SITE	Freq.	Percent	Cum.
1	31	7.85	7.85
2	75	18.99	26.84
3	168	42.53	69.37
4	80	20.25	89.62
5	41	10.38	100.00
Total	395	100.00	

-> tabulation of higheravesalary

HIGHER AVE SALARY	Freq.	Percent	Cum.
1	50	12.66	12.66
2	139	35.19	47.85
3	124	31.39	79.24
4	49	12.41	91.65
5	33	8.35	100.00
Total	395	100.00	

-> tabulation of higherempwithopenendedcontracts

HIGHER EMP WITH OPEN ENDED CONTRACTS	Freq.	Percent	Cum.
1	30	7.59	7.59
2	75	18.99	26.58
3	166	42.03	68.61
4	105	26.58	95.19
5	19	4.81	100.00
Total	395	100.00	

-> tabulation of loweremployeesturnover

LOWER EMPLOYEES TURNOVER	Freq.	Percent	Cum.
1	33	8.35	8.35
2	70	17.72	26.08
3	161	40.76	66.84
4	99	25.06	91.90
5	32	8.10	100.00
Total	395	100.00	

Social Inclusiveness

-> tabulation of higherfemaleworkforce

HIGHER % FEMALE WORKFORCE	Freq.	Percent	Cum.
1	9	2.28	2.28
2	44	11.14	13.42
3	167	42.28	55.70
4	98	24.81	80.51
5	77	19.49	100.00
Total	395	100.00	

-> tabulation of higherfemalewagestomalewagesrati

HIGHER FEMALE WAGES TO MALE WAGES RATIO	Freq.	Percent	Cum.
1	30	7.59	7.59
2	69	17.47	25.06
3	190	48.10	73.16
4	90	22.78	95.95
5	16	4.05	100.00
Total	395	100.00	

-> tabulation of higherempage16to30

HIGHER % EMP AGE 16 to 30	Freq.	Percent	Cum.
1	12	3.04	3.04
2	51	12.91	15.95
3	137	34.68	50.63
4	127	32.15	82.78
5	68	17.22	100.00
Total	395	100.00	

-> tabulation of higherdomesticmsmesinvstment

HIGHER DOMESTIC MSMEs INVSTMENT	Freq.	Percent	Cum.
1	39	9.87	9.87
2	53	13.42	23.29
3	228	57.72	81.01
4	46	11.65	92.66
5	29	7.34	100.00
Total	395	100.00	

Environmental stewardship model

Environmentally Appropriate Site Indicators

-> tabulation of sitecompatabilitywithlump

SITE COMPATABILITY WITH LUMP	Freq.	Percent	Cum.
1	32	8.10	8.10
2	124	31.39	39.49
3	136	34.43	73.92
4	74	18.73	92.66
5	29	7.34	100.00
Total	395	100.00	

-> tabulation of percentageofplotsallocatedtolma

PERCENTAGE OF PLOTS ALLOCATED TO LMA	Freq.	Percent	Cum.
1	14	3.54	3.54
2	66	16.71	20.25
3	229	57.97	78.23
4	54	13.67	91.90
5	32	8.10	100.00
Total	395	100.00	

-> tabulation of ipssituatedinredevelopedbrownfie

IPs SITUATED IN REDEVELOPED BROWNFIELD SITE	Freq.	Percent	Cum.
1	20	5.06	5.06
2	63	15.95	21.01
3	162	41.01	62.03
4	120	30.38	92.41
5	30	7.59	100.00
Total	395	100.00	

Green Infrastructure Indicators

-> tabulation of anoffsitelandfillforswm

AN OFF-SITE LANDFILL FOR SWM	Freq.	Percent	Cum.
1	21	5.32	5.32
2	66	16.71	22.03
3	188	47.59	69.62
4	70	17.72	87.34
5	50	12.66	100.00
Total	395	100.00	

-> tabulation of toxichazardouswastecollectiondmg

TOXIC & HAZARDOUS WASTE COLLECTION & DMG	Freq.	Percent	Cum.
1	17	4.30	4.30
2	124	31.39	35.70
3	83	21.01	56.71
4	140	35.44	92.15
5	31	7.85	100.00
Total	395	100.00	

-> tabulation of wsswwtp

WSS & WWTP	Freq.	Percent	Cum.
1	26	6.58	6.58
2	105	26.58	33.16
3	89	22.53	55.70
4	90	22.78	78.48
5	85	21.52	100.00
Total	395	100.00	

-> tabulation of sustainablerainwatercollectionre

SUSTAINABLE RAIN WATER COLLECTION & RE-USE SYSTEM	Freq.	Percent	Cum.
1	48	12.15	12.15
2	117	29.62	41.77
3	114	28.86	70.63
4	86	21.77	92.41
5	30	7.59	100.00
Total	395	100.00	

-> tabulation of segregatedrecyclingreceptionbins

SEGREGATED RECYCLING RECEPTION BINS OR CONTAINERS	Freq.	Percent	Cum.
1	22	5.57	5.57
2	71	17.97	23.54
3	139	35.19	58.73
4	128	32.41	91.14
5	35	8.86	100.00
Total	395	100.00	

-> tabulation of buildingswithenvironmentaldesign

BUILDINGS WITH ENVIRONMENT AL DESIGN RELATED CERTIFICATE S	Freq.	Percent	Cum.
1	23	5.82	5.82
2	108	27.34	33.16
3	162	41.01	74.18
4	68	17.22	91.39
5	34	8.61	100.00
Total	395	100.00	

-> tabulation of thereissolarstreelighting

THERE IS SOLAR STREE LIGHTING	Freq.	Percent	Cum.
1	35	8.86	8.86
2	123	31.14	40.00
3	120	30.38	70.38
4	90	22.78	93.16
5	27	6.84	100.00
Total	395	100.00	

-> tabulation of wasteexchangeclearinghouse

WASTE EXCHANGE CLEARINGHOU SE	Freq.	Percent	Cum.
1	26	6.58	6.58
2	91	23.04	29.62
3	166	42.03	71.65
4	92	23.29	94.94
5	20	5.06	100.00
Total	395	100.00	

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Green Systems Indicators

-> tabulation of annualenvironmentalauditperforme

ANNUAL ENVIRONMENTAL AUDIT PERFORMED ON EACH FIRM	Freq.	Percent	Cum.
1	30	7.59	7.59
2	27	6.84	14.43
3	154	38.99	53.42
4	143	36.20	89.62
5	41	10.38	100.00
Total	395	100.00	

-> tabulation of firmswithgreencertificationatnat

FIRMS WITH "GREEN" CERTIFICATION AT NATIONAL LEVEL	Freq.	Percent	Cum.
1	10	2.53	2.53
2	51	12.91	15.44
3	212	53.67	69.11
4	98	24.81	93.92
5	24	6.08	100.00
Total	395	100.00	

-> tabulation of operatorpossessesuncompactregist

OPERATOR POSSESSES UN COMPACT REGISTRATION	Freq.	Percent	Cum.
1	6	1.52	1.52
2	90	22.78	24.30
3	230	58.23	82.53
4	53	13.42	95.95
5	16	4.05	100.00
Total	395	100.00	

-> tabulation of operatorpossessesiso14001

OPERATOR POSSESSES ISO14001	Freq.	Percent	Cum.
1	1	0.25	0.25
2	88	22.28	22.53
3	227	57.47	80.00
4	45	11.39	91.39
5	34	8.61	100.00
Total	395	100.00	

-> tabulation of operatorpossessesiscc

OPERATOR POSSESSES ISCC	Freq.	Percent	Cum.
1	10	2.53	2.53
2	105	26.58	29.11
3	207	52.41	81.52
4	53	13.42	94.94
5	20	5.06	100.00
Total	395	100.00	

Efficient and Clean Production, Emissions and Waste Management Indicators

-> tabulation of solidewastecollectionservice

SOLIDE WASTE COLLECTION SERVICE	Freq.	Percent	Cum.
1	13	3.29	3.29
2	45	11.39	14.68
3	107	27.09	41.77
4	159	40.25	82.03
5	71	17.97	100.00
Total	395	100.00	

-> tabulation of efficientwateruseinm3ussales

EFFICIENT WATER USE IN m3/US$ SALES	Freq.	Percent	Cum.
1	17	4.30	4.30
2	125	31.65	35.95
3	165	41.77	77.72
4	74	18.73	96.46
5	14	3.54	100.00
Total	395	100.00	

-> tabulation of hazardouswasteproducedussales

HAZARDOUS WASTE PRODUCED /US$ SALES	Freq.	Percent	Cum.
1	21	5.32	5.32
2	69	17.47	22.78
3	221	55.95	78.73
4	67	16.96	95.70
5	17	4.30	100.00
Total	395	100.00	

-> tabulation of ofsolidewastesenttolandfile

% OF SOLIDE WASTE SENT TO LANDFILE	Freq.	Percent	Cum.
1	10	2.53	2.53
2	55	13.92	16.46
3	177	44.81	61.27
4	112	28.35	89.62
5	41	10.38	100.00
Total	395	100.00	

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Appendix D 1: Summary statistics of study variables

Variables used in Advancing Economic competitiveness model

```
. summarize ecompobjs gooddovernance comptender reguboard crmsystem economicinfrastructor proxhighway proxpower connectivity stabl
> eelectricityss economicenablingser goodwaterss buildmaintenance rrrserv rrrserv busisupp fincsupp ossserv b2bgather hrrecserv ec
> onomicimpactfulnature highpci fteqempt hfdigfcf usexspgipex
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ecompobjs	395	.6708861	.4704874	0	1
gooddovern~e	395	3.318143	.853839	1.666667	5
comptender	395	3.486076	1.064748	1	5
reguboard	395	3.311392	1.337376	1	5
crmsystem	395	3.156962	1.177484	1	5
economicin~r	395	3.882278	.8078783	1.25	5
proxhighway	395	3.597468	1.203841	1	5
proxpower	395	3.81519	.9498983	1	5
connectivity	395	4.083544	1.057056	1	5
stableelec~s	395	4.032911	1.197048	1	5
economicen~r	395	3.447257	.7383815	2	5
goodwaterss	395	3.873418	1.183292	1	5
buildmaint~e	395	3.432911	1.275474	1	5
rrrserv	395	3.632911	1.014829	1	5
rrrserv	395	3.632911	1.014829	1	5
busisupp	395	3.387342	1.121702	1	5
fincsupp	395	3.025316	1.130728	1	5
ossserv	395	3.562025	1.100566	1	5
b2bgather	395	3.281013	1.068477	1	5
hrrecserv	395	3.197468	1.20763	1	5
economicim~e	395	2.992405	.6884235	1.5	4.5
highpci	395	2.967089	.8935359	1	5
fteqempt	395	3.083544	1.153502	1	5
hfdigfcf	395	2.96962	.8720642	1	5
usexspgipex	395	2.949367	.8044725	1	4

Variables used in creating Shared prosperity model

```
. summarize socialinclusivnesssharedp socialyappropriatesiteinfr powerlinesburried childcarefacilities faithprayerfacilities onsit
> eincidenceresponsecenter disabledinclusivebuildingdesign higheravecommutetime qualitysocialmgtsystem simmsystem eprsystem social
> perfreport occupationalhealthsafty morefirmswithohsas18001iso45001c onsitehealthfacilities greaterfirealarmperbuildings accessto
> fireservice highernersuspercapita loweraveemergencyresponsetime goodlarrelationwefare dataoncomplaintsmeasures autorized3plabins
> pactorsonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover socialinclusivness higherfemaleworkforce hi
> gherfemalewagestomalewagesrati higherempage16to30 higherdomesticmsmesinvstment
```

Variable	Obs	Mean	Std. Dev.	Min	Max
socialincl~p	395	.5417722	.4988839	0	1
socialyapp~r	395	3.047679	.6054063	1.666667	4.666667
powerlines~d	395	3.6	1.083799	1	5
childcaref~s	395	2.703797	1.363357	1	5
faithpraye~s	395	2.572152	1.224427	1	5
onsiteinci~r	395	3.232911	1.205499	1	5
disabledin~n	395	2.992405	1.269495	1	5
higheravec~e	395	3.18481	.9552272	1	5
qualitysoc~m	395	3.061603	.8256855	1.333333	5
simmsystem	395	3.025316	1.066027	1	5
eprsystem	395	3.265823	1.079444	1	5
socialperf~t	395	2.893671	1.089328	1	5
occupation~y	395	3.124473	.6506474	1.833333	5
moref~45001c	395	3.131646	.9835634	1	5
onsiteheal~s	395	3.144304	1.350667	1	5
greaterfir~s	395	3.162025	1.114772	1	5
accesstofi~e	395	3.693671	1.09212	1	5
higherners~a	395	2.825316	1.050679	1	5
loweraveem~e	395	2.789873	1.204433	1	5
goodlarrel~e	395	2.948354	.6990683	1.2	4.8
dataoncomp~s	395	2.903797	.9589868	1	5
autorized3~e	395	3.063291	1.058466	1	5
higheraves~y	395	2.686076	1.104988	1	5
higherempw~s	395	3.020253	.9766798	1	5
loweremplo~r	395	3.068354	1.041224	1	5
socialincl~s	395	3.217722	.5635974	1.5	4.75
higherfema~e	395	3.481013	1.000771	1	5
higherfema~i	395	2.982278	.9328684	1	5
higheremp~30	395	3.475949	1.018262	1	5
higherdome~t	395	2.931646	.9679567	1	5

.

Variables used in Environmental safeguarding model

```
. summarize environmentstewardship envitonmentaltappsites sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinr
> edevelopedbrownfie greeninfrastracture anoffsitelandfillforswm toxichazardouswastecollectiondmg wsswwtp sustainablerainwatercoll
> ectionre segregatedrecyclingreceptionbins buildingswithenvironmentaldesign thereissolarstreelighting wasteexchangeclearinghouse
> greensystem annualenvironmentalauditperforme firmswithgreencertificationatnat operatorpossessesuncompactregist operatorpossesses
> iso14001 operatorpossessesiscc efficientcleanproductionemission solidewastecollectionservice efficientwateruseinm3ussales hazard
> ouswasteproducedussales ofsolidewastesenttolandfile
```

Variable	Obs	Mean	Std. Dev.	Min	Max
environmen~p	395	.8202532	.3844634	0	1
envitonmen~s	395	3.037975	.7761013	1	5
sitecompat~p	395	2.858228	1.049608	1	5
percentage~a	395	3.060759	.8762834	1	5
ipssituate~e	395	3.194937	.9664287	1	5
greeninfra~e	395	3.046519	.7469878	1.5	5
anoffsitel~m	395	3.156962	1.020436	1	5
toxichazar~g	395	3.111392	1.07001	1	5
wsswwtp	395	3.260759	1.246459	1	5
sustainabl~e	395	2.83038	1.130603	1	5
segregated~s	395	3.210127	1.019554	1	5
buildingsw~n	395	2.95443	1.011582	1	5
thereissol~g	395	2.875949	1.074534	1	5
wasteexcha~e	395	2.972152	.9647251	1	5
greensystem	395	3.094684	.6364935	1.4	5
annualenvi~e	395	3.349367	1.014848	1	5
firmswithg~t	395	3.189873	.8289794	1	5
operatorpo~t	395	2.956962	.7644851	1	5
operat~14001	395	3.058228	.8303579	1	5
operatorpo~c	395	2.918987	.8360646	1	5
efficientc~n	395	3.178481	.676457	1.25	5
solidewast~e	395	3.582278	1.015209	1	5
efficientw~s	395	2.855696	.8938235	1	5
hazardousw~s	395	2.974684	.8545887	1	5
ofsolidewa~e	395	3.301266	.9222976	1	5

.

Appendix E 1: Binary Logit regression Output

Binary Logit regression model for Advancing Economic competitiveness

```
. logit ecompobjs comptender mgtboard crmsystem proxhighway proxpower connectivity stableelectricss goodwaterss builmaintenance emerm
> aint rrrserv busisupp fincsupp ossserv b2bgather hrrecserv highpci fteqempt hfdigfcf usexspgipex

Iteration 0:   log likelihood = -250.25199
Iteration 1:   log likelihood =   -175.123
Iteration 2:   log likelihood = -169.57413
Iteration 3:   log likelihood = -169.44895
Iteration 4:   log likelihood = -169.44881
Iteration 5:   log likelihood = -169.44881

Logistic regression                             Number of obs     =        395
                                                LR chi2(20)       =     161.61
                                                Prob > chi2       =     0.0000
Log likelihood = -169.44881                     Pseudo R2         =     0.3229
```

ecompobjs	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
comptender	.5544622	.1928127	2.88	0.004	.1765563	.932368
mgtboard	-.1564773	.1423609	-1.10	0.272	-.4354996	.1225449
crmsystem	.0679395	.1727984	0.39	0.694	-.2707391	.4066182
proxhighway	.2843807	.1624191	1.75	0.080	-.0339549	.6027163
proxpower	.4781173	.2131157	2.24	0.025	.0604182	.8958164
connectivity	.4832046	.1918615	2.52	0.012	.107163	.8592461
stableelectricss	.6054101	.2018501	3.00	0.003	.2097912	1.001029
goodwaterss	-.5505638	.2241956	-2.46	0.014	-.9899791	-.1111484
builmaintenance	.4088671	.2053658	1.99	0.046	.0063574	.8113767
emermaint	.7688211	.2757655	2.79	0.005	.2283307	1.309311
rrrserv	-1.064221	.315128	-3.38	0.001	-1.681861	-.4465816
busisupp	.2019592	.1789575	1.13	0.259	-.1487911	.5527095
fincsupp	-.3457926	.1766487	-1.96	0.050	-.6920177	.0004326
ossserv	.1257329	.2304092	0.55	0.585	-.3258608	.5773266
b2bgather	-.0030991	.1968855	-0.02	0.987	-.3889877	.3827894
hrrecserv	-.5981524	.1729131	-3.46	0.001	-.9370557	-.259249
highpci	-.9014129	.2341019	-3.85	0.000	-1.360244	-.4425817
fteqempt	.9185471	.1831895	5.01	0.000	.5595023	1.277592
hfdigfcf	-.5090612	.2496258	-2.04	0.041	-.9983187	-.0198037
usexspgipex	1.012625	.3001498	3.37	0.001	.4243423	1.600908
_cons	-5.764686	1.069247	-5.39	0.000	-7.860371	-3.669

Marginal effect

```
. mfx

Marginal effects after logit
      y  = Pr(ecompobjs) (predict)
         =  .75400997
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
compte~r	.1028411	.03606	2.85	0.004	.032162	.17352	3.48608
mgtboard	-.0290232	.02637	-1.10	0.271	-.080713	.022667	3.31139
crmsys~m	.0126014	.032	0.39	0.694	-.050114	.075316	3.15696
proxhi~y	.0527466	.02984	1.77	0.077	-.005737	.11123	3.59747
proxpo~r	.0886807	.03891	2.28	0.023	.012422	.164939	3.81519
connec~y	.0896243	.03622	2.47	0.013	.018638	.160611	4.08354
stable~s	.1122908	.03651	3.08	0.002	.040738	.183844	4.03291
goodwa~s	-.102118	.04153	-2.46	0.014	-.183522	-.020714	3.87342
builma~e	.0758362	.03827	1.98	0.048	.000833	.15084	3.43291
emerma~t	.1426001	.0499	2.86	0.004	.044805	.240395	3.63291
rrrserv	-.1973906	.057	-3.46	0.001	-.309116	-.085666	3.63291
busisupp	.0374592	.03322	1.13	0.260	-.02766	.102578	3.38734
fincsupp	-.0641372	.0321	-2.00	0.046	-.127055	-.001219	3.02532
ossserv	.0233208	.04276	0.55	0.585	-.060483	.107125	3.56203
b2bgat~r	-.0005748	.03652	-0.02	0.987	-.072145	.070995	3.28101
hrrecs~v	-.1109447	.03256	-3.41	0.001	-.174764	-.047125	3.19747
highpci	-.1671931	.04257	-3.93	0.000	-.250627	-.083759	2.96709
fteqempt	.1703711	.03201	5.32	0.000	.10764	.233102	3.08354
hfdigfcf	-.0944201	.04559	-2.07	0.038	-.183779	-.005061	2.96962
usexsp~x	.1878206	.05537	3.39	0.001	.079305	.296336	2.94937

ODD ratio

```
. logistic ecompobjs comptender mgtboard crmsystem proxhighway proxpower connectivity stableelectricss goodwaterss builmaintenance em
> ermaint rrrserv busisupp fincsupp ossserv b2bgather hrrecserv highpci fteqempt hfdigfcf usexspgipex

Logistic regression                             Number of obs     =        395
                                                LR chi2(20)       =     161.61
                                                Prob > chi2       =     0.0000
Log likelihood = -169.44881                     Pseudo R2         =     0.3229
```

ecompobjs	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
comptender	1.741004	.3356877	2.88	0.004	1.193102	2.540518
mgtboard	.8551509	.1217401	-1.10	0.272	.6469414	1.13037
crmsystem	1.070301	.1849462	0.39	0.694	.7628155	1.501731
proxhighway	1.328939	.215845	1.75	0.080	.9666151	1.827075
proxpower	1.613035	.343763	2.24	0.025	1.062281	2.449335
connectivity	1.621262	.3110576	2.52	0.012	1.113116	2.36138
stableelectricss	1.832003	.3697901	3.00	0.003	1.23342	2.721081
goodwaterss	.5766246	.1292767	-2.46	0.014	.3715845	.8948059
builmaintenance	1.505112	.3090985	1.99	0.046	1.006378	2.251005
emermaint	2.157222	.5948872	2.79	0.005	1.256501	3.703623
rrrserv	.3449964	.1087181	-3.38	0.001	.1860275	.6398116
busisupp	1.223798	.2190079	1.13	0.259	.8617491	1.737956
fincsupp	.7076593	.1250071	-1.96	0.050	.500565	1.000433
ossserv	1.133979	.2612792	0.55	0.585	.7219057	1.78127
b2bgather	.9969057	.1962763	-0.02	0.987	.6777426	1.466369
hrrecserv	.5498266	.0950722	-3.46	0.001	.3917796	.7716309
highpci	.4059956	.0950443	-3.85	0.000	.2565981	.6423759
fteqempt	2.505647	.4590081	5.01	0.000	1.749801	3.587989
hfdigfcf	.6010596	.15004	-2.04	0.041	.3684985	.9803911
usexspgipex	2.752818	.8262576	3.37	0.001	1.528585	4.957531
_cons	.0031364	.0033536	-5.39	0.000	.0003857	.025502

Binary Logit regression model for creating shared prosperity model

```
. logit socialinclusivness powerlinesburried childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledinclusiv
> ebuildingdesign higheravecommutetime simmsystem eprsystem socialperfreport morefirmswithohsas18001iso45001c onsitehealthfacilities
> greaterfirealarmperbuildings accesstofireservice highernersuspercapita loweraveemergencyresponsetime dataoncomplaintsmeasures autor
> ized3plabinspactorsonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover higherfemaleworkforce higherfemale
> wagestomalewagesrati higherempage16to30 higherdomesticmsmesinvstment

Iteration 0:   log likelihood = -272.41305
Iteration 1:   log likelihood =  -111.4838
Iteration 2:   log likelihood = -97.475588
Iteration 3:   log likelihood = -83.546056
Iteration 4:   log likelihood = -79.721038
Iteration 5:   log likelihood = -79.348848
Iteration 6:   log likelihood = -79.343403
Iteration 7:   log likelihood = -79.343401

Logistic regression                             Number of obs     =        395
                                                LR chi2(24)       =     386.14
                                                Prob > chi2       =     0.0000
Log likelihood = -79.343401                     Pseudo R2         =     0.7087
```

socialinclusivness	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
powerlinesburried	3.566665	.7538726	4.73	0.000	2.089102	5.044228
childcarefacilities	-.6263586	.2989872	-2.09	0.036	-1.212363	-.0403545
faithprayerfacilities	1.421023	.4159798	3.42	0.001	.6057173	2.236328
onsiteincidenceresponsecenter	1.123706	.6207265	1.81	0.070	-.0928955	2.340308
disabledinclusivebuildingdesign	-.2742392	.3223839	-0.85	0.395	-.9061001	.3576216
higheravecommutetime	-3.435331	.9511969	-3.61	0.000	-5.299642	-1.571019
simmsystem	-4.01213	1.0036	-4.00	0.000	-5.97915	-2.045111
eprsystem	1.812223	.5872434	3.09	0.002	.6612475	2.963199
socialperfreport	4.195228	.8001685	5.24	0.000	2.626926	5.763529
morefirmswithohsas18001iso45001c	-4.109648	.9360215	-4.39	0.000	-5.944216	-2.275079
onsitehealthfacilities	.0105914	.4362899	0.02	0.981	-.8445211	.8657039
greaterfirealarmperbuildings	.0813515	.5651056	0.14	0.886	-1.026235	1.188938
accesstofireservice	1.46326	.433718	3.37	0.001	.6131885	2.313332
highernersuspercapita	-.8239373	.7085853	-1.16	0.245	-2.212739	.5648643
loweraveemergencyresponsetime	-.020877	.327186	-0.06	0.949	-.6621499	.6203958
dataoncomplaintsmeasures	3.608955	1.148916	3.14	0.002	1.357122	5.860789
autorized3plabinspactorsonsite	3.731468	.8028563	4.65	0.000	2.157899	5.305038
higheravesalary	3.746708	.9453044	3.96	0.000	1.893945	5.59947
higherempwithopenendedcontracts	-2.163673	.6259121	-3.46	0.001	-3.390438	-.9369075
loweremployeesturnover	4.275878	1.080446	3.96	0.000	2.158242	6.393513
higherfemaleworkforce	1.496061	.7761102	1.93	0.054	-.0250871	3.017209
higherfemalewagestomalewagesrati	-1.548966	.5762719	-2.69	0.007	-2.678438	-.4194938
higherempage16to30	-.4713598	.3716682	-1.27	0.205	-1.199816	.2570966
higherdomesticmsmesinvstment	5.482296	1.2632	4.34	0.000	3.00647	7.958122
_cons	-54.33226	11.59034	-4.69	0.000	-77.04891	-31.6156

Marginal effect

```
. mfx

Marginal effects after logit
      y  = Pr(socialinclusivness) (predict)
         =  .90731238
```

variable	dy/dx	Std. Err.	z	P>|z|	[95%	C.I.]	X
powerl~d	.2999445	.1216	2.47	0.014	.061622	.538267	3.6
childc~s	-.0526746	.02562	-2.06	0.040	-.102888	-.002461	2.7038
faithp~s	.1195032	.04798	2.49	0.013	.025467	.213539	2.57215
onsite~r	.0944999	.05248	1.80	0.072	-.008354	.197354	3.23291
disabl~n	-.0230626	.034	-0.68	0.498	-.089706	.043581	2.99241
highe~me	-.2888997	.09816	-2.94	0.003	-.481289	-.09651	3.18481
simmsy~m	-.3374066	.1336	-2.53	0.012	-.599254	-.075559	3.02532
eprsys~m	.1524019	.06413	2.38	0.017	.026704	.2781	3.26582
social~t	.3528045	.14551	2.42	0.015	.067603	.638006	2.89367
m~45001c	-.3456075	.14066	-2.46	0.014	-.621289	-.069926	3.13165
onsite~s	.0008907	.03681	0.02	0.981	-.071249	.07303	3.1443
greate~s	.0068414	.04834	0.14	0.887	-.087903	.101586	3.16203
access~e	.1230552	.07111	1.73	0.084	-.016327	.262438	3.69367
higher~a	-.0692903	.05728	-1.21	0.226	-.18156	.04298	2.82532
lowera~e	-.0017557	.02731	-0.06	0.949	-.055291	.05178	2.78987
dataon~s	.303501	.09904	3.06	0.002	.109386	.497616	2.9038
autori~e	.3138039	.13195	2.38	0.017	.05518	.572428	3.06329
higher~y	.3150855	.10946	2.88	0.004	.100545	.529626	2.68608
higher~s	-.1819576	.06874	-2.65	0.008	-.316692	-.047224	3.02025
lowere~r	.3595869	.12268	2.93	0.003	.119145	.600029	3.06835
highe~ce	.1258137	.04658	2.70	0.007	.034523	.217104	3.48101
higher~i	-.1302628	.04104	-3.17	0.002	-.21069	-.049836	2.98228
highe~30	-.0396398	.03706	-1.07	0.285	-.112267	.032987	3.47595
higher~t	.4610426	.15922	2.90	0.004	.148975	.77311	2.93165

ODD ratio

```
. logistic socialinclusivness powerlinesburried  childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledincl
> usivebuildingdesign higheravecommutetime simmsystem eprsystem socialperfreport morefirmswithohsas18001iso45001c onsitehealthfacilit
> ies greaterfirealarmperbuildings accesstofireservice highernersuspercapita loweraveemergencyresponsetime dataoncomplaintsmeasures a
> utorized3plabinspactorsonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover higherfemaleworkforce higherfe
> malewagestomalewagesrati higherempage16to30 higherdomesticmsmesinvstment

Logistic regression                             Number of obs     =        395
                                                LR chi2(24)       =     386.14
                                                Prob > chi2       =     0.0000
Log likelihood = -79.343401                     Pseudo R2         =     0.7087
```

socialinclusivness	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
powerlinesburried	35.39835	26.68584	4.73	0.000	8.077658	155.1245
childcarefacilities	.5345347	.159819	-2.09	0.036	.2974936	.9604489
faithprayerfacilities	4.141354	1.72272	3.42	0.001	1.832566	9.358904
onsiteincidenceresponsecenter	3.076234	1.9095	1.81	0.070	.9112887	10.38443
disabledinclusivebuildingdesign	.7601502	.2450602	-0.85	0.395	.4040971	1.429924
higheravecommutetime	.0322148	.0306426	-3.61	0.000	.0049934	.2078333
simmsystem	.0180948	.0181599	-4.00	0.000	.002531	.1293659
eprsystem	6.124048	3.596307	3.09	0.002	1.937208	19.35981
socialperfreport	66.36886	53.10627	5.24	0.000	13.83119	318.4704
morefirmswithohsas18001iso45001c	.0164136	.0153634	-4.39	0.000	.002621	.1027887
onsitehealthfacilities	1.010648	.4409354	0.02	0.981	.4297631	2.376678
greaterfirealarmperbuildings	1.084752	.6129995	0.14	0.886	.3583536	3.283593
accesstofireservice	4.320021	1.873671	3.37	0.001	1.846309	10.10805
highernersuspercapita	.4387009	.310857	-1.16	0.245	.1094006	1.759209
loweraveemergencyresponsetime	.9793394	.3204261	-0.06	0.949	.5157414	1.859664
dataoncomplaintsmeasures	36.92746	42.42653	3.14	0.002	3.884997	351.0009
autorized3plabinspactorsonsite	41.74035	33.5115	4.65	0.000	8.652937	201.3486
higheravesalary	42.38133	40.06326	3.96	0.000	6.645536	270.2833
higherempwithopenendedcontracts	.1149023	.0719188	-3.46	0.001	.0336939	.3918377
loweremployeesturnover	71.94326	77.73081	3.96	0.000	8.655911	597.9535
higherfemaleworkforce	4.46407	3.464611	1.93	0.054	.975225	20.43418
higherfemalewagestomalewagesrati	.2124676	.1224391	-2.69	0.007	.0686703	.6573795
higherempage16to30	.624153	.2319778	-1.27	0.205	.3012496	1.29317
higherdomesticmsmesinvstment	240.398	303.6707	4.34	0.000	20.21592	2858.698
_cons	2.53e-24	2.94e-23	-4.69	0.000	3.45e-34	1.86e-14

Binary Logit regression model for Environment safeguarding

```
. logit environmentstewardship sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinredevelopedbrownfie anoffsitela
> ndfillforswm toxichazardouswastecollectiondmg  wsswwtp sustainablerainwatercollectionre segregatedrecyclingreceptionbins buildingsw
> ithenvironmentaldesign thereissolarstreelighting wasteexchangeclearinghouse annualenvironmentalauditperforme firmswithgreencertific
> ationatnat operatorpossessesuncompactregist operatorpossessesiso14001 operatorpossessesiscc solidewastecollectionservice efficientw
> ateruseinm3ussales hazardouswasteproducedussales ofsolidewastesenttolandfile

Iteration 0:   log likelihood = -186.04871
Iteration 1:   log likelihood = -168.18513
Iteration 2:   log likelihood = -165.24866
Iteration 3:   log likelihood = -165.18673
Iteration 4:   log likelihood = -165.18672

Logistic regression                             Number of obs     =        395
                                                LR chi2(20)       =      41.72
                                                Prob > chi2       =     0.0030
Log likelihood = -165.18672                     Pseudo R2         =     0.1121
```

environmentstewardship	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sitecompatabilitywithlump	.5873364	.2487315	2.36	0.018	.0998317	1.074841
percentageofplotsallocatedtolma	.5378809	.2382852	2.26	0.024	.0708504	1.004911
ipssituatedinredevelopedbrownfie	-.3642682	.2397183	-1.52	0.129	-.8341074	.105571
anoffsitelandfillforswm	-.8309571	.2169858	-3.83	0.000	-1.256242	-.4056727
toxichazardouswastecollectiondmg	-.6762757	.2209056	-3.06	0.002	-1.109243	-.2433087
wsswwtp	.900609	.275343	3.27	0.001	.3609466	1.440271
sustainablerainwatercollectionre	.3678815	.2139637	1.72	0.086	-.0514796	.7872426
segregatedrecyclingreceptionbins	.4817907	.2359935	2.04	0.041	.0192519	.9443294
buildingswithenvironmentaldesign	.0037875	.2001844	0.02	0.985	-.3885666	.3961417
thereissolarstreelighting	-.6719909	.2411715	-2.79	0.005	-1.144678	-.1993034
wasteexchangeclearinghouse	.3519313	.2661903	1.32	0.186	-.1697922	.8736547
annualenvironmentalauditperforme	-.6378846	.2536918	-2.51	0.012	-1.135111	-.1406578
firmswithgreencertificationatnat	-.3653079	.2422035	-1.51	0.131	-.8400181	.1094023
operatorpossessesuncompactregist	-.6099775	.4728569	-1.29	0.197	-1.53676	.3168049
operatorpossessesiso14001	1.11379	.4480831	2.49	0.013	.2355635	1.992017
operatorpossessesiscc	-.7382304	.3569881	-2.07	0.039	-1.437914	-.0385467
solidewastecollectionservice	-.7243423	.2498783	-2.90	0.004	-1.214095	-.2345898
efficientwateruseinm3ussales	-.3787959	.2872337	-1.32	0.187	-.9417636	.1841719
hazardouswasteproducedussales	.2060568	.2640913	0.78	0.435	-.3115527	.7236662
ofsolidewastesenttolandfile	.7339145	.3277711	2.24	0.025	.0914949	1.376334
_cons	4.249093	1.017363	4.18	0.000	2.255098	6.243087

Marginal effects

. mfx

Marginal effects after logistic

y = Pr(environmentstewardship) (predict)

= .86260786

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
siteco~p	.0696085	.028	2.49	0.013	.014727	.12449	2.85823
percen~a	.0637472	.02757	2.31	0.021	.009704	.117791	3.06076
ipssit~e	-.0431714	.02814	-1.53	0.125	-.098315	.011972	3.19494
anoffs~m	-.0984813	.02349	-4.19	0.000	-.144517	-.052445	3.15696
toxich~g	-.0801492	.02513	-3.19	0.001	-.129396	-.030903	3.11139
wsswwtp	.1067362	.02883	3.70	0.000	.050236	.163236	3.26076
sustai~e	.0435997	.02514	1.73	0.083	-.005675	.092874	2.83038
segreg~s	.0570997	.02763	2.07	0.039	.00295	.11125	3.21013
buildi~n	.0004489	.02373	0.02	0.985	-.046063	.046961	2.95443
therei~g	-.0796414	.02655	-3.00	0.003	-.131671	-.027612	2.87595
wastee~e	.0417093	.03078	1.36	0.175	-.01862	.102039	2.97215
annual~e	-.0755992	.02888	-2.62	0.009	-.132205	-.018993	3.34937
firmsw~t	-.0432947	.02804	-1.54	0.123	-.098261	.011672	3.18987
operat~t	-.0722918	.05488	-1.32	0.188	-.179857	.035273	2.95696
op~14001	.1320015	.05182	2.55	0.011	.030442	.233561	3.05823
operat~c	-.0874918	.04256	-2.06	0.040	-.170918	-.004066	2.91899
solide~e	-.0858458	.02799	-3.07	0.002	-.140704	-.030988	3.58228
effici~s	-.0448932	.03324	-1.35	0.177	-.110045	.020259	2.8557
hazard~s	.0244209	.03143	0.78	0.437	-.037172	.086014	2.97468
ofsoli~e	.0869803	.03637	2.39	0.017	.015696	.158264	3.30127

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Odd ratios

```
. logistic environmentstewardship sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinredevelopedbrownfie anoffsit
> elandfillforswm toxichazardouswastecollectiondmg wsswwtp sustainablerainwatercollectionre segregatedrecyclingreceptionbins building
> swithenvironmentaldesign thereissolarstreelighting wasteexchangeclearinghouse annualenvironmentalauditperforme firmswithgreencertif
> icationatnat operatorpossessesuncompactregist operatorpossessesiso14001 operatorpossessesiscc solidewastecollectionservice efficien
> twateruseinm3ussales hazardouswasteproducedussales ofsolidewastesenttolandfile
```

```
Logistic regression                         Number of obs     =        395
                                            LR chi2(20)       =      41.72
                                            Prob > chi2       =     0.0030
Log likelihood = -165.18672                 Pseudo R2         =     0.1121
```

environmentstewardship	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sitecompatabilitywithlump	1.79919	.4475152	2.36	0.018	1.104985	2.929528
percentageofplotsallocatedtolma	1.712374	.4080335	2.26	0.024	1.073421	2.731665
ipssituatedinredevelopedbrownfie	.6947049	.1665335	-1.52	0.129	.4342619	1.111345
anoffsitelandfillforswm	.4356321	.094526	-3.83	0.000	.2847221	.6665283
toxichazardouswastecollectiondmg	.5085073	.1123321	-3.06	0.002	.3298086	.7840295
wsswwtp	2.461102	.6776471	3.27	0.001	1.434687	4.221842
sustainablerainwatercollectionre	1.444671	.3091071	1.72	0.086	.9498231	2.197329
segregatedrecyclingreceptionbins	1.618971	.3820666	2.04	0.041	1.019438	2.571089
buildingswithenvironmentaldesign	1.003795	.200944	0.02	0.985	.6780281	1.48608
thereissolarstreelighting	.5106908	.1231641	-2.79	0.005	.3183263	.8193013
wasteexchangeclearinghouse	1.421811	.3784722	1.32	0.186	.8438402	2.39565
annualenvironmentalauditperforme	.528409	.1340531	-2.51	0.012	.3213863	.8687866
firmswithgreencertificationatnat	.6939829	.1680851	-1.51	0.131	.4317027	1.115611
operatorpossessesuncompactregist	.5433631	.256933	-1.29	0.197	.2150768	1.372735
operatorpossessesiso14001	3.045881	1.364808	2.49	0.013	1.265622	7.330304
operatorpossessesiscc	.477959	.1706256	-2.07	0.039	.2374225	.9621868
solidewastecollectionservice	.4846432	.1211018	-2.90	0.004	.2969787	.7908952
efficientwateruseinm3ussales	.6846854	.1966647	-1.32	0.187	.3899395	1.202222
hazardouswasteproducedussales	1.228823	.3245215	0.78	0.435	.732309	2.061979
ofsolidewastesenttolandfile	2.083219	.6828192	2.24	0.025	1.095811	3.960357
_cons	70.04184	71.25796	4.18	0.000	9.53623	514.4443

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Appendix F 1: Logistic regression diagnostics tests

Multicollinearity tests

Advancing Economic competitiveness model

Pairwise Correlation coefficients

```
. pwcorr comptender mgtboard crmsystem proxhighway proxpower connectivity stableelectricityss  goodwaterss builmaintenance emrmaint
> rrrserv busisupp fincsupp ossserv b2bgather hrrecserv highpci fteqempt hfdigfcf usexspgipex, star(5)
```

	compte~r	mgtboard	crmsys~m	proxhi~y	proxpo~r	connec~y	stable~s
comptender	1.0000						
mgtboard	0.2784*	1.0000					
crmsystem	0.3459*	0.1881*	1.0000				
proxhighway	0.3352*	0.3256*	0.2971*	1.0000			
proxpower	0.2572*	0.1393*	0.1236*	0.3587*	1.0000		
connectivity	0.2705*	0.0821	0.2668*	0.3197*	0.5412*	1.0000	
stableelec~s	0.2961*	0.2013*	0.1728*	0.3104*	0.3536*	0.4431*	1.0000
goodwaterss	0.1823*	0.3437*	0.2443*	0.1468*	0.0407	-0.0182	0.2222*
builmainte~e	0.4053*	0.3716*	0.4515*	0.2956*	0.2191*	0.3120*	0.3597*
emrmaint	0.2651*	0.3308*	0.4361*	0.1689*	0.4305*	0.4730*	0.3668*
rrrserv	0.2158*	0.3953*	0.3191*	0.1910*	0.2121*	0.4247*	0.2516*
busisupp	0.2521*	0.1190*	0.3593*	0.3150*	0.3556*	0.3430*	0.2230*
fincsupp	0.0846	0.0199	0.2772*	0.0989*	0.0304	-0.0060	0.1081*
ossserv	0.2861*	0.0481	0.5017*	0.4566*	0.4881*	0.5137*	0.2518*
b2bgather	0.5043*	0.3898*	0.5378*	0.2362*	0.3389*	0.2983*	0.3043*
hrrecserv	0.0179	0.1033*	0.2405*	0.0793	0.1669*	0.2197*	-0.0993*
highpci	0.1983*	0.0341	0.1038*	-0.0666	0.2799*	0.2018*	0.1458*
fteqempt	0.1900*	0.0226	0.1361*	-0.0086	0.0512	0.0047	-0.2171*
hfdigfcf	0.2073*	0.1300*	0.2889*	0.1189*	0.1954*	0.0386	0.0666
usexspgipex	0.2570*	0.1916*	0.4023*	0.0549	0.1638*	0.0975	0.0624

	goodwa~s	builma~e	emrmaint	rrrserv	busisupp	fincsupp	ossserv
goodwaterss	1.0000						
builmainte~e	0.3078*	1.0000					
emrmaint	0.2334*	0.6324*	1.0000				
rrrserv	0.2204*	0.3108*	0.4252*	1.0000			
busisupp	0.2124*	0.3118*	0.4287*	0.2567*	1.0000		
fincsupp	0.2827*	0.4746*	0.3775*	-0.0032	0.4485*	1.0000	
ossserv	0.0183	0.3433*	0.4005*	0.3349*	0.5263*	0.1333*	1.0000
b2bgather	0.4208*	0.4413*	0.4311*	0.3613*	0.3706*	0.2021*	0.4136*
hrrecserv	0.2123*	0.4090*	0.3892*	0.2974*	0.2994*	0.3867*	0.3402*
highpci	0.0119	0.1417*	0.2722*	0.1114*	0.2938*	0.1867*	-0.0379
fteqempt	0.1515*	0.0616	0.0356	0.0927	0.2868*	0.1871*	0.1788*
hfdigfcf	0.4120*	0.4271*	0.2496*	-0.0134	0.3182*	0.3148*	0.1395*
usexspgipex	0.3212*	0.3924*	0.2588*	0.1419*	0.2524*	0.3139*	0.0437

	b2bgat~r	hrrecs~v	highpci	fteqempt	hfdigfcf	usexsp~x
b2bgather	1.0000					
hrrecserv	0.1831*	1.0000				
highpci	0.1267*	0.1354*	1.0000			
fteqempt	0.0118	0.3398*	0.3302*	1.0000		
hfdigfcf	0.2189*	0.2491*	0.2821*	0.3406*	1.0000	
usexspgipex	0.3207*	0.2507*	0.4779*	0.3246*	0.6779*	1.0000

Correlation matrix of independent variables and residuals

```
. predict residual,resid
(21 missing values generated)

. pwcorr comptender mgtboard crmsystem proxhighway proxpower connectivity stableelectricityss  goodwaterss builmaintenance emrmaint
> rrrserv busisupp fincsupp ossserv b2bgather hrrecserv highpci fteqempt hfdigfcf usexspgipex  residual, star(5)
```

	compte~r	mgtboard	crmsys~m	proxhi~y	proxpo~r	connec~y	stable~s
comptender	1.0000						
mgtboard	0.2784*	1.0000					
crmsystem	0.3459*	0.1881*	1.0000				
proxhighway	0.3352*	0.3256*	0.2971*	1.0000			
proxpower	0.2572*	0.1393*	0.1236*	0.3587*	1.0000		
connectivity	0.2705*	0.0821	0.2668*	0.3197*	0.5412*	1.0000	
stableelec~s	0.2961*	0.2013*	0.1728*	0.3104*	0.3536*	0.4431*	1.0000
goodwaterss	0.1823*	0.3437*	0.2443*	0.1468*	0.0407	-0.0182	0.2222*
builmainte~e	0.4053*	0.3716*	0.4515*	0.2956*	0.2191*	0.3120*	0.3597*
emrmaint	0.2651*	0.3308*	0.4361*	0.1689*	0.4305*	0.4730*	0.3668*
rrrserv	0.2158*	0.3953*	0.3191*	0.1910*	0.2121*	0.4247*	0.2516*
busisupp	0.2521*	0.1190*	0.3593*	0.3150*	0.3556*	0.3430*	0.2230*
fincsupp	0.0846	0.0199	0.2772*	0.0989*	0.0304	-0.0060	0.1081*
ossserv	0.2861*	0.0481	0.5017*	0.4566*	0.4881*	0.5137*	0.2518*
b2bgather	0.5043*	0.3898*	0.5378*	0.2362*	0.3389*	0.2983*	0.3043*
hrrecserv	0.0179	0.1033*	0.2405*	0.0793	0.1669*	0.2197*	-0.0993*
highpci	0.1983*	0.0341	0.1038*	-0.0666	0.2799*	0.2018*	0.1458*
fteqempt	0.1900*	0.0226	0.1361*	-0.0086	0.0512	0.0047	-0.2171*
hfdigfcf	0.2073*	0.1300*	0.2889*	0.1189*	0.1954*	0.0386	0.0666
usexspgipex	0.2570*	0.1916*	0.4023*	0.0549	0.1638*	0.0975	0.0624
residual	0.0310	0.0220	-0.0504	-0.0368	-0.0136	-0.0139	0.0459

	goodwa~s	builma~e	emrmaint	rrrserv	busisupp	fincsupp	ossserv
goodwaterss	1.0000						
builmainte~e	0.3078*	1.0000					
emrmaint	0.2334*	0.6324*	1.0000				
rrrserv	0.2204*	0.3108*	0.4252*	1.0000			
busisupp	0.2124*	0.3118*	0.4287*	0.2567*	1.0000		
fincsupp	0.2827*	0.4746*	0.3775*	-0.0032	0.4485*	1.0000	
ossserv	0.0183	0.3433*	0.4005*	0.3349*	0.5263*	0.1333*	1.0000
b2bgather	0.4208*	0.4413*	0.4311*	0.3613*	0.3706*	0.2021*	0.4136*
hrrecserv	0.2123*	0.4090*	0.3892*	0.2974*	0.2994*	0.3867*	0.3402*
highpci	0.0119	0.1417*	0.2722*	0.1114*	0.2938*	0.1867*	-0.0379
fteqempt	0.1515*	0.0616	0.0356	0.0927	0.2868*	0.1871*	0.1788*
hfdigfcf	0.4120*	0.4271*	0.2496*	-0.0134	0.3182*	0.3148*	0.1395*
usexspgipex	0.3212*	0.3924*	0.2588*	0.1419*	0.2524*	0.3139*	0.0437
residual	0.0566	0.0542	-0.0388	-0.0117	-0.0455	0.0642	0.0065

	b2bgat~r	hrrecs~v	highpci	fteqempt	hfdigfcf	usexsp~x	residual
b2bgather	1.0000						
hrrecserv	0.1831*	1.0000					
highpci	0.1267*	0.1354*	1.0000				
fteqempt	0.0118	0.3398*	0.3302*	1.0000			
hfdigfcf	0.2189*	0.2491*	0.2821*	0.3406*	1.0000		
usexspgipex	0.3207*	0.2507*	0.4779*	0.3246*	0.6779*	1.0000	
residual	0.0538	-0.0161	-0.0091	-0.0010	0.0384	0.0446	1.0000

Multicollinearity test after regress

```
. estat vif
```

Variable	VIF	1/VIF
emrmaint	3.61	0.276745
ossserv	3.24	0.309003
builmainte~e	3.04	0.328464
usexspgipex	2.85	0.351138
sitedevtst~y	2.82	0.354319
stableelec~s	2.81	0.355406
landtitle	2.78	0.359843
crmsystem	2.34	0.427105
hfdigfcf	2.30	0.435477
b2bgather	2.28	0.439358
busisupp	2.27	0.440647
connectivity	2.24	0.446287
proxpower	2.22	0.451045
fincsupp	2.03	0.491944
proxhighway	1.94	0.514373
highpci	1.90	0.526341
hrrecserv	1.89	0.530145
fteqempt	1.82	0.547981
comptender	1.82	0.550398
mgtboard	1.74	0.573819
Mean VIF	2.40	

Creating shared prosperity model

Pairwise Correlation coefficients

```
. pwcorr powerlinesburried childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledinclusivebuildingdesign hi
> gheravecommutetime simmsystem eprsystem socialperfreport morefirmswithohsas18001iso45001c onsitehealthfacilities greaterfirealarmpe
> rbuildings accesstofireservice highernersuspercapita loweraveemergencyresponsetime dataoncomplaintsmeasures autorized3plabinspactor
> sonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover higherfemaleworkforce higherfemalewagestomalewagesra
> ti higherempage16to30 higherdomesticmsmesinvstment, star(5)
```

	powerl~d	childc~s	faithp~s	onsite~r	disabl~n	highe~me	simmsy~m
powerlines~d	1.0000						
childcaref~s	-0.0941	1.0000					
faithpraye~s	-0.2192*	0.3070*	1.0000				
onsiteinci~r	-0.0004	0.4915*	0.1795*	1.0000			
disabledin~n	0.1657*	0.1263*	-0.0641	-0.0022	1.0000		
higheravec~e	0.4124*	0.0090	-0.0103	0.0375	0.3088*	1.0000	
simmsystem	0.2241*	0.1222*	0.1464*	0.1218*	0.2233*	0.2696*	1.0000
eprsystem	0.1150*	0.2037*	0.1343*	0.4692*	0.1145*	0.2968*	0.2522*
socialperf~t	0.0370	0.2727*	0.1732*	0.3939*	0.1279*	0.2141*	0.3979*
moref~45001c	0.0281	0.2487*	0.1164*	0.3829*	-0.0094	0.0956	0.1566*
onsiteheal~s	-0.0558	0.3210*	0.2293*	0.5124*	0.1102*	0.0776	0.2601*
greaterfir~s	0.0832	0.1502*	0.0360	0.4270*	0.1157*	0.2006*	0.2165*
accesstofi~e	0.1664*	0.2457*	-0.0318	0.3609*	0.2601*	0.1128*	0.2923*
higherners~a	0.1034*	0.0559	0.3403*	0.1304*	0.1151*	0.0929	0.2306*
loweraveem~e	0.0813	0.0733	0.1368*	0.0460	0.2297*	0.0537	0.3283*
dataoncomp~s	0.2291*	0.3645*	0.0297	0.2763*	0.2266*	0.1358*	0.4195*
autorized3~e	0.2810*	0.2417*	0.2383*	0.2768*	0.0797	0.0712	0.3135*
higheraves~y	-0.0055	0.1268*	0.0806	0.3237*	-0.0343	0.1825*	0.2826*
higherempw~s	0.1491*	0.0674	0.0709	0.2180*	0.1782*	0.3170*	0.3969*
loweremplo~r	0.2604*	0.1502*	-0.0128	0.0115	0.2289*	0.4083*	0.4306*
higherfema~e	0.2059*	0.0061	0.0731	0.0016	0.0808	0.1431*	0.2526*
higherfema~i	0.2114*	0.0158	-0.0022	0.2993*	0.0963	0.1717*	0.1893*
higheremp~30	0.0396	0.2993*	0.0518	0.1865*	0.0244	0.0137	0.1315*
higherdome~t	-0.0673	0.2039*	0.0930	0.2660*	-0.0190	0.1043*	0.2354*

	eprsys~m	social~t	m~45001c	onsite~s	greate~s	access~e	higher~a
eprsystem	1.0000						
socialperf~t	0.4860*	1.0000					
moref~45001c	0.4403*	0.5319*	1.0000				
onsiteheal~s	0.5777*	0.5107*	0.3792*	1.0000			
greaterfir~s	0.4450*	0.3633*	0.2259*	0.2592*	1.0000		
accesstofi~e	0.1037*	0.1027*	0.0991*	0.2021*	0.2577*	1.0000	
higherners~a	0.1350*	0.3186*	0.3465*	0.0393	0.2604*	-0.0844	1.0000
loweraveem~e	0.2344*	0.1416*	0.1155*	0.2371*	0.3203*	0.1130*	0.1153*
dataoncomp~s	0.2700*	0.3157*	0.3633*	0.2478*	0.3660*	0.2820*	0.2100*
autorized3~e	0.4562*	0.4769*	0.5625*	0.4570*	0.1806*	0.0915	0.3820*
higheraves~y	0.4042*	0.2358*	0.3511*	0.4641*	0.2371*	0.0694	0.0532
higherempw~s	0.2717*	0.3456*	0.4517*	0.3999*	0.2044*	0.0653	0.2211*
loweremplo~r	0.3406*	0.1765*	0.2341*	0.1843*	0.0735	0.2394*	0.0597
higherfema~e	0.0411	0.0587	0.0593	-0.0815	-0.0223	0.3558*	0.0608
higherfema~i	0.2794*	0.1605*	0.1768*	0.2538*	0.3030*	0.2239*	0.0616
higheremp~30	0.2240*	0.1007*	-0.0196	0.2932*	0.0571	0.2387*	-0.0976
higherdome~t	0.2263*	0.3710*	0.4867*	0.1920*	0.2173*	-0.0247	0.3177*

	lowera~e	dataon~s	autori~e	higher~y	higher~s	lowere~r	highe~ce
loweraveem~e	1.0000						
dataoncomp~s	0.2439*	1.0000					
autorized3~e	0.3529*	0.5336*	1.0000				
higheraves~y	0.3737*	0.1511*	0.2905*	1.0000			
higherempw~s	0.1849*	0.3462*	0.3597*	0.2811*	1.0000		
loweremplo~r	0.0702	0.4336*	0.2379*	0.2989*	0.3730*	1.0000	
higherfema~e	0.0546	-0.0760	0.0982	0.0703	0.0342	0.2533*	1.0000
higherfema~i	0.2836*	0.3215*	0.2787*	0.3861*	0.1313*	0.3357*	0.1396*
higheremp~30	0.3032*	0.0210	0.0544	0.1422*	0.0388	0.0578	0.2455*
higherdome~t	0.1052*	0.3073*	0.2891*	0.2694*	0.2753*	0.1557*	-0.0865

	higher~i	highe~30	higher~t
higherfema~i	1.0000		
higheremp~30	0.0142	1.0000	
higherdome~t	0.2825*	0.0537	1.0000

Correlation matrix of independent variables and residuals

```
. pwcorr powerlinesburried childcarefacilities faithprayerfacilities onsiteincidenceresponsecenter disabledinclusivebuildingdesign hi
> gheravecommutetime simmsystem eprsystem socialperfreport morefirmswithohsas18001iso45001c onsitehealthfacilities greaterfirealarmpe
> rbuildings accesstofireservice highernersuspercapita loweraveemergencyresponsetime dataoncomplaintsmeasures autorized3plabinspactor
> sonsite higheravesalary higherempwithopenendedcontracts loweremployeesturnover higherfemaleworkforce higherfemalewagestomalewagesra
> ti higherempage16to30 higherdomesticmsmesinvstment residual, star(5)

             | powerl~d childc~s faithp~s onsite~r disabl~n highe~me simmsy~m
-------------+---------------------------------------------------------------
powerlines~d |   1.0000 
childcaref~s |  -0.0941   1.0000 
faithpraye~s |  -0.2192*  0.3070*  1.0000 
onsiteinci~r |  -0.0004   0.4915*  0.1795*  1.0000 
disabledin~n |   0.1657*  0.1263* -0.0641  -0.0022   1.0000 
higheravec~e |   0.4124*  0.0090  -0.0103   0.0375   0.3088*  1.0000 
  simmsystem |   0.2241*  0.1222*  0.1464*  0.1218*  0.2233*  0.2696*  1.0000 
   eprsystem |   0.1150*  0.2037*  0.1343*  0.4692*  0.1145*  0.2968*  0.2522*
socialperf~t |   0.0370   0.2727*  0.1732*  0.3939*  0.1279*  0.2141*  0.3979*
moref~45001c |   0.0281   0.2487*  0.1164*  0.3829* -0.0094   0.0956   0.1566*
onsiteheal~s |  -0.0558   0.3210*  0.2293*  0.5124*  0.1102*  0.0776   0.2601*
greaterfir~s |   0.0832   0.1502*  0.0360   0.4270*  0.1157*  0.2006*  0.2165*
accesstofi~e |   0.1664*  0.2457* -0.0318   0.3609*  0.2601*  0.1128*  0.2923*
higherners~a |   0.1034*  0.0559   0.3403*  0.1304*  0.1151*  0.0929   0.2306*
loweraveem~e |   0.0813   0.0733   0.1368*  0.0460   0.2297*  0.0537   0.3283*
dataoncomp~s |   0.2291*  0.3645*  0.0297   0.2763*  0.2266*  0.1358*  0.4195*
autorized3~e |   0.2810*  0.2417*  0.2383*  0.2768*  0.0797   0.0712   0.3135*
higheraves~y |  -0.0055   0.1268*  0.0806   0.3237* -0.0343   0.1825*  0.2826*
higherempw~s |   0.1491*  0.0674   0.0709   0.2180*  0.1782*  0.3170*  0.3969*
loweremplo~r |   0.2604*  0.1502* -0.0128   0.0115   0.2289*  0.4083*  0.4306*
higherfema~e |   0.2059*  0.0061   0.0731   0.0016   0.0808   0.1431*  0.2526*
higherfema~i |   0.2114*  0.0158  -0.0022   0.2993*  0.0963   0.1717*  0.1893*
higheremp~30 |   0.0396   0.2993*  0.0518   0.1865*  0.0244   0.0137   0.1315*
higherdome~t |  -0.0673   0.2039*  0.0930   0.2660* -0.0190   0.1043*  0.2354*
    residual |  -0.1434* -0.0399  -0.0407  -0.0740  -0.0008  -0.0124  -0.0197 

             | eprsys~m social~t m~45001c onsite~s greate~s access~e higher~a
-------------+---------------------------------------------------------------
   eprsystem |   1.0000 
socialperf~t |   0.4860*  1.0000 
moref~45001c |   0.4403*  0.5319*  1.0000 
onsiteheal~s |   0.5777*  0.5107*  0.3792*  1.0000 
greaterfir~s |   0.4450*  0.3633*  0.2259*  0.2592*  1.0000 
accesstofi~e |   0.1037*  0.1027*  0.0991*  0.2021*  0.2577*  1.0000 
higherners~a |   0.1350*  0.3186*  0.3465*  0.0393   0.2604* -0.0844   1.0000 
loweraveem~e |   0.2344*  0.1416*  0.1155*  0.2371*  0.3203*  0.1130*  0.1153*
dataoncomp~s |   0.2700*  0.3157*  0.3633*  0.2478*  0.3660*  0.2820*  0.2100*
autorized3~e |   0.4562*  0.4769*  0.5625*  0.4570*  0.1806*  0.0915   0.3820*
higheraves~y |   0.4042*  0.2358*  0.3511*  0.4641*  0.2371*  0.0694   0.0532 
higherempw~s |   0.2717*  0.3456*  0.4517*  0.3999*  0.2044*  0.0653   0.2211*
loweremplo~r |   0.3406*  0.1765*  0.2341*  0.1843*  0.0735   0.2394*  0.0597 
higherfema~e |   0.0411   0.0587   0.0593  -0.0815  -0.0223   0.3558*  0.0608 
higherfema~i |   0.2794*  0.1605*  0.1768*  0.2538*  0.3030*  0.2239*  0.0616 
higheremp~30 |   0.2240*  0.1007* -0.0196   0.2932*  0.0571   0.2387* -0.0976 
higherdome~t |   0.2263*  0.3710*  0.4867*  0.1920*  0.2173* -0.0247   0.3177*
    residual |  -0.1040* -0.0046  -0.0062   0.0191  -0.0068  -0.0881  -0.0808 

             | lowera~e dataon~s autori~e higher~y higher~s lowere~r highe~ce
-------------+---------------------------------------------------------------
loweraveem~e |   1.0000 
dataoncomp~s |   0.2439*  1.0000 
autorized3~e |   0.3529*  0.5336*  1.0000 
higheraves~y |   0.3737*  0.1511*  0.2905*  1.0000 
higherempw~s |   0.1849*  0.3462*  0.3597*  0.2811*  1.0000 
loweremplo~r |   0.0702   0.4336*  0.2379*  0.2989*  0.3730*  1.0000 
higherfema~e |   0.0546  -0.0760   0.0982   0.0703   0.0342   0.2533*  1.0000 
higherfema~i |   0.2836*  0.3215*  0.2787*  0.3861*  0.1313*  0.3357*  0.1396*
higheremp~30 |   0.3032*  0.0210   0.0544   0.1422*  0.0388   0.0578   0.2455*
higherdome~t |   0.1052*  0.3073*  0.2891*  0.2694*  0.2753*  0.1557* -0.0865 
    residual |   0.0566   0.0403  -0.0185  -0.0198  -0.1006* -0.0506   0.0122 

             | higher~i highe~30 higher~t residual
-------------+------------------------------------
higherfema~i |   1.0000 
higheremp~30 |   0.0142   1.0000 
higherdome~t |   0.2825*  0.0537   1.0000 
    residual |   0.0040  -0.0294   0.0109   1.0000 
```

Multicollinearity test after regress

```
. estat vif
```

Variable	VIF	1/VIF
autorized3~e	3.41	0.293583
onsiteheal~s	3.09	0.324122
onsiteinci~r	2.92	0.342386
eprsystem	2.89	0.346079
dataoncomp~s	2.85	0.350406
moref~45001c	2.77	0.360663
loweremplo~r	2.50	0.399706
socialperf~t	2.33	0.429859
simmsystem	2.20	0.454099
greaterfir~s	2.20	0.455123
childcaref~s	2.13	0.468479
loweraveem~e	2.12	0.470934
accesstofi~e	2.04	0.491226
higheraves~y	2.02	0.495711
higherempw~s	2.01	0.498525
higheravec~e	1.85	0.540929
higherfema~i	1.85	0.541667
higherners~a	1.84	0.543462
powerlines~d	1.84	0.543868
higherfema~e	1.80	0.554607
higherdome~t	1.76	0.568165
higheremp~30	1.75	0.571508
faithpraye~s	1.64	0.608034
disabledin~n	1.52	0.658082
Mean VIF	2.22	

Environmental safeguarding model

Pairwise Correlation coefficients of independent variables

```
. pwcorr sitecompatabilitywithlump percentageofplotsallocatedtolma ipssituatedinredevelopedbrownfie anoffsitelandfillforswm toxichaza
> rdouswastecollectiondmg wsswwtp sustainablerainwatercollectionre segregatedrecyclingreceptionbins buildingswithenvironmentaldesign
> thereissolarstreelighting wasteexchangeclearinghouse annualenvironmentalauditperforme firmswithgreencertificationatnat operatorposs
> essesuncompactregist operatorpossessesiso14001 operatorpossessesiscc solidewastecollectionservice efficientwateruseinm3ussales haza
> rdouswasteproducedussales ofsolidewastesenttolandfile, star(5)
```

	siteco~p	percen~a	ipssit~e	anoffs~m	toxich~g	wsswwtp	sustai~e
sitecompat~p	1.0000						
percentage~a	0.4233*	1.0000					
ipssituate~e	0.4252*	0.5764*	1.0000				
anoffsitel~m	0.2720*	0.2022*	0.2237*	1.0000			
toxichazar~g	0.3260*	0.3961*	0.3496*	0.4117*	1.0000		
wsswwtp	0.3853*	0.3224*	0.3707*	0.4626*	0.6499*	1.0000	
sustainabl~e	0.4203*	0.4229*	0.4763*	0.4697*	0.6052*	0.7104*	1.0000
segregated~s	0.2034*	0.4374*	0.4297*	0.4147*	0.4252*	0.4081*	0.5418*
buildingsw~n	0.2784*	0.2007*	0.3622*	0.3413*	0.4104*	0.4080*	0.4193*
thereissol~g	0.0879	0.1886*	0.0918	-0.0540	0.1511*	0.2895*	0.3629*
wasteexcha~e	0.3119*	0.2632*	0.2590*	0.2932*	0.3374*	0.4050*	0.4913*
annualenvi~e	0.2587*	0.3728*	0.3807*	0.1846*	0.4806*	0.4836*	0.4234*
firmswithg~t	0.2294*	0.0679	0.2832*	0.1297*	0.1363*	0.2811*	0.2700*
operatorpo~t	0.4415*	0.2388*	0.4752*	0.1941*	0.2200*	0.3740*	0.3234*
operat~14001	0.3531*	0.2916*	0.5267*	0.2887*	0.4126*	0.5052*	0.4188*
operatorpo~c	0.4815*	0.4155*	0.5222*	0.2410*	0.3591*	0.4490*	0.4580*
solidewast~e	0.3087*	0.2711*	0.3005*	0.2570*	0.2532*	0.4032*	0.4047*
efficientw~s	0.4949*	0.2769*	0.3235*	0.2503*	0.3592*	0.5442*	0.5157*
hazardousw~s	0.3186*	0.1715*	0.2918*	0.4149*	0.3806*	0.3636*	0.3896*
ofsolidewa~e	0.1150*	0.2254*	0.3782*	0.1006*	0.1485*	0.1655*	0.2025*

	segreg~s	buildi~n	therei~g	wastee~e	annual~e	firmsw~t	operat~t
segregated~s	1.0000						
buildingsw~n	0.4793*	1.0000					
thereissol~g	0.2648*	0.3170*	1.0000				
wasteexcha~e	0.5246*	0.4564*	0.5500*	1.0000			
annualenvi~e	0.5151*	0.4433*	0.3284*	0.4818*	1.0000		
firmswithg~t	0.2680*	0.2797*	0.1918*	0.2637*	0.1110*	1.0000	
operatorpo~t	0.1158*	0.1648*	0.1758*	0.1188*	0.1634*	0.4455*	1.0000
operat~14001	0.2643*	0.2237*	0.1873*	0.3062*	0.3523*	0.4890*	0.7996*
operatorpo~c	0.2850*	0.1997*	0.1668*	0.2615*	0.2757*	0.4104*	0.7609*
solidewast~e	0.6122*	0.4559*	0.2037*	0.3950*	0.3489*	0.5107*	0.2220*
efficientw~s	0.3258*	0.3239*	0.2641*	0.3044*	0.4279*	0.2905*	0.3363*
hazardousw~s	0.3790*	0.2923*	0.0353	0.3255*	0.4316*	0.1609*	0.2625*
ofsolidewa~e	0.3428*	0.3820*	0.1274*	0.0950	0.4106*	0.4229*	0.3928*

	op~14001	operat~c	solide~e	effici~s	hazard~s	ofsoli~e
operat~14001	1.0000					
operatorpo~c	0.8221*	1.0000				
solidewast~e	0.2879*	0.2770*	1.0000			
efficientw~s	0.4457*	0.4530*	0.3725*	1.0000		
hazardousw~s	0.3598*	0.4163*	0.2218*	0.4704*	1.0000	
ofsolidewa~e	0.3449*	0.2852*	0.4167*	0.4808*	0.3543*	1.0000

.

Correlation matrix of independent variables and residuals

```
. pwcorr sitecompatabilitywithlump plotsallocatedtononpollutingacti ipsonredevelopedbrownfieldsite offsitelandfillforipswm toxicandha
> zardousmaterialcstdmgt pwssandwwtp sustainablerainandstormwatercmtr segregatedrecyclingreceptionbins buildingswithenvdesigncertific
> at solarstreetlighting wasteexccleaninghouse annualenvauditconductedoneachfir firmswithnationalgreencertificat operatorpossessesung
> cr operatorpossessesiso14001 operatorpossessesiscc solidwastecollectionservice lowerratioofwateruseinm3tousdsal lowerhazardouswaste
> sproducedtous higherofsolidwastesenttolandfill residual, star(5)
```

	siteco~p	plotsa~i	ipsonr~e	offsit~m	toxica~t	pwssan~p	sustai~r
sitecompat~p	1.0000						
plotsalloc~i	0.4233*	1.0000					
ipsonredev~e	0.4252*	0.5764*	1.0000				
offsitelan~m	0.2720*	0.2022*	0.2237*	1.0000			
toxicandha~t	0.3260*	0.3961*	0.3496*	0.4117*	1.0000		
pwssandwwtp	0.3853*	0.3224*	0.3707*	0.4626*	0.6499*	1.0000	
sustainabl~r	0.4203*	0.4229*	0.4763*	0.4697*	0.6052*	0.7104*	1.0000
segregated~s	0.2034*	0.4374*	0.4297*	0.4147*	0.4252*	0.4081*	0.5418*
buildingsw~t	0.2784*	0.2007*	0.3622*	0.3413*	0.4104*	0.4080*	0.4193*
solarstree~g	0.0879	0.1886*	0.0918	-0.0540	0.1511*	0.2895*	0.3629*
wasteexccl~e	0.3119*	0.2632*	0.2590*	0.2932*	0.3374*	0.4050*	0.4913*
annualenva~r	0.2587*	0.3728*	0.3807*	0.1846*	0.4806*	0.4836*	0.4234*
firmswithn~t	0.2294*	0.0679	0.2832*	0.1297*	0.1363*	0.2811*	0.2700*
operatorpo~r	0.4415*	0.2388*	0.4752*	0.1941*	0.2200*	0.3740*	0.3234*
operat~14001	0.3531*	0.2916*	0.5267*	0.2887*	0.4126*	0.5052*	0.4188*
operatorpo~c	0.4815*	0.4155*	0.5222*	0.2410*	0.3591*	0.4490*	0.4580*
solidwaste~e	0.3087*	0.2711*	0.3005*	0.2570*	0.2532*	0.4032*	0.4047*
lowerratio~l	0.4949*	0.2769*	0.3235*	0.2503*	0.3592*	0.5442*	0.5157*
lowerhazar~s	0.3186*	0.1715*	0.2918*	0.4149*	0.3806*	0.3636*	0.3896*
higherofso~l	0.1051*	0.2171*	0.3731*	0.0915	0.1402*	0.1589*	0.1945*
residual	-0.0564	0.0173	0.0332	-0.0403	-0.0290	-0.0118	-0.0009

	segreg~s	buildi~t	solars~g	wastee~e	annual~r	firmsw~t	operat~r
segregated~s	1.0000						
buildingsw~t	0.4793*	1.0000					
solarstree~g	0.2648*	0.3170*	1.0000				
wasteexccl~e	0.5246*	0.4564*	0.5500*	1.0000			
annualenva~r	0.5151*	0.4433*	0.3284*	0.4818*	1.0000		
firmswithn~t	0.2680*	0.2797*	0.1918*	0.2637*	0.1110*	1.0000	
operatorpo~r	0.1158*	0.1648*	0.1758*	0.1188*	0.1634*	0.4455*	1.0000
operat~14001	0.2643*	0.2237*	0.1873*	0.3062*	0.3523*	0.4890*	0.7996*
operatorpo~c	0.2850*	0.1997*	0.1668*	0.2615*	0.2757*	0.4104*	0.7609*
solidwaste~e	0.6122*	0.4559*	0.2037*	0.3950*	0.3489*	0.5107*	0.2220*
lowerratio~l	0.3258*	0.3239*	0.2641*	0.3044*	0.4279*	0.2905*	0.3363*
lowerhazar~s	0.3790*	0.2923*	0.0353	0.3255*	0.4316*	0.1609*	0.2625*
higherofso~l	0.3373*	0.3770*	0.1221*	0.0894	0.4084*	0.4197*	0.3885*
residual	-0.0331	-0.0583	-0.0598	0.0031	-0.0248	0.0206	0.0065

	op~14001	operat~c	solidw~e	lowerr~l	lowerh~s	higher~l	residual
operat~14001	1.0000						
operatorpo~c	0.8221*	1.0000					
solidwaste~e	0.2879*	0.2770*	1.0000				
lowerratio~l	0.4457*	0.4530*	0.3725*	1.0000			
lowerhazar~s	0.3598*	0.4163*	0.2218*	0.4704*	1.0000		
higherofso~l	0.3407*	0.2801*	0.4125*	0.4810*	0.3500*	1.0000	
residual	0.0230	-0.0647	-0.0611	-0.0092	0.0079	-0.0436	1.0000

Multicollinearity test after regress

```
. vif
```

Variable	VIF	1/VIF
operat~14001	6.65	0.150458
operatorpo~t	5.32	0.188135
operatorpo~c	4.74	0.210985
wsswwtp	3.39	0.294657
sustainabl~e	3.21	0.311870
ofsolidewa~e	3.09	0.323715
segregated~s	2.94	0.340521
efficientw~s	2.90	0.344482
sitecompat~p	2.67	0.374494
wasteexcha~e	2.64	0.378994
annualenvi~e	2.50	0.399275
ipssituate~e	2.50	0.399309
toxichazar~g	2.44	0.409622
solidewast~e	2.42	0.413191
percentage~a	2.26	0.442944
thereissol~g	2.16	0.462994
firmswithg~t	2.05	0.488880
buildingsw~n	2.00	0.501125
hazardousw~s	1.96	0.509328
anoffsitel~m	1.95	0.513940
Mean VIF	2.99	

Postestimation after Logit regression model

For economic competitiveness Binary logit model

Hosmer –Lemeshow goodness of Fit test (gof)

```
. lfit, group(10)table
```

Logistic model for ecompobjs, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

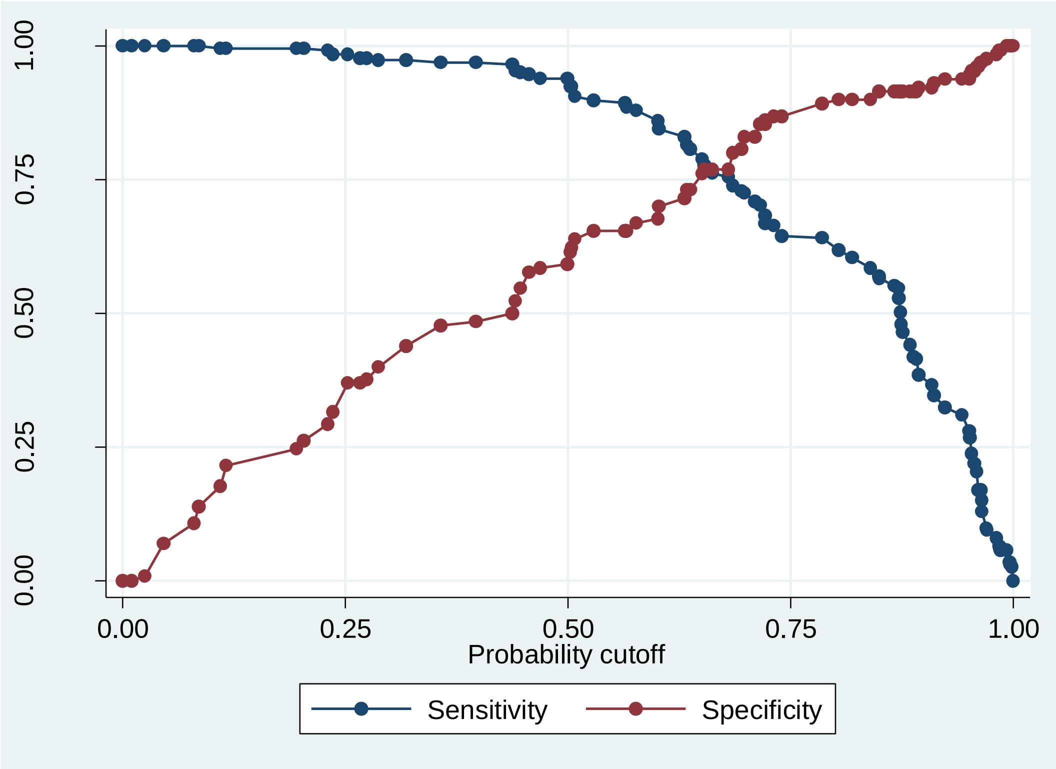
Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.3410	12	9.3	30	32.7	42
2	0.4517	13	15.7	25	22.3	38
3	0.5454	16	19.9	24	20.1	40
4	0.6226	28	23.1	10	14.9	38
5	0.7489	27	27.1	13	12.9	40
6	0.7952	32	31.9	9	9.1	41
7	0.8402	32	31.8	7	7.2	39
8	0.8798	34	32.8	4	5.2	38
9	0.9402	37	38.1	5	3.9	42
10	0.9834	34	35.3	3	1.7	37

```
      number of observations =       395
            number of groups =        10
     Hosmer-Lemeshow chi2(8) =         7.79
                 Prob > chi2 =         0.4546
```

Classification Test Table based on the Binary Logistic regression model for economic competitiveness (Model 3.10) using a cut-point 0.5

```
. estat classification

Logistic model for ecompobjs

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |       245            50  |        295
     -     |        20            80  |        100
-----------+--------------------------+-----------
   Total   |       265           130  |        395

Classified + if predicted Pr(D) >= .5
True D defined as ecompobjs != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   92.45%
Specificity                     Pr( -|~D)   61.54%
Positive predictive value       Pr( D| +)   83.05%
Negative predictive value       Pr(~D| -)   80.00%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   38.46%
False - rate for true D         Pr( -| D)    7.55%
False + rate for classified +   Pr(~D| +)   16.95%
False - rate for classified -   Pr( D| -)   20.00%
--------------------------------------------------
Correctly classified                        82.28%
--------------------------------------------------
```

Plot of Sensitivity and specificity versus all possible cut-point lsens



Summary of sample statistics

```
. estat summarize

  Estimation sample logistic              Number of obs =        395
```

Variable	Mean	Std. Dev.	Min	Max
ecompobjs	.6708861	.4704874	0	1
comptender	3.486076	1.064748	1	5
mgtboard	3.311392	1.337376	1	5
crmsystem	3.156962	1.177484	1	5
proxhighway	3.597468	1.203841	1	5
proxpower	3.81519	.9498983	1	5
connectivity	4.083544	1.057056	1	5
stableelec~s	4.032911	1.197048	1	5
goodwaterss	3.873418	1.183292	1	5
builmainte~e	3.432911	1.275474	1	5
emermaint	3.632911	1.056491	1	5
rrrserv	3.632911	1.014829	1	5
busisupp	3.387342	1.121702	1	5
fincsupp	3.025316	1.130728	1	5
ossserv	3.562025	1.100566	1	5
b2bgather	3.281013	1.068477	1	5
hrrecserv	3.197468	1.20763	1	5
highpci	2.967089	.8935359	1	5
fteqempt	3.083544	1.153502	1	5
hfdigfcf	2.96962	.8720642	1	5
usexspgipex	2.949367	.8044725	1	4

.

Covariant matrix estimation for Logit model coefficients

```
. estat vce
```

Covariance matrix of coefficients of logistic model

e(V)	ecompobjs comptender	mgtboard	crmsystem	proxhigh~y	proxpower	connecti~y	stableel~s	goodwate~s	builmain~e
ecompobjs									
comptender	.03717672								
mgtboard	-.00403072	.02026663							
crmsystem	.00355373	.00046191	.02985928						
proxhighway	.00107885	-.01061604	-.00260556	.02637996					
proxpower	.00596543	-.00263135	.00968538	-.00234099	.04541831				
connectivity	.00304089	.00483979	-.0005181	-.00007155	-.00396167	.03681083			
stableelec~s	-.00004626	.0010692	.00288564	-.00476635	.00082976	-.00457246	.04074347		
goodwaterss	-.00301497	-.00199598	.00040768	.00314012	.00077819	-.00810236	-.0290434	.05026368	
builmainte~e	-.00661433	-.00419375	-.0043495	-.00281656	.00683825	.00035495	-.00037519	-.01118884	.04217513
emermaint	.00914118	-.01236141	-.00417196	.01907047	-.00001937	-.0031916	-.00701314	.00843934	-.01345952
rrrserv	-.01177883	.00468878	-.00360255	-.01277337	-.01669828	-.00886907	.00839696	-.01564008	-.00084201
busisupp	-.00036551	-.00181289	.00390564	-.00256116	.00549399	-.00368954	.00090555	.00187153	.00213627
fincsupp	.00050732	.00826055	-.00092576	-.0047669	.00021609	.00791347	-.00635498	.00170264	-.00516728
ossserv	-.0033529	.01217693	-.01500429	-.00885021	-.01518041	-.00103946	.00173834	-.00181752	-.00320643
b2bgather	-.01095871	-.00694885	-.01105512	.0023456	-.00522631	-.00036603	-.00121779	-.00459983	.00893982
hrrecserv	.00631379	-.00325247	.00495365	.00117017	.00144024	-.00979284	-.00036165	.01236897	-.0121133
highpci	-.01326411	.00875908	-.00189513	-.00015387	-.02105687	-.00428004	-.00482944	.00068228	-.00102138
fteqempt	-.0016777	-.00670883	.00229876	.00354884	.00774418	.00160534	.0105323	-.00654628	.00638884
hfdigfcf	-.00277646	.00618547	-.00146227	-.00001499	-.01247085	.00910387	-.0078277	.01144312	-.02118387
usexspgipex	.00600536	-.00551909	-.01318176	-.00265286	.0040873	.00031723	.01336916	-.01718471	.00762091
_cons	-.05756396	-.01805968	.00335343	-.00814922	-.04363158	-.06265271	-.04759246	.02341519	.03986888

e(V)	ecompobjs emermaint	rrrserv	busisupp	fincsupp	ossserv	b2bgather	hrrecserv	highpci	fteqempt
ecompobjs									
emermaint	.07604659								
rrrserv	-.05464984	.09930569							
busisupp	.00586695	-.01120642	.03202579						
fincsupp	-.01213889	.00306643	-.01424373	.03120478					
ossserv	-.00094465	-.00412992	-.01611647	.01059206	.05308838				
b2bgather	-.00033421	.00230786	-.00197983	-.00325058	-.00775873	.03876391			
hrrecserv	-.00052372	-.00063348	.00294923	-.00551846	-.00860841	-.00237881	.02989893		
highpci	-.02193652	.02306051	-.0120825	.00609622	.0167745	-.00014887	-.00077753	.05480368	
fteqempt	.00741919	-.00151636	-.00217575	-.0054029	-.00874969	.00439416	-.00803551	-.01658437	.03355838
hfdigfcf	-.00647439	.00871934	-.00570575	.00456876	.0033278	-.00396451	.003072	.01389814	-.01359105
usexspgipex	.01117667	-.00573367	.00259607	-.00626565	.01156328	-.000477	-.01195889	-.02616529	.01517402
_cons	-.00825089	.00418221	.04131385	-.03025452	-.03778988	.01721733	.00334805	.02005704	-.07130794

e(V)	ecompobjs hfdigfcf	usexspgi~x	_cons
ecompobjs			
hfdigfcf	.06231302		
usexspgipex	-.04334071	.09008988	
_cons	-.01044738	-.09181407	1.1432889

For social inclusiveness and shared prosperity Binary logit model

Pearson or Hosmer –Lemeshow goodness of Fit test (gof)

```
. lfit, group(10)table
```

Logistic model for socialinclusivness, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.0000	0	0.0	40	40.0	40
2	0.0025	3	0.0	36	39.0	39
3	0.0837	0	1.6	42	40.4	42
4	0.3089	1	7.5	39	32.5	40
5	0.6901	14	19.7	24	18.3	38
6	0.8711	40	31.6	0	8.4	40
7	0.9895	42	39.9	0	2.1	42
8	0.9999	38	37.8	0	0.2	38
9	1.0000	38	38.0	0	0.0	38
10	1.0000	38	38.0	0	0.0	38

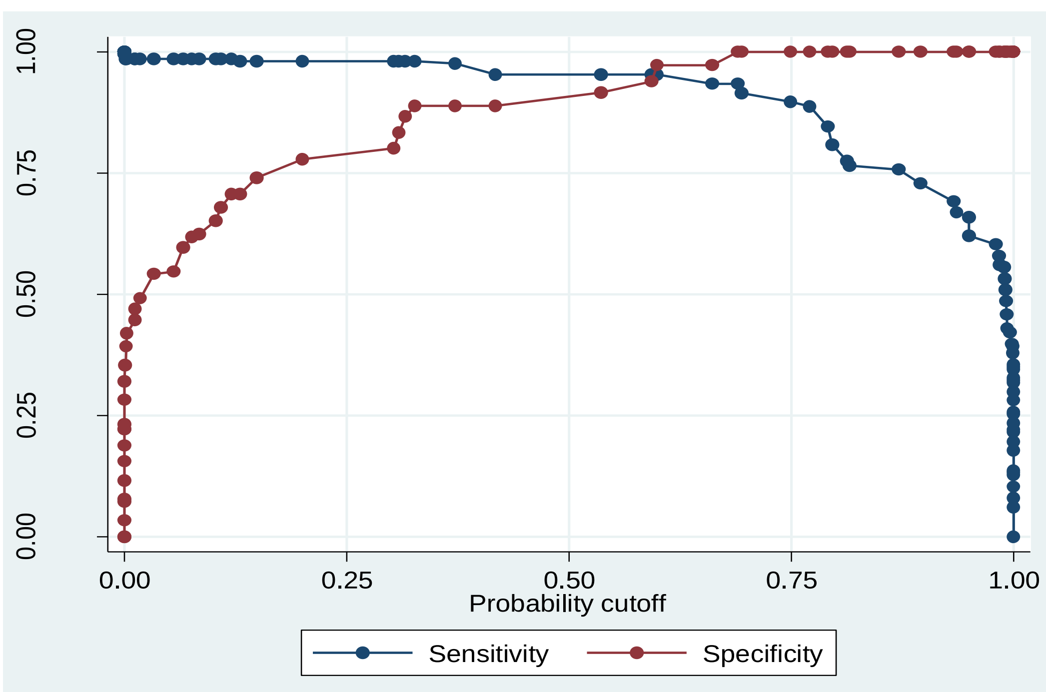
```
      number of observations =       395
            number of groups =        10
      Hosmer-Lemeshow chi2(8) =       423.03
                  Prob > chi2 =         0.0000
```

Classification test

```
. estat classification

Logistic model for socialinclusivness

              ──────── True ────────
Classified │         D            ~D  │      Total
───────────┼──────────────────────────┼───────────
     +     │       204            15  │        219
     -     │        10           166  │        176
───────────┼──────────────────────────┼───────────
   Total   │       214           181  │        395

Classified + if predicted Pr(D) >= .5
True D defined as socialinclusivness != 0
──────────────────────────────────────────────────
Sensitivity                     Pr( +| D)   95.33%
Specificity                     Pr( -|~D)   91.71%
Positive predictive value       Pr( D| +)   93.15%
Negative predictive value       Pr(~D| -)   94.32%
──────────────────────────────────────────────────
False + rate for true ~D        Pr( +|~D)    8.29%
False - rate for true D         Pr( -| D)    4.67%
False + rate for classified +   Pr(~D| +)    6.85%
False - rate for classified -   Pr( D| -)    5.68%
──────────────────────────────────────────────────
Correctly classified                        93.67%
```

Plot of Sensitivity and specificity versus all possible cut-point

lsens



Summary of sample statistics

```
. estat summarize

  Estimation sample logistic              Number of obs =        395
```

Variable	Mean	Std. Dev.	Min	Max
socialincl~s	.5417722	.4988839	0	1
powerlines~d	3.6	1.083799	1	5
childcaref~s	2.703797	1.363357	1	5
faithpraye~s	2.572152	1.224427	1	5
onsiteinci~r	3.232911	1.205499	1	5
disabledin~n	2.992405	1.269495	1	5
higheravec~e	3.18481	.9552272	1	5
simmsystem	3.025316	1.066027	1	5
eprsystem	3.265823	1.079444	1	5
socialperf~t	2.893671	1.089328	1	5
moref~45001c	3.131646	.9835634	1	5
onsiteheal~s	3.144304	1.350667	1	5
greaterfir~s	3.162025	1.114772	1	5
accesstofi~e	3.693671	1.09212	1	5
higherners~a	2.825316	1.050679	1	5
loweraveem~e	2.789873	1.204433	1	5
dataoncomp~s	2.903797	.9589868	1	5
autorized3~e	3.063291	1.058466	1	5
higheraves~y	2.686076	1.104988	1	5
higherempw~s	3.020253	.9766798	1	5
loweremplo~r	3.068354	1.041224	1	5
higherfema~e	3.481013	1.000771	1	5
higherfema~i	2.982278	.9328684	1	5
higheremp~30	3.475949	1.018262	1	5
higherdome~t	2.931646	.9679567	1	5

.

Covariant matrix estimation for Logit model coefficients

```
. estat vce
```

Covariance matrix of coefficients of logistic model

	socialin~s								
e(V)	powerlin~d	childcar~s	faithpra~s	onsitein~r	disabled~n	higherav~e	simmsystem	eprsystem	socialpe~t
socialincl~s									
powerlines~d	.56832391								
childcaref~s	-.1060727	.08939333							
faithpraye~s	.21516981	-.03675472	.17303921						
onsiteinci~r	.1564138	-.12238602	.09583202	.38530136					
disabledin~n	.07241248	-.041654	.0336555	.06522908	.10393138				
higheravec~e	-.60537483	.16214082	-.27576129	-.32165626	-.13824405	.90477557			
simmsystem	-.50443685	.1148742	-.33881255	-.3634179	-.06492649	.65031662	1.0072126		
eprsystem	.26173713	-.04077756	.16084893	.10314437	.02901806	-.39008524	-.34339356	.34485476	
socialperf~t	.44291369	-.09404858	.2605265	.23540602	.02650365	-.58452957	-.69685682	.29069099	.64026964
moref~45001c	-.48021258	.08590975	-.32412786	-.20335113	-.0157822	.6190401	.80288155	-.38649492	-.63902465
onsiteheal~s	-.02898575	.01235273	-.06714841	-.10685863	-.02650616	.1605872	.09357776	-.1512374	-.09342613
greaterfir~s	.00357617	.05208055	-.04666319	-.24415578	-.03573809	.16523546	.2298747	-.10137865	-.13488838
accesstofi~e	.08174886	.00971078	.03495121	-.04138207	-.04555242	-.10527864	-.05877571	.13393682	.12390997
higherners~a	-.269414	.05301841	-.05148313	.0491883	-.08375876	.21377245	.01287633	-.06759964	-.04491567
loweraveem~e	-.00687389	.02034563	-.02245882	-.01076691	-.04807823	.06500656	.05029651	.01494074	-.03366184
dataoncomp~s	.57152729	-.17972928	.37659515	.41793456	.13778713	-.83940838	-1.0193833	.41516162	.75917994
autorized3~e	.47458409	-.12010058	.17173598	.08517045	.06784611	-.5250911	-.3636692	.25563515	.35393177
higheraves~y	.53585451	-.13928735	.32423817	.32595282	.1304896	-.77531709	-.83178243	.35416337	.64858743
higherempw~s	-.29247849	.11438724	-.13477551	-.19015388	-.0531171	.38721396	.38822809	-.13768019	-.35245217
loweremplo~r	.67966022	-.19408817	.31277327	.40685569	.10727755	-.92044668	-.79484242	.39334386	.7013803
higherfema~e	.29905074	-.09442481	.21560796	.28464695	.07166749	-.44791408	-.67209461	.20969621	.46159419
higherfema~i	-.30219956	.10333318	-.13807557	-.18289761	-.07343859	.41471176	.34738915	-.1810362	-.27855596
higheremp~30	.00738831	-.01547096	.00957318	.01690155	.01832192	-.03935112	-.00594013	.02013753	.00592123
higherdome~t	.78914869	-.2141904	.38504743	.36124275	.15510915	-.98368255	-1.008882	.47020049	.79875583
_cons	-7.5225393	1.6906327	-3.8135411	-3.4164594	-1.0975659	9.2605546	9.6522839	-4.8215583	-8.060279

	socialin~s								
e(V)	mor~45001c	onsitehe~s	greaterf~s	accessto~e	higherne~a	lowerave~e	dataonco~s	autorize~e	higherav~y
socialincl~s									
moref~45001c	.87613634								
onsiteheal~s	.09170888	.19034887							
greaterfir~s	.1118541	.12162568	.31934434						
accesstofi~e	-.11424737	-.06502583	-.02194271	.18811133					
higherners~a	.05347006	-.02939799	-.20786286	.04381591	.50209311				
loweraveem~e	.04148309	-.01023999	.00500145	.0319982	-.0095738	.10705069			
dataoncomp~s	-.86337889	-.11575637	-.26625009	.04507581	-.05596227	-.09816811	1.3200071		
autorized3~e	-.45107755	-.03429141	.11161399	.08538224	-.37296956	-.02191308	.44175088	.64457828	
higheraves~y	-.72312624	-.12983378	-.18918285	.064654	-.1191616	-.10472319	.97202466	.45468045	.89360039
higherempw~s	.34279956	-.00530743	.06720606	-.01761762	.06568657	.06598031	-.50507894	-.26400822	-.41839707
loweremplo~r	-.72995673	-.14955817	-.14290759	.09987827	-.28557166	-.0121786	.94384157	.64282535	.85296237
higherfema~e	-.53173267	-.03885487	-.17900352	-.02857435	.01330479	-.0556846	.81246938	.1955072	.58140316
higherfema~i	.30205503	.05898511	.03647017	-.02333097	.19294488	.01408727	-.47008206	-.29996512	-.3940387
higheremp~30	-.00907643	-.03717968	-.05528788	.0228117	.08241675	-.0094146	.04646724	.00884798	.03539444
higherdome~t	-.93833864	-.07396244	-.09287187	.05837125	-.4119062	-.06385111	1.2110304	.7765109	.99406128
_cons	8.8461785	1.2220002	1.3587285	-1.5634374	2.1388052	.18614298	-11.605261	-6.8116513	-9.5436711

	socialin~s						
e(V)	higherem~s	loweremp~r	higherfe~e	higherfe~i	highere~30	higherdo~t	_cons
socialincl~s							
higherempw~s	.39176593						
loweremplo~r	-.48878177	1.1673636					
higherfema~e	-.31918527	.55407499	.6023471				
higherfema~i	.21578437	-.50899728	-.2792678	.33208931			
higheremp~30	.00804507	.0123747	.00516756	.03978241	.13813728		
higherdome~t	-.57680771	1.1835307	.75023723	-.58404711	-.04404173	1.5956731	
_cons	4.895407	-11.075556	-6.8469371	4.7532079	-.84631807	-13.061225	134.33606

For Environmental stewardship Binary logit model

Pearson or Hosmer –Lemeshow goodness of Fit test (gof)

```
. lfit, group(10)table
```

Logistic model for environmentstewardship, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

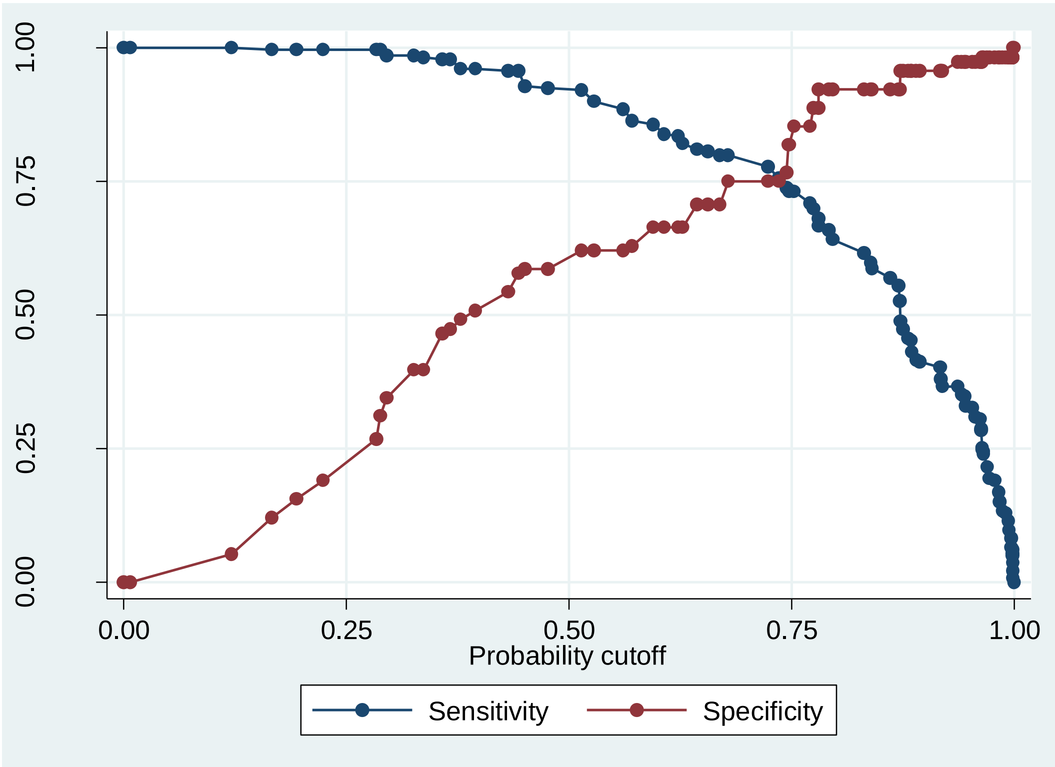
Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.6888	26	25.1	18	18.9	44
2	0.7197	23	24.8	12	10.2	35
3	0.7831	32	29.9	8	10.1	40
4	0.8072	35	34.4	8	8.6	43
5	0.8349	28	29.9	8	6.1	36
6	0.8651	34	33.3	5	5.7	39
7	0.8915	35	36.9	7	5.1	42
8	0.9212	35	35.4	4	3.6	39
9	0.9600	37	35.9	1	2.1	38
10	0.9967	39	38.4	0	0.6	39

```
   number of observations =       395
         number of groups =        10
  Hosmer-Lemeshow chi2(8) =         4.03
              Prob > chi2 =         0.8542
```

Classification test

```
. estat classification

Logistic model for environmentstewardship

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |       320            65  |        385
     -     |         4             6  |         10
-----------+--------------------------+-----------
   Total   |       324            71  |        395

Classified + if predicted Pr(D) >= .5
True D defined as environmentstewardship != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   98.77%
Specificity                     Pr( -|~D)    8.45%
Positive predictive value       Pr( D| +)   83.12%
Negative predictive value       Pr(~D| -)   60.00%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   91.55%
False - rate for true D         Pr( -| D)    1.23%
False + rate for classified +   Pr(~D| +)   16.88%
False - rate for classified -   Pr( D| -)   40.00%
--------------------------------------------------
Correctly classified                        82.53%
--------------------------------------------------
```

Plot of Sensitivity and specificity versus all possible cut-point lsens



Summary of sample statistics

```
. estat summarize
```

Estimation sample logistic   Number of obs =   395

Variable	Mean	Std. Dev.	Min	Max
environmen~p	.8202532	.3844634	0	1
sitecompat~p	2.858228	1.049608	1	5
percentage~a	3.060759	.8762834	1	5
ipssituate~e	3.194937	.9664287	1	5
anoffsitel~m	3.156962	1.020436	1	5
toxichazar~g	3.111392	1.07001	1	5
wsswwtp	3.260759	1.246459	1	5
sustainabl~e	2.83038	1.130603	1	5
segregated~s	3.210127	1.019554	1	5
buildingsw~n	2.95443	1.011582	1	5
thereissol~g	2.875949	1.074534	1	5
wasteexcha~e	2.972152	.9647251	1	5
annualenvi~e	3.349367	1.014848	1	5
firmswithg~t	3.189873	.8289794	1	5
operatorpo~t	2.956962	.7644851	1	5
operat~14001	3.058228	.8303579	1	5
operatorpo~c	2.918987	.8360646	1	5
solidewast~e	3.582278	1.015209	1	5
efficientw~s	2.855696	.8938235	1	5
hazardousw~s	2.974684	.8545887	1	5
ofsolidewa~e	3.301266	.9222976	1	5

Covariant matrix estimation for Logit model coefficients

```
. estat vce
```

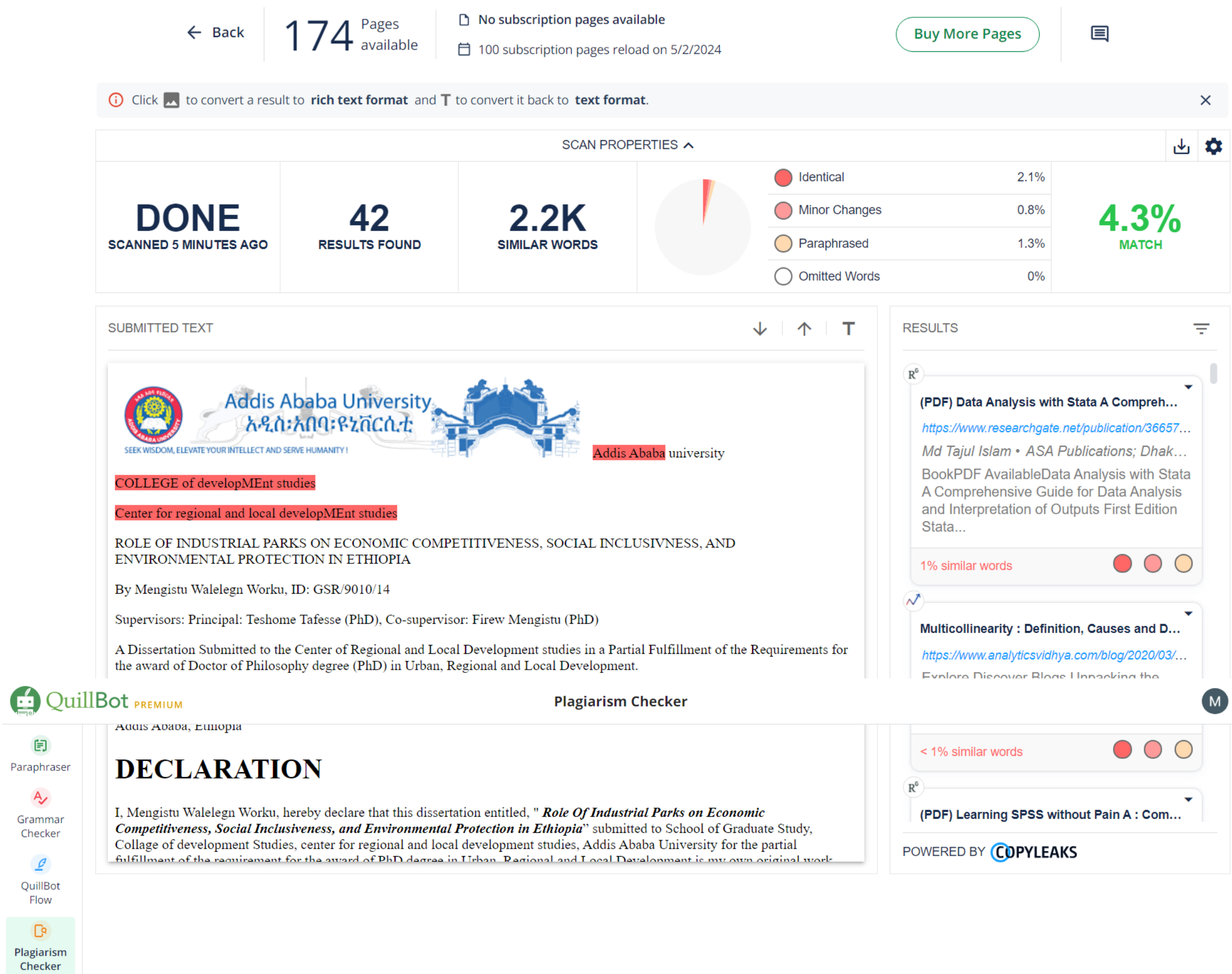
Covariance matrix of coefficients of logistic model

e(V)	environm~p sitecomp~p	percenta~a	ipssitua~e	anoffsit~m	toxichaz~g	wsswwtp	sustaina~e	segregat~s	building~n
environmen~p									
sitecompat~p	.06186736								
percentage~a	-.00548931	.05677986							
ipssituate~e	-.01293503	-.02027916	.05746486						
anoffsitel~m	-.01562949	-.01081192	.01090223	.04708285					
toxichazar~g	-.0117039	-.01319003	.01385066	.01040697	.04879929				
wsswwtp	.0293258	.01037485	-.0092091	-.02864622	-.03250327	.07581377			
sustainabl~e	.00430056	.00199989	-.01445572	-.01104217	-.00393544	-.00822033	.04578045		
segregated~s	.02087054	-.005899	-.01369581	-.01483012	-.00947824	.01778353	-.00369831	.05569293	
buildingsw~n	-.00777687	.00690834	-.00787035	-.00308955	-.00786657	-.00854816	.0008621	-.00061048	.04007378
thereissol~g	-.00509868	-.01426722	.01567128	.02544182	.01077659	-.01904176	-.01861447	-.00406633	-.00482239
wasteexcha~e	-.00334809	.00474726	.0011328	-.01133826	-.00169297	.01434093	.00174097	-.00929027	-.01122923
annualenvi~e	-.0189137	-.00285107	.00515203	.01312158	.00795885	-.03079217	.00078136	-.01508273	.00530273
firmswithg~t	-.01018747	.00150382	.00187369	.00999517	.00599578	-.01420626	-.00463834	-.0049621	.00671762
operatorpo~t	-.05931735	.01250239	.00021201	.01154328	.02611609	-.04906138	-.00139754	-.00444904	.0165495
operat~14001	.04571073	.01197009	-.03329558	-.02215879	-.0312545	.02980974	.01471766	.01769012	-.00334595
operatorpo~c	-.00991395	-.02015537	.01196603	.0098993	.0043496	-.00130529	-.01185337	-.011091	.00105568
solidewast~e	-.02154813	-.00717098	.00478203	.0160586	.01067378	-.02907323	.00065014	-.02210941	-.00052611
efficientw~s	-.03806488	-.00437655	.01221533	.01429059	.01006507	-.03301922	-.00880464	-.0097627	.01126251
hazardousw~s	-.00463921	.0114801	-.00135154	-.00679713	-.00493655	.00288992	-.00623408	-.00459956	.00264797
ofsolidewa~e	.0445504	.00088023	-.01182413	-.01770965	-.01276328	.04829014	.00586585	.00916715	-.02551414
_cons	.0664611	-.03168693	-.04439549	-.10258246	-.07198011	.12108922	.06322365	.04881813	-.02187799

e(V)	environm~p thereiss~g	wasteexc~e	annualen~e	firmswit~t	operator~t	oper~14001	operator~c	solidewa~e	efficien~s
environmen~p									
thereissol~g	.05816369								
wasteexcha~e	-.03654962	.07085728							
annualenvi~e	.00126767	-.01384537	.06435954						
firmswithg~t	.00545367	-.01569445	.0201003	.05866256					
operatorpo~t	-.0035673	.00236577	.04756534	.01375311	.22359363				
operat~14001	-.00286913	-.00603702	-.04320025	-.03493085	-.11846907	.20077847			
operatorpo~c	-.00110693	.00633181	.01615968	.00359742	-.03663751	-.07395298	.12744047		
solidewast~e	.01856997	-.01429861	.00114701	-.00509823	.01275005	-.00421934	-.00531777	.06243918	
efficientw~s	.00228848	-.00013036	.01009034	.01167346	.04175822	-.04443716	.00387562	.01765975	.08250321
hazardousw~s	.01705532	-.02105142	-.0100954	.00931042	.00015117	.01682822	-.03115147	.01100322	-.01008124
ofsolidewa~e	-.01864927	.03184657	-.03599309	-.03280369	-.07637367	.04390477	.01265409	-.03178548	-.04982855
_cons	-.09919835	.04737101	-.08330485	-.08752927	-.17999328	.1202885	.01071636	-.07418861	-.05428172

e(V)	environm~p hazardou~s	ofsolide~e	_cons
environmen~p			
hazardousw~s	.06974422		
ofsolidewa~e	-.02484573	.10743391	
_cons	-.04461334	.11003755	1.0350272

Appendix G 1: Plagiarism



Appendix H 1: Acceptance letter for puplication

EJBME UOG EBE Journal

Ethiopian Journal of
Business Management and Economics
College of Business and Economics
University of Gondar, Gondar, Ethiopia

የኢትዮጵያ ቢዝነስ ማኔጅመንት እና
ኢኮኖሚክስ መፅሔት
ቢዝነስና ኢኮኖሚክስ ኮሌጅ
ጎንደር ዩኒቨርሲቲ፣ ጎንደር፣

Mr. Mengistu Walelegn and Dr. Teshome Tafesse

Addis Ababa University

College of Development Studies

Center for Regional and Local Development Studies

Addis Ababa

May 20, 2024

Subject: ***Acceptance of Manuscript***

It is with great pleasure and utmost enthusiasm that I have the honor to announce the *ACCEPTANCE* of your esteemed manuscript titled *"Industrial Parks in Ethiopia: A Catalyst for Economic Competitiveness"* for publication in the renowned Ethiopian Journal of Business Management and Economics (EJBME), Volume 6, Issue 2. I extend my most profound appreciation and heartfelt gratitude for your invaluable collaboration with EJBME. Your scholarly contribution enriches the academic discourse and significantly advances and spreads global knowledge. I firmly believe that your work will catalyze accelerating research and fostering intellectual growth within the scholarly community.

I take great pride in informing you that your manuscript, in its entirety, will proceed to the esteemed printing house for both hard copy and online dissemination, ensuring its accessibility to a wide readership. Should you have any inquiries, please do not hesitate to contact me. Your dedication and commitment to excellence are highly commendable, and I am honored to be associated with such esteemed authors as you.

With warm regards and profound appreciation,

Yechale Mehiret Geremew (PhD)

Editor-in-Chief

Ethiopian Journal of Business Management and Economics (EJBME)

Multidisciplinary and a Peer-Reviewed Open Access Journal Published Biannually by the University of Gondar, Gondar, Ethiopia, Po.Box:196, https://journal.uog.edu.et/index.php/EJBME, Email: ejbme@uog.edu.et

ቁጥር Ref.No RGSc/104/2024
ቀን Date 18/04/2024

From: Research and Postgraduate Office

Jimma University

To: Mengistu Walelegn ,Teshome Tafesse (Ph.D.) and Frew Mengistu (Ph,D)

Re: **Sending an acceptance letter**

Our College had a nationally accredited journal (Horn of African Journal of Business and Economics- HAJBE), which is published twice a year.

Hence, HAJBE vol. 7, Issue, 1 is going to be published on June, 30, 2024. Hence, the review board of the journal had confirmed to publish your article entitled "Role of Ethiopia's Industrial Parks for Environmental Stewardship" on the aforementioned issue

With best regards

Zerihun Ayenew Birbirsa (PhD),
College of Business and Economics Research and Postgraduate Coordinator

College of Business & Economics
Research & Postgraduate
Coordinator

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Ext.Re Tel +251-47 111 22 02 +251-471112040 Jimma,Oromia Ethiopia website:http://www.ju.edu.et

Appendix I 1: Approval Letter

Addis Ababa University

College o Development Studies

Center for Regional and Local Development Studies

Request to PhD Dissertation Public Defense Sheet

Name of the student: Mengistu Walelegn Worku

Approved Dissertation Title:

Role of Industrial Parks on Economic Competitiveness, Social Inclusiveness, and Environmental Protection in Ethiopia

Approval statement

The undersigned certify that they have read and hereby recommend Addis Ababa University accept the dissertation submitted by Mengistu Walelegn Worku entitled "Role of Industrial Parks on Economic Competitiveness, Social Inclusiveness, and Environmental Protection in Ethiopia" in partial fulfillment of the requirements for the award of a Doctoral of Philosophy Degree in Urban, Regional and Local Development Studies. Moreover, we confirm that the PhD candidate also published two articles in a reputable journal. The published articles DOI are as follows:

1.
2.

Advisors

Advisor Teshome Tafesse (Ph.D.) Signature________ Date: May/2024

Co-Advisor: Firew Mengistu (Ph.D.) Signature________ Date: May 2024

Appendix J 1: Ethical clerance certificate

Addis Ababa University

አዲስ አበባ ዩኒቨርሲቲ

SEEK WISDOM, ELEVATE YOUR INTELLECT AND SERVE HUMANITY !

COLLEGE OF DEVELOPMENT STUDIES (CoDS)

Institutional Review Board (IRB)

Approved

No: 027/01/2023

Ph.D. Proposal Ethical Clearance Certificate

1. **Student's name:** Mengistu Walelegn Worku **Gender:** Male **Birth Date:** 28 November 1986
   Id No: GSR/9010/14 **e-mail:** newplc34@gmail.com

2. **Home Center/Dep't: CoDS:** Center for Regional and Local Development Studies **Stream:** Urban Development and Governance.

3. **PhD Dissertation Supervisor** and Co-Supervisor

   Supervisor: Teshome Tafesse (PhD) Email: teshome.tb@aau.edu.et

   Co-Supervisor: Firew Mengistu (PhD) Email:frew.mengistu@aau.edu.et

4. **Title of the Proposal:** INDUSTRIAL PARKS DEVELOPMENT IN ETHIOPIA: ANALYSIS OF ECONOMIC, SOCIAL, AND ENVIRONMENTAL PERFORMANCE.

   a. **Proposal No:** N.A. **Date accepted:** August 18, 2023
   b. **Amendment No (if any):** N.A. **Date:** N.A.

5. **A Clear Statement of the Decision:** The Academic Commission of the Center for Regional and Local Development Studies reviewed and approved this proposal in accordance with the University's academic standards and rules. The applicant requested the issuance of an ethical clearance certificate, which is required for data collection and subsequent publication process. The CoDS Institutional Review Board (IRB) reviewed the proposal's content, research tools, and informed consent of the respondents. As a result, the proposal was deemed qualified for ethical clearance

6. **Decision:** This proposal fulfills the standard requirements described in IRB-CoDS Standard operating Procedure (SoP) and ethical clearance is hereby awarded.

7. **This certificate is issued upon the consent of:** IRB-CoDS.

IRB-CoDS

Name: Meskerem Abi (Ph.D.)

Designation: Secretary of CoDS/IRB

E-mail: cods.irb@aau.edu.et

Signature:..............................

Date: October 20, 2023

Addis Ababa University College of Development Studies Institutional Review Board (IRB)

This certificate is valid only sealed and signed