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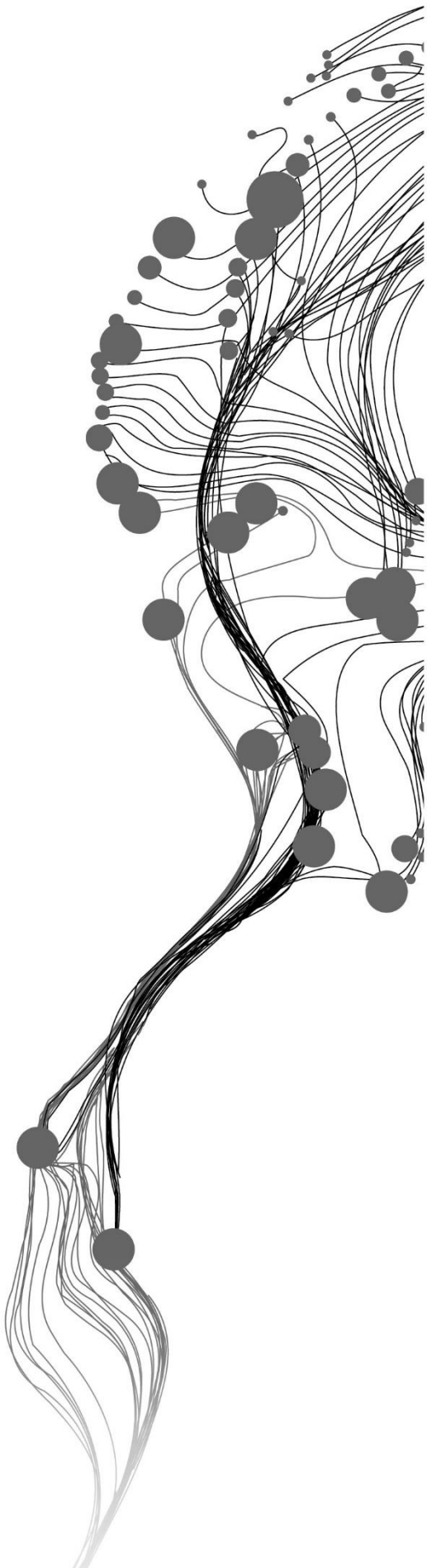

Impacts of industrial parks on their employees environmental quality of life: A case of Bole Lemi I Industrial Park and Eastern Industry Zone

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ABSTRACT

Developing countries have been creating industrial parks to boost their economic development. Industrial parks come with their advantages and disadvantages on social, economic, environmental, and political features that people use. In this vein, Ethiopia is one of the developing countries creating industrial parks; the creation of industrial parks aims to provide employees better conditions and opportunities to boost production. Although the industrial parks generate job opportunities, the turnover of employees is observed in most of the Ethiopian industrial parks. Some of these turnovers are caused due to the lack of cultural context policies such as adapting to new technologies and working environments. This paper aims to understand how the characteristics of industrial parks influence the environmental quality of life of their employees by measuring the environmental quality of life of employees in government-owned and privately-owned Ethiopian industrial parks. The research utilized a case study approach, using a mixed-method approach, both quantitative and qualitative data collection, and analysis methods to measure the subjective and objective environmental quality of life and understand the influences of the characteristics of industrial parks on the environmental quality of life. The environmental quality of life in Ethiopian privately-owned and government-owned industrial parks was investigated using surveys, key informant interviews, and satellite images. The findings have shown differences in the environmental quality of life of employees in the government-owned and privately-owned industrial parks. The respondents of the government-owned industrial park have a better level of satisfaction on recreational areas, clinic, and first aid services, while the respondents of the privately-owned industrial park have a better level of satisfaction on water and sanitation, waste disposal, café/restaurants, green/open spaces, and training centers. In addition to this, respondents of both industrial parks have a similar level of satisfaction with house, break rooms, and employee transportation services. The findings imply that both subjective and objective measures need to be integrated to understand the environmental quality of life fully. Also, the characteristics of both industrial parks have positively and negatively affected the perception of the employees on their environmental quality of life.

Key words: Industrial parks, Environmental quality of life, Employees, Subjective and Objective environmental quality of life

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1. INTRODUCTION

This chapter consists of five sections. The first section presents the background of the study, followed by the problem statement in section two. The third section presents the main and sub-objectives of the study. The fourth section presents the scope of the study. Lastly, the fifth section presents the conceptual framework of the study.

1.1. Background of the study

The main reasoning for developing an industrial park is to facilitate industries settling and producing at a particular area that is arranged and improved to support industrial development (UNIDO, 2019). Industrial parks can be defined as places where many factories share similar areas, infrastructure, and facilities to improve national and regional economies (Fan, Qiao, Xian, Xiao, & Fang, 2017; Sosnovskikh, 2017). In this regard, Industrial Park policies are an important tool for local and regional economic growth planning and development (Sosnovskikh, 2017; UNIDO, 2019). Industrial parks are meant to expand trade, introduce new technology, share information, generate job opportunities, and provide quality of life for people in surrounding areas (Farole & Akinci, 2017; Sosnovskikh, 2017). Some industrial areas have production spaces and supporting amenities; they may also include residential areas for the employees.

While having their advantages, industrial parks may also generate undesirable physical and social conditions like pollution and annoyance in neighboring areas (Santos & Martins, 2007; Lima & Marques, 2017). They may similarly present genuine threats to the community's health and well-being around them (Lima & Marques, 2017). Furthermore, industrial parks sometimes have difficulty integrating with local urban planning and development because the investment of some industrial parks is not based on the relative benefit of the location, like proximity and resource potential (Farole & Akinci, 2017). This lack of integration exposes the industrial parks to inadequate healthcare services, public transportation, and a shortage of housing that might adversely influence their employees (Farole & Akinci, 2017).

Developing countries have been creating industrial parks to mobilize resources and undertake socio-economic goals, including economic upsurge of the regions for which industrial parks are planned (Szirmai, 2012). Ethiopia is also one of the developing countries utilizing an industrial park policy to boost its economic development, aiming to create job opportunities for more than 717,000 people all over the country (FDRE, 2019). Following this, the government of Ethiopia constructed industrial parks that are government-owned, private (built by private investors), and jointly between the government and the private sector throughout the country (EIC, 2017; FDRE, 2019).

Ethiopia's industrial park development centers on developing an integrated economic development area that creates industrial parks, commercial areas, and residential areas for employees (FDRE Ministry of Industry, 2013a). In this regard, the Ethiopian Investment Commission has set various guidelines for the sustainability of industrial parks, including working conditions. The working conditions section emphasizes providing employees better conditions and opportunities to boost production (International Trade Centre & EIC, 2019). Thus, for better production, investors might be concerned about offering sufficient income, provide living areas, food, transportation, childcare, and healthcare services for their employees (International Trade Centre & EIC, 2019).

Even though industrial development and guidelines for the sustainability of industrial parks incorporate the above development areas, industrial parks impact the employees' economic and environmental quality of life. However, studies conducted on Ethiopian industrial parks mostly focus on the economic development point of view. In this regard, this research aims to understand employees' environmental quality of life in government and privately-owned Ethiopian industrial parks by considering the subjective and objective environmental quality of life.

1.2. Research problem statement

Even though developing countries are creating industrial parks to boost their economies, their positive and negative impact should be considered in conjunction with this practice, because industrial parks also have a detrimental effect on the surrounding communities, such as air and water pollution in neighboring areas due to industrial activities (Santos & Martins, 2007; Lima & Marques, 2017). Industrial activities have been linked to increased air pollution in neighboring areas, adversely affecting individuals (Lima & Marques, 2017). Additionally, in some cases, the incompatibility of industrial park development with local planning policies of an area exposes them to the inadequacy of healthcare services, public transportation, and a shortage of housing (Farole & Akinci, 2017).

These problems might impact the environmental quality of life of people residing and working inside these industrial parks. Since one of the critical issues to consider in studies of environmental quality of life is the interaction between individuals and their surrounding environment. As Hassine, Marcouyeux, Annabi-Attia, & Fleury-Bahi (2014) revealed, the environmental quality of life among people residing inside industrial areas is low due to industrial activities, since industrial activities, most of the time, are associated with increased air pollutants in nearby areas with significant impacts on its residents (Lima & Marques, 2017). Besides, the residents of industrial areas have an unfavorable environmental quality of life due to the above reasons (Sopsuk, Chongsuvivatwong, Sornsrivichai, & Hasuwanakit, 2013).

Ethiopia has been actively practicing an industrial policy that has included a wide range of well-planned policy tools, including creating industrial parks. However, the policies were not completely successful due

to a lack of research before implementation, cultural context policies, and a complete understanding of the specific industrial structure of each sector (Oqubay, 2018). Despite these problems, Ethiopia is still creating industrial parks to help speed its economic development.

The major productivity indicators in industrial parks include labor productivity (Oqubay, 2015). According to FDRE (2019), the emergence of the industrial parks increased employment by creating several job opportunities. Although the industrial parks generate job opportunities, the turnover of employees is observed in most of the Ethiopian industrial parks. Some of these turnovers are caused due to the lack of cultural context policies such as adapting to new technologies and working environments (Oqubay, 2015). In this regard, company owners and managers attempt to lower employee turnover by offering nonmonetary benefits such as subsidized lunch, health care services, and annual leave. However, there are still challenges of lack of transportation system and housing facility for employees, lack of social services, lower wages, poor working conditions, and poor health. These challenges are mostly linked with infrastructure and services provided in addition to the economic perspective. Thus, it is noteworthy to study employees' well-being or quality of life to decrease turnovers and maintain the productivity of the industrial parks.

On the other hand, a study by Evcil & Atalik, 2010 & Sopsuk et al. (2013), revealed that various characteristics and types of industrial parks would differently affect the quality of life of people. In this regard, Ethiopia develops government-owned and privately-owned industrial parks all over the country. All government-owned industrial parks specialize in textile and apparel (e.g., Hawassa and Bole Lemi IPs), whereas privately-owned industrial parks have different sectors such as construction material and home appliances (e.g., Eastern Industry Zone and CCCC Areti Industrial Park). This difference of type and characteristics helps investigate the impacts of these industrial parks on their residents, workers, and the surrounding community.

This study will focus on the "Impacts of government-owned and privately owned industrial parks on employees' environmental quality of life in two Ethiopian industrial parks." The study will explore the difference between the characteristics of government-owned and privately owned industrial parks and the environmental quality of life. Specifically, it compares the similarities and differences in the environmental quality of life among the governmentally and privately owned industrial parks relating to their characteristics based on the following objectives.

1.3. Research objectives and research questions

1.3.1. Main research Objective

The main objective of this study is to understand how the characteristics of industrial parks influence the environmental quality of life of their employees, by measuring the environmental quality of life of employees in government-owned and privately-owned industrial parks.

1.3.2. Sub-Objectives

1. To distinguish the characteristics of industrial parks that can influence the environmental quality of life.
2. To understand how the characteristics of the government-owned and privately-owned industrial parks influence their employees' environmental quality of life.

1.3.3. Research Questions

1. To distinguish the characteristics of industrial parks that can influence the environmental quality of life.
   - 1.1. What are the characteristics of industrial parks?
   - 1.2. Which characteristics and how do these characteristics influence the environmental quality of life?
   - 1.3. What are the subjective and objective indicators of environmental quality of life relevant for the Ethiopian industrial parks?

2. To understand how the characteristics of the government-owned and privately-owned industrial parks influence their employees' environmental quality of life.
   - 2.1. What is the objective environmental quality of life within government-owned and privately-owned industrial parks?
   - 2.2. What is the subjective environmental quality of life within government-owned and privately-owned industrial parks?
   - 2.3. How do the characteristics of the government-owned and privately-owned industrial parks influence their employees' environmental quality of life?

1.4. Thesis Structure

This study comprises five chapters. Chapter two presents the introduction, background of the study, research problem statement, research objectives, and research questions. Chapter two spotlights on existing literature review on industrial parks, their characteristics, dimensions of quality of life, environmental quality of life, and the relationship between characteristics of industrial parks and environmental quality of life. Chapter three features the study area description, data collection and processing methods, research design, sampling strategy, and ethical considerations. Chapter four presents the results of this study based on the set research objectives and research questions and the discussion on the findings, interpretation, and justification in line with current literature. Chapter five presents the conclusion based on the findings and recommendations for future research.

2. LITERATURE REVIEW

This section explains key concepts and related terms regarding the impacts of industrial parks on employee's environmental quality of life. It will break down the key concepts into subsections. The first section explains what industrial parks and their characteristics are. The second section discusses Ethiopian industrial parks. The third section describes the quality of life and its dimensions, followed by the environmental quality of life.

2.1. Industrial parks and their characteristics

Previous studies use several words interchangeably to describe an industrial park, including industrial clusters, industrial districts, industrial zones, industrial regions, industrial areas, industrial sites, industrial estates, special economic zones, etc. (Farole, 2011; UNIDO, 2012; Sopsuk et al., 2013; Farole & Akinci, 2017; Fan et al., 2017; Lima & Marques, 2017; UNIDO, 2019). Industrial parks can be defined as a division of an area chosen, designed, and zoned for industrial development. Likewise, UNIDO described industrial parks as "*a tract of land developed and subdivided into plots according to a comprehensive plan with or without built-up factories, sometimes with common facilities for the use of a group of industries*" (UNIDO, 2012, pg.11).

Industrial parks are generally designed to gather companies together in a particular area to benefit from each other. They also are created to represent trade, investment, and extensive economic growth (Farole, 2011). Industrial Park development has key elements, including appropriate geographical location and proximity to resources, a better environment, and regulations that facilitate modernization and productivity (Sosnovskikh, 2017).

Current research by Sosnovskikh (2017), identified three characteristics of industrial parks, namely, proximity: which deals with the geographical accessibility; value creation: the manufacture of goods and services that delivers value for customers; the business environment: that is produced by both individual activities and association between companies (Sosnovskikh, 2017). Industrial parks can also be characterized by their size, operation, location, industry focus, infrastructure, and services they offer (Farole & Akinci, 2017). Similarly, Siegel (2019), discussed industrial parks' characteristics by classifying them as light and heavy industries. Light industries are located close to good transportation, residential areas, and major markets involving several phases from raw material production to the congregation of products within a smaller footprint. Light industries produce foods and beverages, apparel, textiles, paper, plastics, etc. (Siegel, 2019). Heavy industries are large-scale industries that occupy several buildings and infrastructure in a larger footprint (Siegel, 2019). They include industries generating raw materials, making heavy machinery, producing steel, chemicals, plastics, etc. (Siegel, 2019). These heavy industries generate large masses of pollutants that contaminate the environment (workplace, street, and residential area) if not collected on-site

and recycled securely (Siegel, 2019). Comparably, UNIDO (2012), stated industrial park specialization, ownership of the industrial park, and the land of development as industrial parks' characteristics.
According to UNIDO (2019), industrial parks also have the following characteristics:

1. An industrial park having a prepared master plan for each constructed environment.
2. An area zoned for an industrial purpose including services such as industrial waste and wastewater treatment, telecommunications, emergency services for firefighting, first aid, landscaping, access to transportation, and other public and private services and
3. Single management facilitates investment options and strategies for further developing the industrial park (UNIDO, 2019)

Table 1 Summary of characteristics of industrial parks from literature review

Author, Year	**Characteristics of industrial parks**	**Description**
(Siegel, 2019)	Physical footprint	Area the industrial park covered
	Skill needed by employees	Skills to perform any activity in the industrial parks
	Toxins	That might be produced by industrial activity
	Proximity to good transportation	Transportation for workers, receiving raw materials, and delivering commodities produced.
(UNIDO, 2012)	Park specialization	Sectors the park is specializing such as textile and apparel
	Ownership	Public, private, governmental,…
	Land of development	Greenfield or Brownfield
(UNIDO, 2019)	Master plan	An industrial park having a prepared master plan for each constructed environment
	A geographically delineated tract of land	An area zoned for an industrial purpose Including services such as industrial waste and access to transportation
	Single management and administration entity	Single management facilitates investment options and strategies for further developing the industrial park
(Sosnovskikh, 2017)	Proximity	Deals with the geographical accessibility
	Value creation	The manufacture of goods and services that delivers value for customers
	The business environment	That is produced by both individual activities and association between companies
(Farole & Akinci, 2017)	Size	The total area of the industrial park
	Location	Proximity to urbanized areas
	Industry focus	Industrial park specialization
	Infrastructure	
	Services they offer	

2.2. Ethiopian Industrial Parks

According to Oqubay (2015), Ethiopia has reached various levels of industrial development as of the early 20th century. Ethiopia utilizes industrial development to reduce poverty, improve job opportunities, and transform the economy into a middle-income country (FDRE Ministry of Industry, 2013b). The government is employing a Growth and Transformation Plan (GTP) to boost rapid development and structural transformation as a leading economic sector (FDRE, 2010). Ethiopia is applying a growth and transformation plan to develop industrial parks consisting of two phases. The first growth and transformation plan focuses on developing large and medium-scale manufacturing industries (FDRE, 2019). It was proposed to establish five industrial parks: Addis Ababa, Hawassa, Dire Dawa, and Kombolcha (EIC, 2017). The second phase is ongoing to build a stable and robust industrial center that leads to economic change and integrates growth (EIC, 2017). Ethiopian industrial parks can be categorized based on their specialization, including textile and garment, agro-processing, pharmaceutical, and IT parks. They also vary in process technology, size, nature of the product, characteristics of the wastes discharged, and ownership.

On the other hand, industrial parks aim to generate job opportunities for several young people (FDRE, 2019). Ethiopian policymakers argued that given the significant rise in employment challenges and the increasing demand for workers, enormous job creation is required, focusing on a huge scope of modern advancement to drive development and job creation (FDRE, 2010). This is because the country's industrial development plan primarily attracts foreign investment (FDRE, 2016). Even in areas where industrial parks have effectively drawn investment, there are still concerns about the quality of employment, labor rights, and long-term viability (Abebe, Buehren, & Goldstein, 2020). In this vein, worker retention is frequently highlighted by newly launched companies in Ethiopian industrial parks, such as Bole Lemi and Hawassa industrial parks (Abebe et al., 2020).

2.3. Quality of life and its dimensions

Even though the quality of life is a multifaceted concept, it can be defined as "*the relation between the individual perceptions and the feelings of people, and their experiences within the space they live in*" (Senlier, Yildiz, & Aktaş, 2009)(Senlier, Yildiz, & Aktaş, 2009, p.215). In addition to people's perceptions, feelings, and experiences, social, economic, and environmental factors affect the quality of life. Additionally, the term quality of life can also refer to people's satisfaction and characteristics in relation to their living and working environment (Pacione, 2003).

Quality of life studies have been conducted in various fields, including health science, environmental science, social science, and urban studies (Rogerson, 1995; Tesfazghi, Martinez, & Verplanke, 2010; Keles, 2012; Serag El Din, Shalaby, Farouh, & Elariane, 2013). It is linked to several domains of life and individual satisfaction with these domains (Khaef & Zebardast, 2016). Quality of life varies from one lifetime to

another and from one spatial unit to another and can be studied at any spatial level, such as local, regional, and international levels (Sinha, 2019; Tesfazghi et al., 2010).

Various studies on quality of life have revealed that quality of life has different dimensions. Among these dimensions, (Keles, 2012), considered the physical, socio-cultural, psychological, environmental, economic, etc., dimensions of quality of life. While in another study, Serag El Din et al. (2013), pointed out seven dimensions of quality of life. These are the environmental dimension, physical dimension, social dimension, psychological dimension, economic dimension, and political dimension.

Quality of life is usually measured by subjective and objective measures (Liao, 2009). Subjective indicators are drawn from polls of residents' understanding, appraisal, and satisfaction with their life. They are mostly measured on the Likert scale, typically varying from very satisfied to very dissatisfied (Tesfazghi et al., 2010). Subjective measures generally signify the standard of living and people's attitudes towards these living standards. Objective quality of life is measured using objective variables related to measurable information obtained from secondary data (Liao, 2009; Tesfazghi et al., 2010). The state or level of quality of life is assessed with respective indicators or components for every dimension. These indicators or components differ based on the area characteristics, the dimension of quality of life being studied, and the characteristics of the people involved in the study. In addition, the evaluation of the quality of life prospects in an area may also depend on an assessment of the presence and absence of necessary conditions as well as features of the surrounding in which people live and work.

2.4. Environmental quality of life

The environmental quality of life is one of the dimensions of quality of life. The environmental quality of life can be defined as a combination of environment and personal characteristics (Rogerson, 1995). In a space where people live or work, the environment contains goods, services, and other social, physical, and economic features. Personal characteristics include characteristics of people, like satisfaction (Rogerson, 1995). Environmental quality of life also refers to the quality of life of people that are understood in the social, physical, and economic growth in an area in which they live or work (Hassine et al., 2014).

It is a process of expressing the level of satisfaction with a place or a part of a place and describing the users' experience or judgment of the physical environment they occupy (Rioux, 2017; Vischer & Wifi, 2017). In environmental quality of life studies, the relationship between people and their surrounding environment is crucial since it changes depending on an area's characteristics or environment where people live, work, or stay (Hassine et al., 2014; Demarque & Girandola, 2017).

Existing studies on the environmental quality of life have mostly focused only on the subjective measure. These studies identified various indicators of environmental quality of life in a convenient way for their

study. Fleury-Bahi & Ndobo (2017), stated that the environmental attributes and the feeling of continued satisfaction or dissatisfaction rely on factors like sociodemographic, personal desires, and personality variations. Furthermore, Westaway (2006) & Westaway (2009), mentioned that environmental quality of life comprises satisfaction with shelter/dwelling place, schools, health care services, safety and security, pollution level, shopping facilities, cost of living, jobs, or employment opportunities and transport. Moreover, environmental quality of life can be described by environmental aesthetics, neighborhood image, shops and services, annoyances, and pollution and health (Hassine et al., 2014; Streimikiene, 2015). In Addition, satisfaction with social aspects such as good recreational facilities, landscaping, and economic factors such as cost of living in a community are also other indicators of the environmental quality of life (Westaway, 2009).

In existing research, the environmental quality of life is measured using subjective measures since they only focus on the subjective environmental quality of life. For instance, (Fleury-Bahi, Marcouyeux, Préau, & Annabi-Attia, 2013; Westaway, 2006) used a 10-point scale to measure the environmental quality of life. Likewise, (Sopsuk et al., 2013), used a 5-point scale to measure four domains of environmental quality of life: physical health, psychological well-being, social relationships, and satisfaction with the environment. But there is scanty of such study that measures the environmental quality of life using both subjective and objective measures since most of the existing studies aimed to develop a scale to measure perceived environmental quality of life. Thus, in this study, the environmental quality of life is measured by subjective and objective measures. In this respect, the conceptualization of environmental quality of life by Rogerson (1995), has shown that employing both objective (material life arena) and subjective (personal life arena) measures are necessary to provide an understanding of the environmental quality of life using the diagram below.

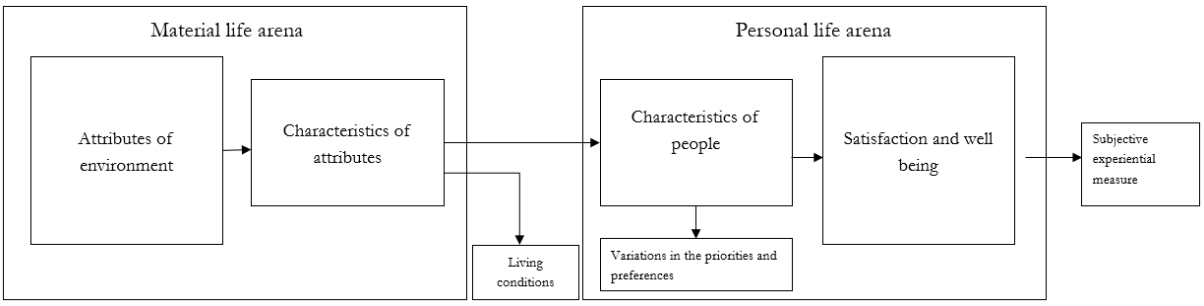

Figure 1 Conceptualization of environmental quality of life (source: (Rogerson, 1995))

2.5. Conceptual Framework

The conceptual framework (Figure 2) explains the relationship among the different main concepts underlying industrial parks and environmental quality of life. The concepts include the various dimensions of quality of life, industrial parks as a living and working environment, and how industrial parks affect employees' environmental quality of life. The relationship between industrial parks and the environmental quality of life of people residing and working inside industrial parks was explained in existing literature (Hassine et al., 2014; Sopsuk et al., 2013; Evcil & Atalik, 2010). As Sopsuk et al. (2013), underlined industrial parks impact people's environmental quality of life besides their socioeconomic advantages.

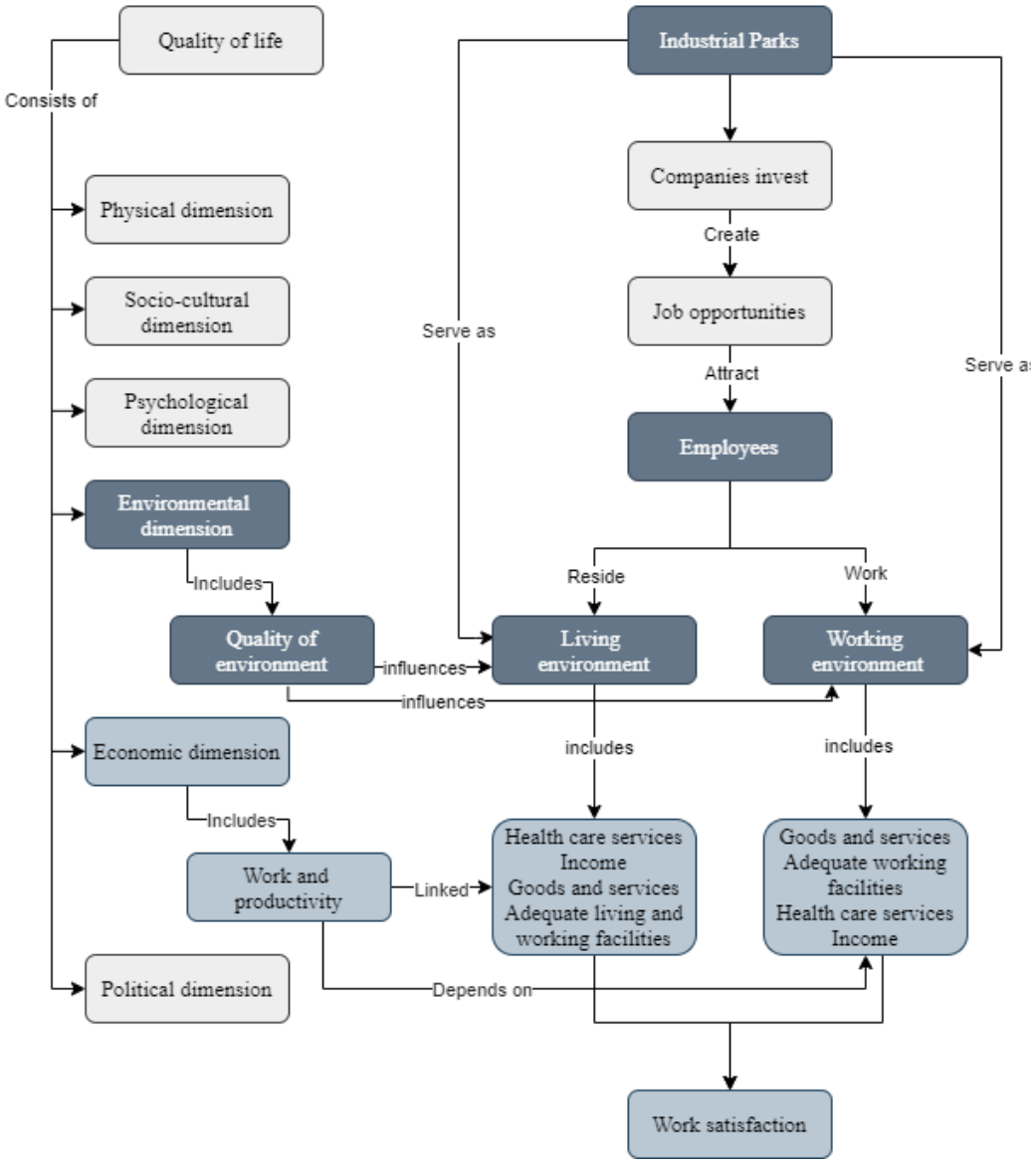

Figure 2 Conceptual framework of the study

3. RESEARCH METHODOLOGY

This chapter describes case study areas used in this study. Following the case studies description, the research design (see table 2) and methods used to achieve the objectives of this study are discussed.

3.1. Selection of case study area

A case study is a typical approach for conducting research (Denzin & Lincoln, 2018). According to Yin (2018), a case study design centers upon contemporary occurrences to comprehend a real-world case assuming that such an understanding would likely maintain the holistic and significant characteristics of real-life experiences. A person, institution, population, or organization is investigated using numerous case studies conducted in a multiple case study. For this study, the two main reasons for the selection of the two case study areas were 1) the first one is the different characteristic of the industrial parks so that the study can explore the influence of the government-owned and privately owned industrial parks on their employees environmental quality of life 2) the second one is due the review of the literature indicated that the different type of industrial sectors that are present in different industrial parks influence the environmental quality of life of their employees differently.

3.1.1. Bole Lemi I Industrial Park

Bole Lemi I Industrial Park is a government-owned industrial park found in the southeastern part of the capital city of Ethiopia, Addis Ababa. It is a modern industrial park developed by the Industrial Park Development Corporation. According to the Ethiopian Investment Commission (EIC), the industrial park has 20 sheds within the compound. The Park is home to only export companies in garment, apparel, and textiles & leather products (shoes). Bole Lemi I is the first industrial park under the policy. It was built on agricultural land or greenfield, covering an area of 155 hectares in Addis Ababa. This industrial park specializes in apparel and textile products.

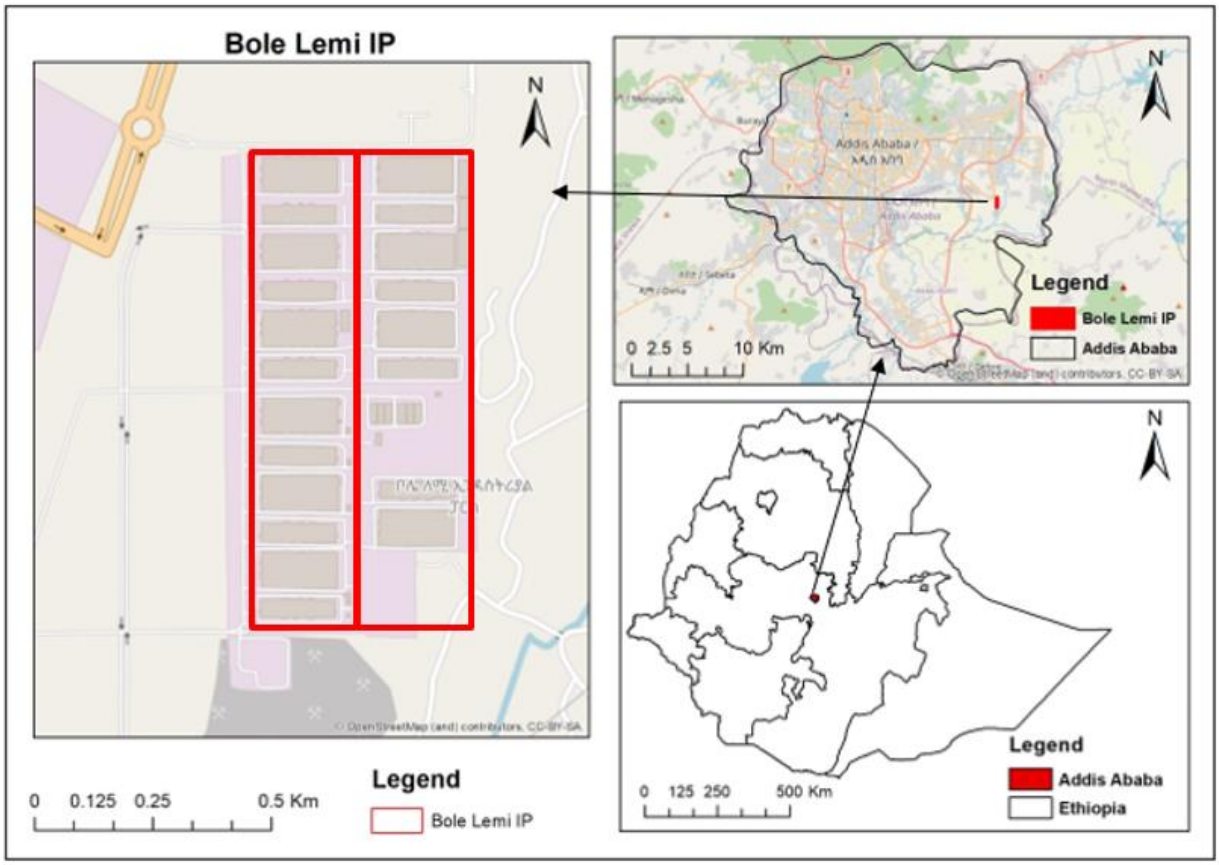

Figure 3 Location of Bole Lemi I Industrial Park

3.1.2. Eastern Industry Zone

Eastern Industry Zone is the first privately owned (Chinese) industrial park found in Ethiopia's Dukem town. Dukem is a town in the central Oromia region and 37 kilometers southeast of Addis Ababa. The town is situated along the Adama – Dire Dawa highway, and there is also a station on the Ethio-Djibouti Railway. The industrial park specializes in diverse sectors such as Textile and clothing (garment), metal works, shoe, processors and car assemblers, construction materials, machinery, electrical equipment, engineering material equipment manufacturing, food processing factories, miscellaneous manufacturing, packing, and service.

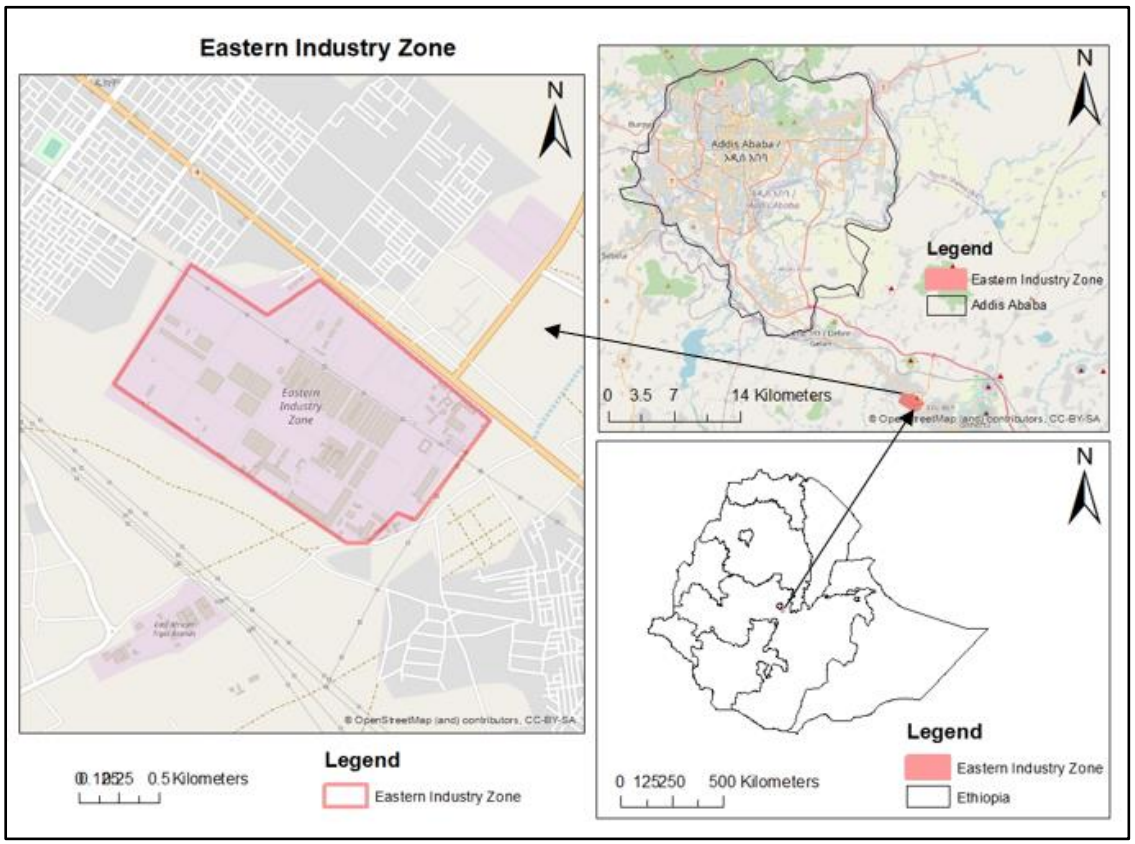

Figure 4 Location of Eastern Industry Zone

3.2. Research Design

This study aims to understand how the characteristics of industrial parks influence the environmental quality of life of its employees by measuring the environmental quality of life of employees in government-owned and privately-owned industrial parks. In this perspective, this study adopts a case study approach to achieve the research objectives and answer the research questions. The case studies in this research help to understand the influences of the characteristics of government-owned and privately-owned industrial parks on their employees' environmental quality of life. This research aims to combine a mixed-method approach, both quantitative and qualitative data collection, and analysis methods. Combining these approaches enables identifying the subjective and objective environmental quality of life measurements. Current research has shown that both objective and subjective aspects must be considered when conducting quality of life studies (Evcil & Atalik, 2010; Liao, 2009).

For this reason, this study employed surveys and key informant interviews to capture the employees' perception of the environmental quality of life and the influence of the characteristics of both industrial parks over the environmental quality of life. Additionally, satellite images were used for spatial analysis.

Table 1 below shows the data collection and analysis methods used in this study to achieve the main and sub-objectives.

Table 2 Research Design

Sub-Objectives	**Research Question**	**Methods of data collection**	**Methods of data analysis**
To distinguish the characteristics of industrial parks that can influence the environmental quality of life.	What are the characteristics of industrial parks?	Literature Review	Coding
	Which characteristics and how do these characteristics influence the environmental quality of life?	Literature Review	Coding
	What are the subjective and objective indicators of environmental quality of life relevant for the Ethiopian industrial parks?	Literature Review	Preliminary survey
To understand how the characteristics of the government-owned and the privately-owned industrial parks influence the environmental quality of life of their employees	What is the objective environmental quality of life within government-owned and privately-owned industrial parks?	Key informant interview Secondary Data Satellite imagery	Qualitative analysis Content Analysis
	What is the subjective environmental quality of life within government-owned and privately-owned industrial parks?	Survey for employees	Descriptive statistics Content Analysis
	How do the characteristics of the government-owned and privately-owned industrial parks	Key informant interview Survey for employees Secondary Data Satellite imagery	Qualitative analysis Content Analysis

	influence their employees' environmental quality of life?		

Indicators

Subjective quality of life as a measure of satisfaction has been examined using interviews and surveys amongst population groups to provide a subjective evaluation of people's well-being (Rogerson, 1995). In this vein, researchers ought to make their own indicators by adjusting the fundamental indicators to their study area (Evcil & Atalik, 2010). In this study, the selection of relevant and reliable indicators to measure employee's perceptions regarding the impact of industrial parks on their employees' environmental quality of life was through literature review and adapted to the local context of the case study area (industrial parks).

During the contextualization process, the indicators adopted from the literature review that is not related to industrial parks were discarded. Also, some of the indicators were discarded because they are not available, and the data collection for those was impossible in the case study areas. The identified and contextualized indicators were grouped into five categories, i.e., three indicators under living facilities, four indicators for leisure/recreational facilities, two indicators for healthcare facilities, one indicator for educational facilities, and one indicator for transportation facilities (see table 2 below).

Table 3 Groupings and indicators to measure employees perceptions of the impacts of industrial park on their EQOL

Grouping	**Indicator**	**Description**
Living facilities	House	Satisfaction Availability
	Water and sanitation	Satisfaction Availability
	Waste disposal	Satisfaction Availability
Recreational facilities	Café/ Restaurants	Satisfaction Availability
	Recreational areas	Satisfaction Availability
	Green/ open spaces	Satisfaction Availability
	Break rooms	Satisfaction Availability
Healthcare facilities	Clinic	Satisfaction Availability
	First aid services	Satisfaction

		Availability
Educational facilities	Training centers	Satisfaction Availability
Transportation facilities	Employee transport	Satisfaction Availability

3.3. Data source and acquisition methods

The data for this study is based on both primary and secondary sources of data. The primary data was collected through a survey and key informant interviews. The secondary data was collected from the Ethiopian Investment Commission, Industrial Park Development Corporation, Bole Lemi I Industrial Park, and Eastern Industry Zone.

3.3.1. Acquisition of primary data

The primary data was collected by a survey and key informant interviews. The survey is used to gather data on subjective and objective attributes of life and acquire the perception of Bole Lemi I Industrial Park and Eastern Industry Zone employees over their environmental quality of life. The key informant interviews were employed to get additional information about the effect of the characteristics of industrial parks on the environmental quality of life and the domains of environmental quality of life. Both the survey and interview questions were translated to the local language (Amharic).

Research assistant and communication

Due to the travel restrictions caused by the Covid 19 pandemic, the researcher could not travel to Ethiopia and do the fieldwork. For this reason, it was imperative to use a research assistant to execute the fieldwork. The research assistant chosen for the fieldwork is a graduate urban planner who is currently working in a research organization called Waas international. She has prior experience in data collection and sufficient knowledge of both Amharic and English languages. The research she has been experiencing during her work is somewhat different from this study, or she hasn't done any survey in industrial parks. However, because she studied her undergraduate program in urban and regional planning, the communication was easygoing and understandable.

Before the interview, the researcher and the research assistant discussed the sample size, the whole data collection process, and approaching the employees. The communication includes the summary, including the problem statement, and the objectives of the study. While communicating, she also raised ideas and unclear questions on the study based on her experience during prior data collection work. During the first three interviews (as a pilot survey), the researcher spoke with the research assistant on a phone call to control if the survey was working as desired. At that time, there was a misunderstanding on the questions when translated to Amharic. Then unclear questions and procedures were reformulated to start the main survey.

3.3.2. Sampling strategy

The sample size is an important aspect of any research in order to draw conclusions regarding a sample population. In reality, the sample size used in a study normally depends on the expense, time, or ease of data collection and the requirement that data be collected to have sufficient representativeness. The sampling strategy for this study is a random sampling method. The randomly chosen samples include gender, living area, and the company where the employees work. The sample size is calculated for both industrial parks based on the sample size formula and respective confidence level below.

For Bole Lemi I Industrial park

Sample size= $Sample\ size = \frac{\frac{z^2 \times P(1-P)}{e^2}}{1+\left(\frac{z^2 \times P(1-P)}{e^2 N}\right)}$

Equation 1 Sample size formula

Where,

z = z-score (1.645 at 90% confidence level)

P = Population proportion (taken 50% = 0.5)

e = Margin of error

N = the size of population = 17547

The sample size = 31 employees

For Eastern Industry Zone

Sample size= $Sample\ size = \frac{\frac{z^2 \times P(1-P)}{e^2}}{1+\left(\frac{z^2 \times P(1-P)}{e^2 N}\right)}$

Equation 2 Sample size formula

Where,

z = z-score (1.645 at 90% confidence level)

P = Population proportion (taken 50% = 0.5)

e = Margin of error

N = the size of population = 17892

The sample size = 31 employees

Survey

A survey among 62 sample employees was conducted in Bole Lemi I Industrial park and Eastern Industry Zone. This survey addresses research question two of sub-objective two "what is the subjective environmental quality of life within government-owned and privately-owned industrial parks"? The survey aims to obtain information on the employees' perception of the environmental quality of life. It includes basic attributes of objective environmental quality of life; satisfaction with house, water, and sanitation, waste disposal, café/restaurants, recreational areas, green/open spaces, break rooms, clinic, first aid service, training centers, and employee transportation. The survey includes a Likert scale, open and multiple-choice questions. The Likert scale varies from 1 (Very Satisfied) to 5 (Very Dissatisfied). As stated in chapter two, the Likert scale is a commonly used method in quality of life studies to obtain individual perceptions of the respective dimension.

The employees to be surveyed were 1) only working inside the industrial parks and 2) residing and working inside the industrial parks. Thus, for this reason, the survey questions were separated into two sections. Section one about the living facilities was asked only for employees residing and working in the industrial parks, while section five about transportation was asked for employees working inside the industrial parks.

Key Informant Interviews

A key informant interview was conducted online on 16th and 18th April to address research questions one and three of sub-objective two. "What is the objective environmental quality of life within government-owned and privately-owned industrial parks"?, and "How do the characteristics of the government-owned and privately-owned industrial parks influence the environmental quality of life of their employees?"

The interviews were conducted using semi-structured questions and were recorded to transcribe later. This interview aimed to understand the relationship between the characteristics of industrial parks and the environmental quality of life. These target professionals were selected based on their position, i.e., respective branch office managers of Bole Lemi I Industrial park and Eastern Industry Zone. The interviews include semi-structured questions on the availability of services and infrastructure, the sufficiency of these services and infrastructure for the employees, and the impacts of the characteristics of industrial parks on employees' environmental quality of life.

3.3.3. Acquisition of secondary data

Secondary data (population number, documents on facilities, and photos) were collected from Ethiopian Investment Commission, Industrial Park Development Corporation, Bole Lemi 1 Industrial Park, and Eastern Industry Zone. These secondary data were used to calculate the sample size of this study, check the availability of facilities related to the environmental quality of life, and get an insight into the characteristics of both industrial parks. Furthermore, satellite imagery was collected from google earth.

3.4. Data preparation

The primary data was collected by Maptionnaire; thus, the responses for every survey were saved automatically to the response database. The responses were then downloaded as CSV files for further analysis.

3.5. Methods of data analysis

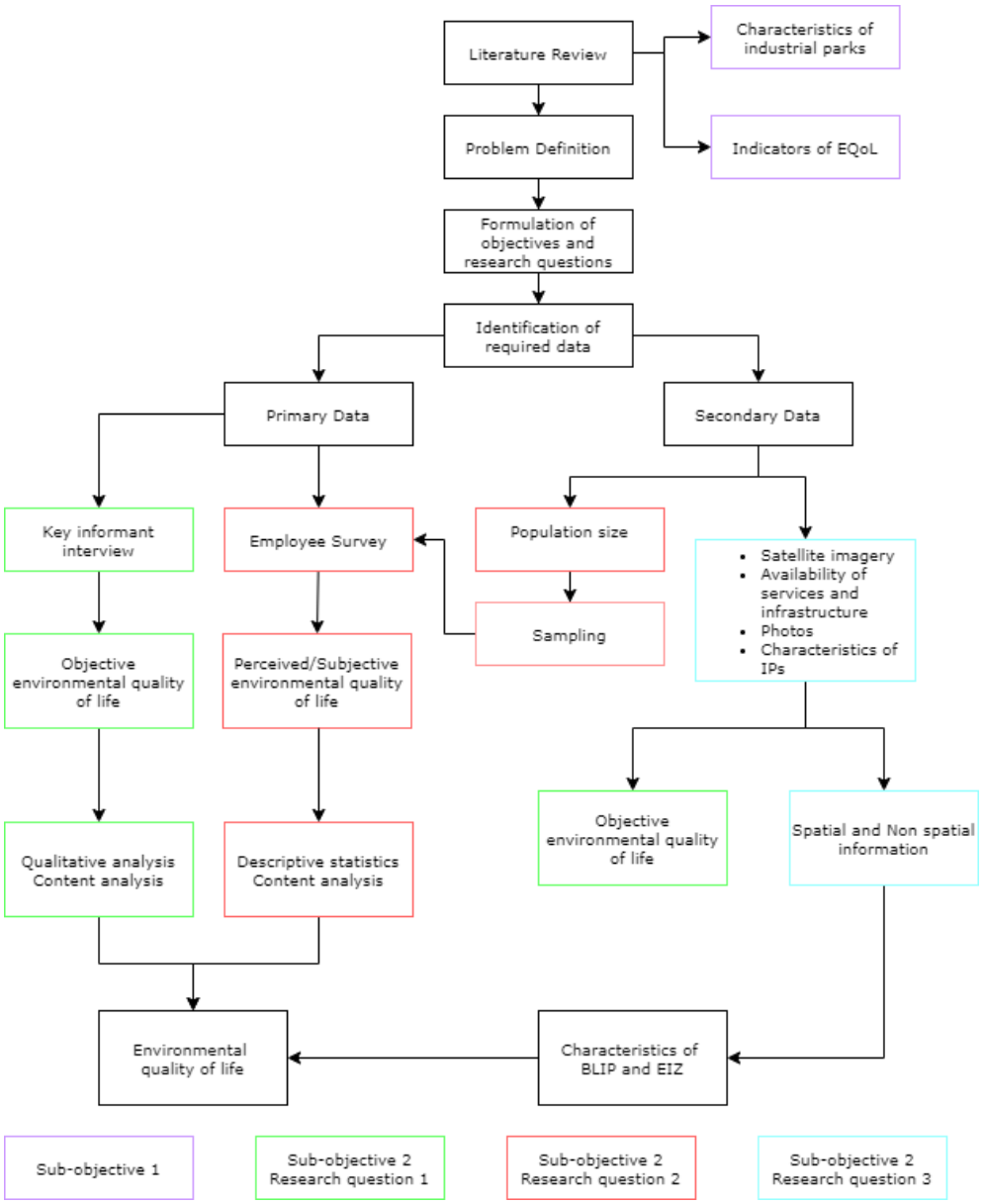

Figure 5 Method of data analysis

3.5.1. Analyzing the objective environmental quality of life

For this study, the objective environmental quality of life aims to understand how the companies inside bole lemi I industrial park and eastern industry zone affect employees' environmental quality of life. Objective quality of life is measured using objective variables related to measurable information obtained from secondary data (Tesfazghi et al., 2010). To identify the dimensions of objective environmental quality of life in the industrial parks, secondary data (reports, photos, population number) were acquired, then the data was analyzed by qualitative and spatial analysis. The objective environmental quality of life is measured using quantitative indicators, such as pollution, representing observable and measurable conditions.

3.5.2. Analyzing subjective environmental quality of life

The subjective environmental quality of life will show employees' self-expressed satisfaction and dissatisfaction with several environmental quality of life components in Bole Lemi I Industrial park and Eastern Industry Zone. It was obtained through a survey (see Appendix A).

The survey for this study consists of six parts which included:

Part 1: General questions or characteristics of employees. This section covers the age, gender, income, and living area of the respondents. This section aims to understand the influences of these characteristics on the employees' perception. **Part 2**: Perceptions of respondents regarding living facilities: This part covers the availability, level of satisfaction of employees on house, water and sanitation, and waste disposal. **Part 3**: Perceptions of respondents regarding leisure/recreational facilities: This part covers the availability, level of satisfaction of employees on café/restaurants, recreational areas, green/open spaces, and break rooms. **Part 4**: Perceptions of respondents regarding healthcare facilities: This part covers the availability and satisfaction of employees on clinic and first aid services. **Part 5**: Perceptions of respondents regarding educational facilities: This part covers the availability and satisfaction of employees in the training center. **Part 6**: Perceptions of respondents regarding transportation facilities: This part covers the availability and satisfaction of employees on employee transport. The survey was done on weekdays, including Saturday half-day since the industrial park is closed on Saturday afternoon and Sunday. After the survey, descriptive statistics and content analysis was applied to measure the employees' perception of environmental quality of life within Bole Lemi I Industrial park and Eastern Industry Zone. The responses were measured using a five-point Likert scale, where one represents very satisfied, and five is very dissatisfied. The open-ended question responses will be coded into manageable code categories to summarize data. A descriptive statistic was applied to the Likert scale responses, and the content analysis was applied for the open-ended questions.

3.6. Ethical considerations

Before starting the data collection process, a consent form containing an introduction, this thesis's aim, and a question to ask the employees' willingness to participate in this data collection process was given. During the primary data collection, the research assistant clearly described that the data is gathered for educational research purposes and will not be shared with anyone. The data will be stored anonymously, and participation was voluntary. Any employee who was uncomfortable to respond refrained from answering any particular question. If necessary, the audio recorded by the research assistant was used to fill data gaps. Furthermore, general notes were taken by the research assistant to give an insight into the fieldwork and capture the current circumstances. The research also followed ethical protocols when doing the online interview with the key informants regarding their willingness and permission to record the session.

4. RESULTS AND DISCUSSION

The findings of this study are presented in this chapter with three main sections. Initially, the first section analyses the subjective environmental quality of life within governmental (BLIP) and private (EIZ) industrial parks. The second section analyses the objective environmental quality of life within governmental (BLIP) and private (EIZ) industrial parks. Lastly, the third section discusses the influences of the characteristics of governmental (BLIP) and private (EIZ) industrial parks on the environmental quality of life.

4.1. Environmental quality of life in Bole Lemi I Industrial Park and Eastern Industry Zone

This study sought to understand the impacts of industrial parks on their employees' environmental quality of life in two case study areas in Ethiopia. According to the study objectives to be achieved and research questions to be answered, environmental quality of life is measured using subjective and objective indicators. The subjective and objective environmental quality of life measured by the chosen indicators within Bole Lemi I Industrial park and Eastern Industry Zone are presented below.

In chapter three, the reason to compare the government-owned and privately-owned industrial parks were discussed. Accordingly, the difference between the environmental quality of life of employees in government-owned (BLIP) and privately-owned (EIZ) industrial parks is presented broadly in the table below, followed by an analysis of the subjective and objective environmental quality of life under sections 4.2 and 4.3 with the reasons of variation. The objective indicators show the availability, and the subjective indicators show the respondents' satisfaction. Here, the objective indicators should not be interpreted as related to the employees' satisfaction but rather as an indication of presence or absence.

Table 4 The difference between the environmental quality of life of employees in government-owned (BLIP) and privately-owned (EIZ) industrial parks

			BLIP	EIZ
Groupings	**Indicators**			
Living facilities	House	Satisfaction	**S**	**S**
		Availability	**A**	**A**
	Water and sanitation	Satisfaction	**M**	**S**
		Availability	**A**	**A**
	Waste disposal	Satisfaction	**M**	**S**
		Availability	**A**	**A**
	Café/ Restaurants	Satisfaction	**M**	**S**
		Availability	**A**	**A**
	Recreational areas	Satisfaction	**M**	**D**
		Availability	**A**	**A**
	Green/ open spaces	Satisfaction	**M**	**S**

Recreational facilities		Availability	**A**	**A**	**Likert Scale** 1.VS (Very satisfied) 2. S (Satisfied) 3. M (Moderate) 4. D (Dissatisfied) 5. VD (Very dissatisfied) **Availability** 6. A (Available) 7. NA (Not available)
	Break rooms	Satisfaction	**D**	**D**	
		Availability	**A**	**A**	
Healthcare facilities	Clinic	Satisfaction	**M**	**-**	
		Availability	**A**	**NA**	
	First aid services	Satisfaction	**D**	**VD**	
		Availability	**A**	**A**	
Educational facilities	Training centers	Satisfaction	**D**	**M**	
		Availability	**A**	**A**	
Transportation facilities	Employee transport	Satisfaction	**S**	**S**	
		Availability	**A**	**A**	

The following sections will address sub-objective two "to understand how the characteristics of the government-owned and the privately-owned industrial parks influence the environmental quality of life of its employees."

4.2. Objective environmental quality of life in Bole Lemi I Industrial Park and Eastern Industry Zone

This section will address research question 2.1: what is the objective environmental quality of life within government-owned and privately-owned industrial parks? It focuses on the availability, serving population, and frequency of provision of the facilities, i.e., house, water and sanitation, waste disposal, café/ restaurants, recreational areas, green/ open spaces, break rooms, clinic, first aid services, training centers, and employee transport in Bole Lemi I Industrial Park and Eastern Industry Zone based on the key informant interview and secondary data.

4.2.1.1. Living Facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

In this study, the living facilities include house, water and sanitation, and waste disposal. According to the key informant interview, it can be said that there is no housing built inside Bole Lemi I Industrial Park for the employees, but one company has built six apartment complexes on its own, from its 13 intendeds (see figure 4 below). After the completion, it is thought to hold a large number of employees because of its larger size and length. As stated by the key informant, companies are provided with incentives with lease-free investment land and some infrastructure to build residences for their employees on their own initiatives, which they then utilize themselves. This is only possible when the company's capacity allows and has enough deposit capital to build residential areas. These incentives comprise providing efficient and effective industrial parks, including living and commercial areas, and improving physical infrastructure for new and existing industrial parks (FDRE, 2019). While in Eastern Industry Zone, the key informant indicated that there are no living facilities inside Eastern Industry Zone for local employees, but there is a provision of housing for rent only for expats. Thus, the survey for this study tried to capture the perception or satisfaction

of sample employees over these indicators under living facilities by including the employees residing inside and outside both industrial parks (section 4.3).

Figure 6 Living facilities inside Eastern Industry Zone (left) and Bole Lemi I Industrial Park (right)

With respect to water and sanitation and waste disposal, the industrial parks provide their employees with houses. But for Bole Lemi I Industrial park, the water, and sanitation are not fully operational because the housing is still under construction.

4.2.1.2. Physical environment and recreational facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

As explained under section 3.2, pollution, smell, and noise are considered the physical environment, and cafes/restaurants, recreational areas, green/open spaces, and break rooms are considered recreational facilities. In this regard, in Bole Lemi I Industrial park, there are green spaces and recreational areas built for the employees to enjoy. According to the key informant interview, even though the industrial park has to provide these facilities in conjugation with the other built environment, the green spaces and recreational areas still need renovation to fully serve the employees. The recreational areas and green spaces found in Bole Lemi I Industrial park ought to serve employees all employees inside the compound. But some companies offer volleyball, badminton, and table tennis games inside their own compound. The cafes/restaurants and break rooms are also available in Bole Lemi I Industrial park, where the employees have their meals, gather, and have a break. The cafes/restaurants can also be used by people outside the industrial park, such as customers and communities in the surrounding areas (see figure 7). Whereas, as expressed by the key informant, in Eastern Industry Zone, there is no place intended to be a recreational area, but the employees are using other spaces as recreational and green areas to recreate. The cafes/restaurants in Eastern Industry Zone also serve other people outside the industrial park in addition to the employees. Additionally, there are also banks inside the industrial parks, which serve the people inside and outside both industrial parks (see figure 8). However, the key informants did not allude to any problems reported by the employees related to pollution, smell, and noise, which can adversely affect them.


Figure 7 Cafeterias in Bole Lemi I Industrial Park (left) and Eastern Industry Zone (right)

Figure 8 Bank in Eastern Industry Zone

4.2.1.3. Healthcare Facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

The healthcare facilities for this study includes clinic and first aid services. The key informant explained that there are healthcare facilities inside Bole Lemi I Industrial park for employees, and each factory has its own health department (first aid services or emergency room), followed by a clinic in the compound of the industrial park. Currently, there are about 23 factory buildings inside Bole Lemi I Industrial park, which has its own first aid centers or emergency rooms coordinated by a secretary. The clinic inside Bole Lemi I Industrial Park serves the employees and the surrounding community fairly.

For the Eastern Industry Zone, the key informant stated about the absence of healthcare facilities serving the whole employees inside the industrial park. "*Even though the industrial park started operation over ten years ago, there are no healthcare facilities inside the compound. But there are companies that cover medical bills for their employees in terms of health like one European company called Unilever that has life insurance not only for the employee but also for their family members".* According to the key informant interview, the lack of a healthcare facility was identified as a major gap in Eastern Industry Zone, and plans are afoot to address it.

4.2.1.4. Educational Facilities

As this study was conducted in an industrial park, only training centers were included as educational facilities. According to the FDRE Ministry of Industry (2013b), establishing a stronger incentive system for in-house skill advancement initiatives is compulsory for companies investing in industrial parks. It helps them to select and organize skill-oriented training based on their needs.

In this regard, there are training centers in both industrial parks. The companies manage the training centers and provide specific training according to their needs as per their own schedules. The key informant for Eastern Industry Zone explained that "*generally speaking, I can say there are no training centers inside the industrial park, but there are a small number of companies that provide trainings for their own employees."* Whereas for Bole Lemi Industrial I park, more companies provide training for their own employees, but these training centers are not used for all employees.

4.2.1.5. Transportation

The transportation facilities grouping includes employee transport provided by the industrial parks. In addition to the provision of housing in Bole Lemi I Industrial park, the companies provide transportation depending on the company's capacity. Employees in Bole Lemi I Industrial park commute from 20 to 30 km, so their working company assigns transportation. The employee transport brings the employee from their living area returns them back after work. Also, the companies in Eastern Industry Zone also provide transportation. Almost all of the companies provide transportation, and some provide cash because their transportation lacks continuity.

4.3. Subjective environmental quality of life in Bole Lemi I Industrial Park and Eastern Industry Zone

This section will address research question 2.2: what is the subjective environmental quality of life within government-owned and privately-owned industrial parks? It focuses on employees satisfaction on the subjective indicators of environmental quality of life (table 3).

4.3.1. Employee sample characteristics in Bole Lemi I Industrial Park and Eastern Industry Zone

There are variables that have an impact on the preferences of the people related to their environmental quality of life. For instance, Sopsuk et al. (2013), utilized variables such as age, gender, occupation, economic status, place of residence, and distance from workplace to residence. For this study, the first part (general questions) of the survey included questions related to variables that might help explain differences in perception of environmental quality of life, namely age, gender, and income. The primary data was collected from 62 employees working and residing inside Bole Lemi I Industrial park and Eastern Industry Zone. The characteristics of Bole Lemi I Industrial park and Eastern Industry Zone sample employees are presented under Appendix E.

The age of the respondents in Bole Lemi I Industrial park varies from 21 to 46. But the majority of the employees' age (48.38%) ranged from 21 to 29 years. For the Eastern Industry Zone age of the employees varies from 25 to 42, and the majority are between 29 to 35.

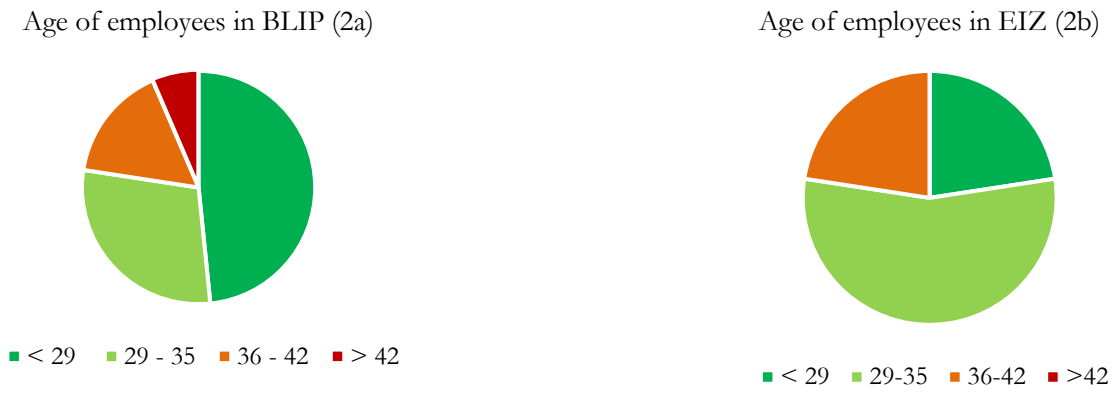

Figure 9 Age of employees in Bole Lemi I Industrial Park (2a) and Eastern Industry Zone (2b)

As shown in Figure 4 below, 51.6% of the respondents in Bole Lemi I Industrial Park have a monthly income of less than 3000 ETB. However, none of the employees in the Eastern Industry Zone were willing to tell their amount of income for the survey. Due to the unwillingness, the variable income becomes difficult to compare the effects of income over the environmental quality of life of the two industrial parks.

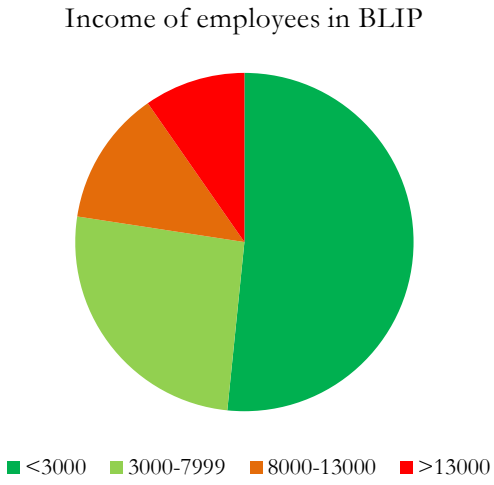

Figure 10 Income of employees in Bole Lemi I Industrial Park

4.3.2. Subjective environmental quality of life in Bole Lemi I Industrial Park and Eastern Industry Zone

The following sections focus on the research findings on the measured level of subjective environmental quality of life (employees perception) for each grouping and indicators related to personal traits.

4.3.2.1. Living Facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

According to current literature in the environmental quality of life, the living facilities are mentioned housing, living place, residential area, waste disposal as the important indicators for measuring the environmental quality of life (Fleury-Bahi et al., 2013; Westaway, 2009; Ejechi & Ejechi, 2008; Sopsuk et al., 2013; Westaway, 2006). For this study, to identify the effects of these indicators on the environmental quality of life, the grouping of employees living facilities includes house, water and sanitation, and waste disposal.

The result below shows the difference between the employees' level of satisfaction residing inside Bole Lemi I Industrial park and Eastern Industry Zone (figure 11). This grouping was asked only for employees residing and working inside both industrial parks. From the indicators included under living facilities, 69.2% of the employees residing in the Eastern Industry Zone are very satisfied with the house, and 84.6% and 69.2% are satisfied with the water and sanitation, and waste disposal, respectively. In comparison, 36.3% of the employees residing inside Bole Lemi I Industrial park are very satisfied with the house and moderately satisfied with water, and sanitation, and waste disposal.

However, some employees of Bole Lemi I Industrial park did not respond to the scales under water, sanitation, and waste disposal. This is because the living facilities inside Bole Lemi I Industrial Park are still under construction, and the water and sanitation and waste disposal because they are not fully operational. Thus, the employees could not provide an actual level of satisfaction for those indicators (see figure 12 below). Respondent 2 (BLIP) - "*I am satisfied with the housing in Bole Lemi Industrial park due to the provision of the free housing.*", Respondent 10 (BLIP) - "*I am very satisfied with the house in Bole Lemi Industrial park because it is better than the one I used to live, it is free, and I can't even afford to rent any other house with my income*." Respondent 2(EIZ) - "*Currently I am very satisfied with the living facilities inside Eastern Industry Zone, but since there is not much water supply, it is better to fix it*.", Respondent 12(EIZ) - "*The housing inside Eastern Industry Zone it is made of raw material (as a whole) and plastic roof, do not satisfy housing standards*."

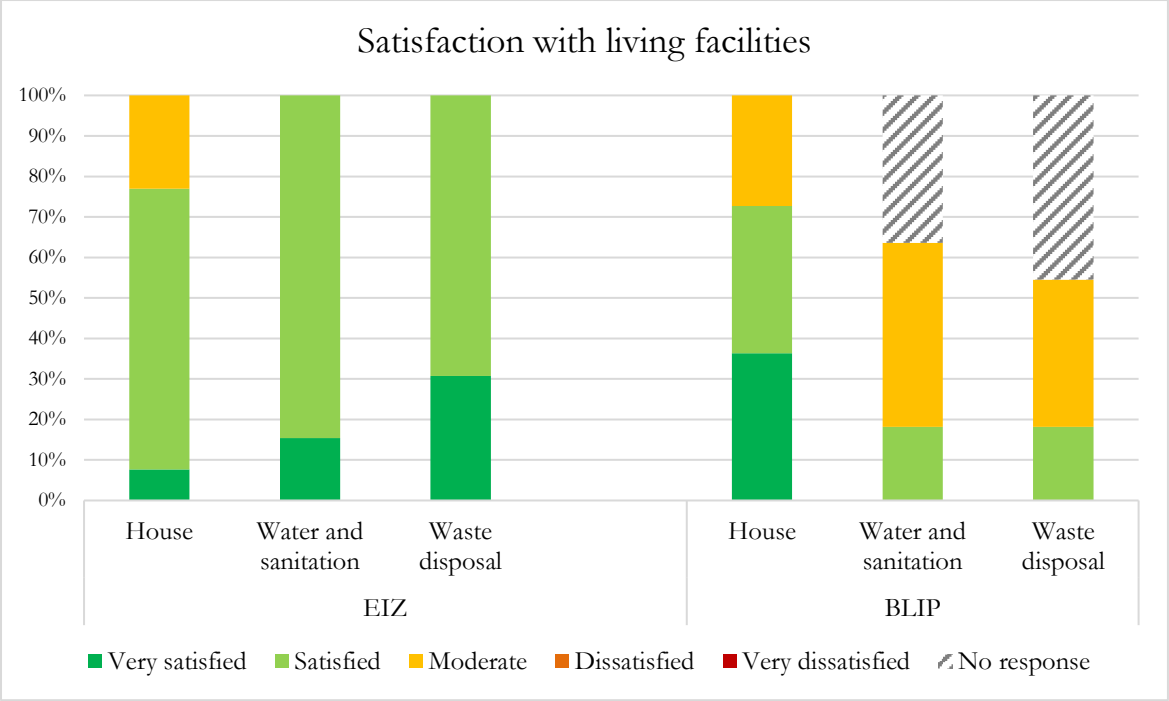

Figure 11 Satisfaction with living facilities living inside Bole Lemi Industrial Park and Eastern Industry Zone

Figure 12 Employee house in Bole Lemi I Industrial park

Even though the living facilities in Bole Lemi I Industrial park are under construction, no respondents are dissatisfied with the living facilities. According to the key informant interview, the number of employees constantly increases; thus, this might affect the level of satisfaction since available housing is not even sufficient for current employees. In this regard, Ejechi & Ejechi (2008), has also found low satisfaction level with the indicator house in some oil and gas industry of Nigeria because the house is inadequate due to high population density. But in the case of Eastern Industry Zone, the main concern is the provision of living facilities for local employees.

In a study that focused on the aspects of environmental quality of life by Westaway (2009), the respondents were also satisfied with the house due to its availability and to the more spacious designs. In this study as well the respondents living inside both industrial parks are predominantly satisfied with the house. The reason behind their level of satisfaction in Bole Lemi I Industrial park is that the house is free of charge, it is close to their workplace, there are no additional transportation costs, and the company provides free meals three times a day. These reasons of satisfaction were also linked with income because some of the respondents with lower income were satisfied with the house since they can't afford other houses. While for Eastern Industry Zone, the expat respondents were satisfied due to the availability of the living facilities, except some of them are dissatisfied with the house's construction materials.

Figure 13 Living facilities inside Bole Lemi I Industrial Park

Figure 14 Living facilities inside Eastern Industry Zone

4.3.2.2. Physical environment and recreational facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

According to existing literature, the physical environment (pollution, noise, smell, annoyance,…) and recreational facilities are indicators of the environmental quality of life (Westaway, 2009; Ejechi & Ejechi, 2008; Sopsuk et al., 2013; Hassine et al., 2014). Under this grouping, indicators café/ restaurants, recreational areas, green/ open spaces, break rooms, pollution, noise, and smell were considered.

Current studies on the environmental quality of life in industrial parks found that industrial parks are associated with air and water pollution, smell, chemical substances, dust, and disturbances (Sopsuk et al., 2013; Hassine et al., 2014). However, surprisingly, most of the respondents in Bole Lemi I Industrial park and Eastern Industry Zone mentioned that they were not suffering from health-related problems or disturbances related to the physical environment (pollution, smell, and noise) associated with industrial pollution activities. In the case of Bole Lemi, I Industrial park, all of the respondents residing inside did not experience health-related problems while the respondents residing outside the industrial park faced these health-related and disturbances. Respondent -19(BLIP) "*yes I had health problems and the reason was a smell coming from the toilet*." Respondent -19(BLIP) "*sometimes there is* a *noise from a machine*." In contrast, in Eastern Industry Zone the respondents residing inside were the ones having health-related problems or disturbances

related to the physical environment. Respondent -2(EIZ) "*The liquid they use for watering plants is probably toilet water.*" Respondent -13(EIZ) "*There is noise disturbance that comes with big cars/vehicles.*"

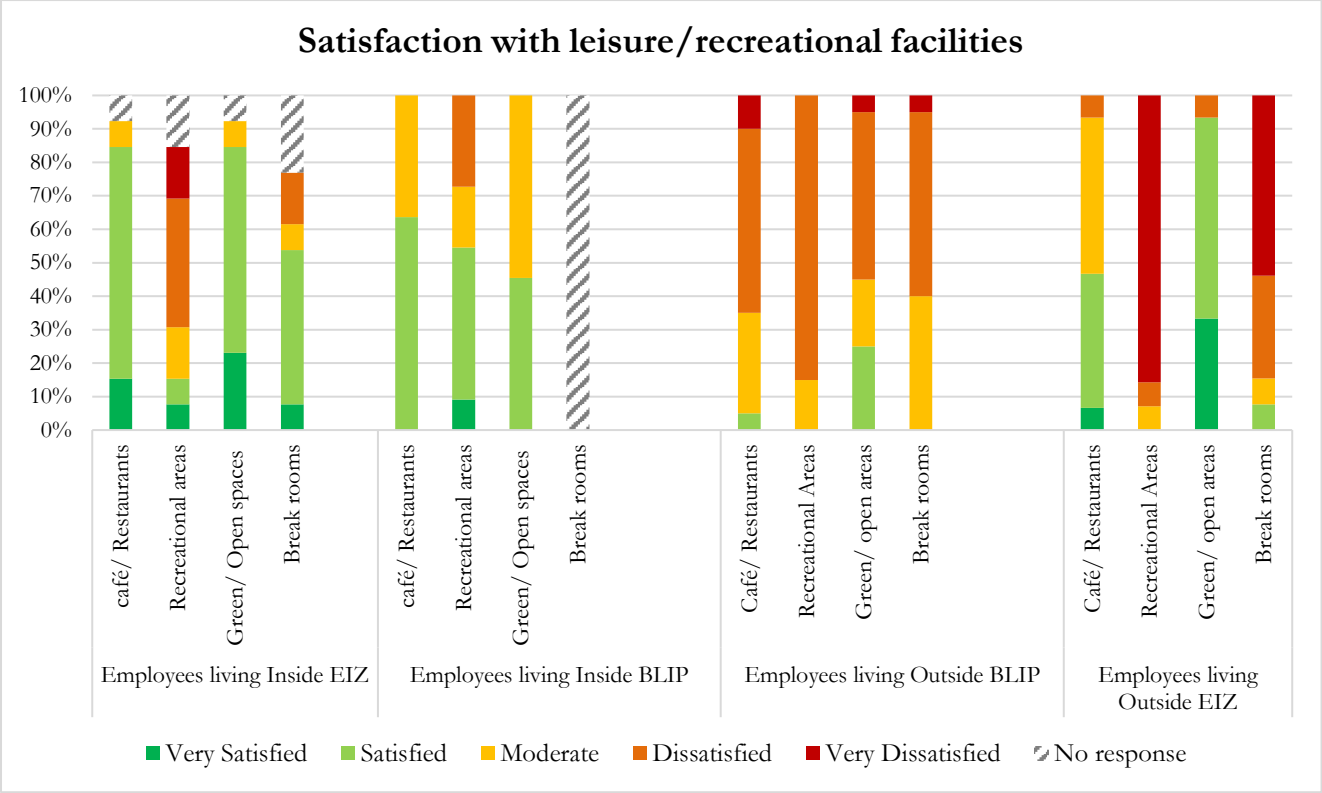

Figure 15 Satisfaction with leisure/recreational facilities living inside and outside Bole Lemi Industrial Park and Eastern Industry Zone

The results above (figure 15) show the difference between the employees' level of satisfaction residing inside and outside Bole Lemi I Industrial Park and Eastern Industry Zone in recreational facilities. Looking at the percentage, 69.2% of the employees residing inside Eastern Industry Zone and 63.3 % of the employees residing inside Bole Lemi I Industrial Park are satisfied with the cafes/restaurants. They also have similar levels of satisfaction in recreational areas. Also, on the green/open spaces, the employees residing inside Eastern Industry Zone have higher percentages than the employees residing inside Bole Lemi I Industrial Park. However, the break rooms were not responded to by any of the employees residing inside Bole Lemi I Industrial Park because they are staying at their house: - Respondent 1- "*I am using the open space areas inside the industrial park to recreate, but I don't think the areas were purposely built for recreational purpose.*" Respondent 6- "*I am not using the break rooms because whenever I have a break, I am staying in my room.*"

On the other hand, the employees living outside the industrial parks, 40% of the employees residing inside the Eastern Industry Zone, and only 5% of the employees residing inside Bole Lemi I Industrial Park are satisfied with the cafes/restaurants. But the level of dissatisfaction with the recreational areas is higher in both industrial parks.

4.3.2.3. Healthcare Facilities in Bole Lemi I Industrial Park and Eastern Industry Zone

Satisfaction with health facilities is also an indicator of the subjective environmental quality of life (Fleury-Bahi et al., 2013). This grouping on the survey included clinic and first aid services. At first, the survey included hospital, clinic, and pharmacy, but after the key informant interview, only clinic and first aid services were found to be available. Also, the satisfaction level with the clinic and first aid services depends on the provision of the companies in which the employees work but not on the industrial park itself. The majority of the respondents (63.6%) residing inside Bole Lemi I Industrial park are satisfied with the clinic provided, while 30% of the employees living outside Bole Lemi I Industrial park are satisfied with the clinic. In the case of Eastern Industry Zone, there is no clinic inside, but during the survey, some of the respondents consider the first aid service as a clinic. Figure 16 below shows the difference in the level of satisfaction with the clinic and first aid services in Bole Lemi I Industrial park and Eastern Industry Zone.

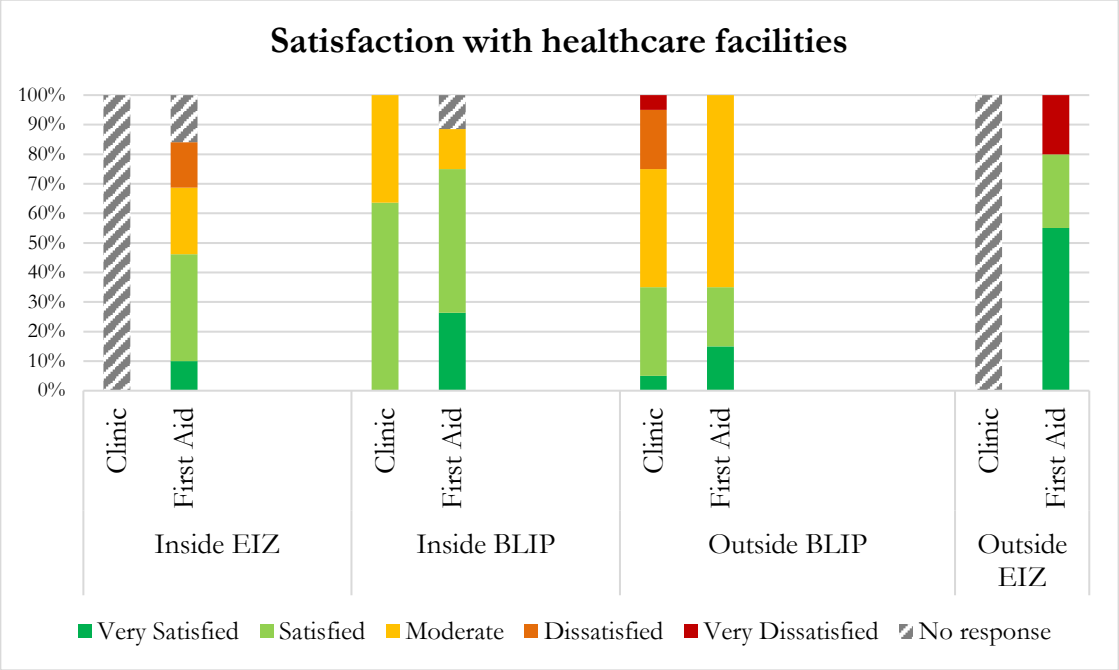

Figure 16 Satisfaction with healthcare facilities living inside Bole Lemi Industrial Park and Eastern Industry Zone

According to Sopsuk et al. (2013), dissatisfaction with healthcare facilities can be caused as a result of the unavailability of the healthcare facilities and long waiting time in nearby services. Moreover, high population density could make healthcare services inadequate, leading to dissatisfaction (Ejechi & Ejechi, 2007). In this study, the level of satisfaction for clinic in the Eastern Industry Zone was discarded by the respondents because the clinic was not available, but they mentioned its absence being very problematic. While in Bole Lemi I Industrial park, some of the respondents were dissatisfied because there are times that they can't use the service due to a mismatch between the opening hours and the time they need.

4.3.2.4. Educational Facilities

Satisfaction with health facilities is also an indicator of the subjective environmental quality of life. The group of educational facilities includes daycare/kindergarten, primary/secondary schools, and training centers. There are no primary/secondary schools and daycare in both industrial parks; thus, the level of satisfaction was not surveyed. Bole Lemi I Industrial park employees are mostly dissatisfied (67.7%) while the other 32.2% were moderately satisfied with the training center (see figure 17). In the Eastern Industry Zone case, 35.4% of the respondents are satisfied with the training centers. Respondent 1 (BLIP)- "*Uninterrupted training lesson provision because employees can upgrade their understanding and skills on their work*." Respondent 9 (BLIP)- "*I think it would be good if there were continuous and uninterrupted trainings."* Respondent 23 (EIZ)- "*There are no enough training centers*." Respondent 29 (EIZ)- "*There is a training facility in my working company, and I am satisfied with it. I upgraded my skills."*

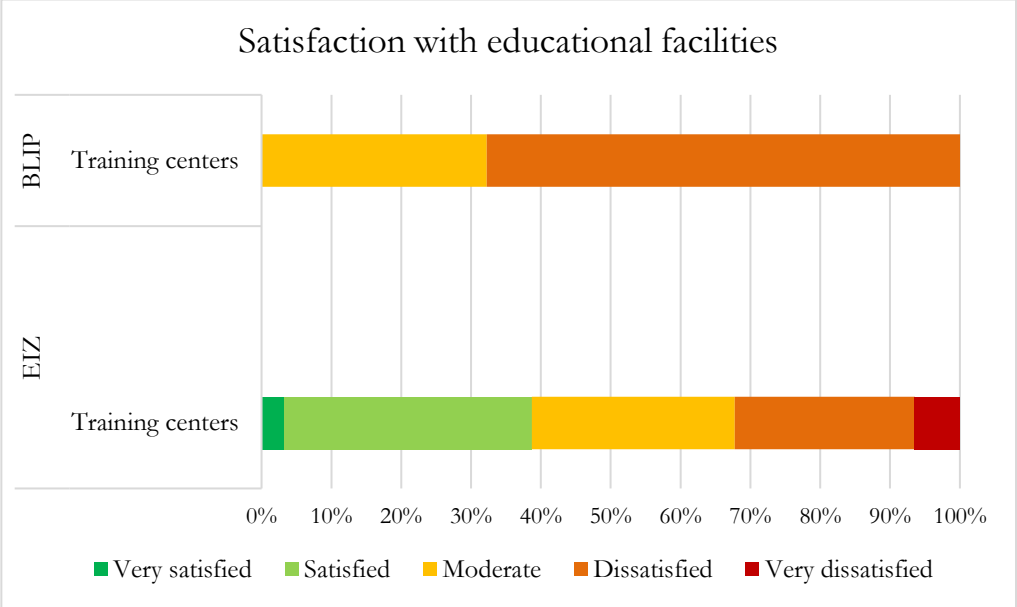

Figure 17 Satisfaction with educational facilities living inside Bole Lemi Industrial Park and Eastern Industry Zone

4.3.2.5. Transportation

Satisfaction with transportation is also an indicator of the subjective environmental quality of life. The respondents rated their level of satisfaction on the employee transport provided by Bole Lemi I Industrial Park and Eastern Industry Zone or the company they are working for. This grouping was asked only for employees working inside both industrial parks since the employees residing inside don't use the transportation provided by the industrial parks to commute. The results in figure 16 below show the level of satisfaction of employees residing outside the industrial parks. The level of dissatisfaction on the employee transport is higher in Eastern Industry Zone than Bole Lemi I Industrial Park (see figure 18). This could be due to the smaller number and the departure schedule of the transportation facility. Respondent 3 (BLIP)- "*Everything about the transport is good for me. I am satisfied*." Respondent 14 (BLIP)- "*It is all good. I always*

use the transport, and it saves me a lot of time and money." Respondent 19 (BLIP)- *I think it would be good if the time was changed; I am sometimes late and use public transport because the industrial park is near a developed area where I can access transportation easily."* Respondent 3 (EIZ)- "*It would be nice if there were more vehicles that could provide quantity adjustment and were accessible to all the workers, and they would also give service inside since the industry zone compound is large."* Respondent 12 (EIZ)- "*For the transportation, we have been using is an allowance. It is better if we could get our own working company transportation service.*" Even if the companies in both industrial parks do not provide living facilities sufficiently, they provide transportation to their employees to commute. We can see in figure 19 below that some of the respondents were dissatisfied/ very dissatisfied with the transportation provided by their company because of the lack of sufficient transportation for all and inconsistency with the time of departure.

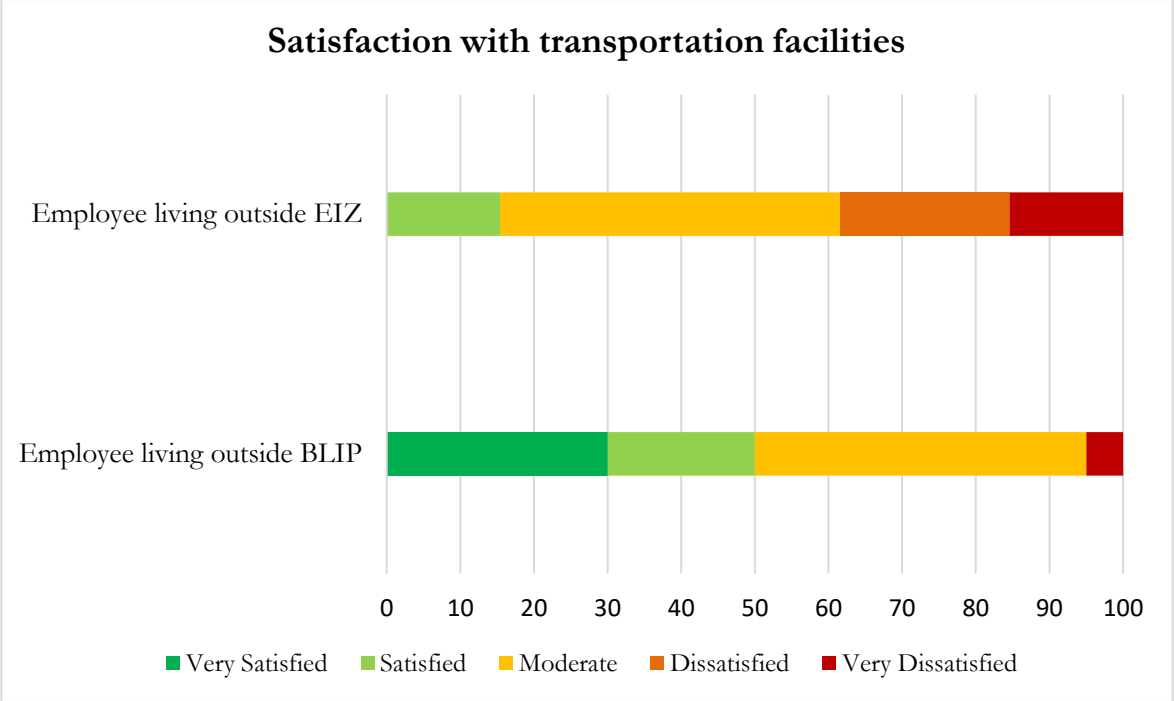

Figure 18 Satisfaction with transportation facility living outside Bole Lemi Industrial Park and Eastern Industry Zone

Do age, gender, and income influence the perception of the employees on the environmental quality of life?

As explained under section 4.3.1, age, gender, and income might influence people's preference. In addition, the conceptualization of environmental quality of life by Rogerson (1995), under chapter two, indicated that the environmental quality of life involves the relationship between the characteristics of people and their satisfaction and wellbeing. Based on the correlation analysis between age and the environmental quality of life indicators, there is a significant positive correlation. For the Eastern Industry Zone case, age is positively correlated with water and sanitation, which means the probability of having a high level of satisfaction with water and sanitation increases with age (see table 5 below). While for Bole Lemi I Industrial park, there was

no significant relationship between age and environmental quality of life indicators. This might also be linked with the age group of most of the respondents lying between 29 and 42.

Table 5: Significant correlation between age and water and sanitation in Eastern Industry Zone

			Age	Water and sanitation
Spearman's rho	Age	Correlation Coefficient	1.000	.632*
		Sig. (2-tailed)		**0.020**
		N	13	13
	Water and sanitation	Correlation Coefficient	.632*	1.000
		Sig. (2-tailed)	**0.020**	
		N	13	13

Looking at the correlation between income and indicators of environmental quality of life, income is positively correlated with cafes/ restaurants and first aid services (see table 6 and 7 below) for Bole Lemi I Industrial park. This implies when income increases, the level of satisfaction with cafes/ restaurants and first aid services also increases. However, this correlation result does not align with the survey since the cafe/ restaurants and first aid service serve the employees at a free or fair price. According to the survey, the respondents' level of satisfaction with the house inside Bole Lemi I Industrial park was related to their income, but the correlation results show no correlation in between (see table 8). This might be an effect of the smaller number of respondents residing inside the industrial park. Also, due to the unwillingness to tell income for Eastern Industry Zone, comparing the two industrial parks is not possible. Looking at age, there is no direct relationship between the gender of respondents and the indicators of environmental quality of life in both industrial parks (see Appendix F). The correlation results of income and age and the graphs of gender (see Appendix F) do not show a significant difference; this doesn't mean that they are not related. Because (Sopsuk et al., 2013), for instance, has revealed that age and income have influenced people's environmental quality of life near three industrial parks.

Table 6: Significant correlation between income and cafe/ restaurants in Bole Lemi I Industrial park

			Income	Café/ restaurants
Spearman's rho	Income	Correlation Coefficient	1.000	0.520**
		Sig. (2-tailed)		0.003
		N	31	31
	Café/ restaurants	Correlation Coefficient	.520**	1.000
		Sig. (2-tailed)	0.003	
		N	31	31

Table 7: Significant correlation between income and first aid service in Bole Lemi I Industrial park

			Income	First-aid service
Spearman's rho	Income	Correlation Coefficient	1.000	0.620**
		Sig. (2-tailed)		0.000
		N	31	31
	First-aid service	Correlation Coefficient	.620**	1.000
		Sig. (2-tailed)	0.000	

		N	31	31

Table 8: Significant correlation between income and house in Bole Lemi I Industrial park

			Income	House
Spearman's rho	Income	Correlation Coefficient	1.000	0.565
		Sig. (2-tailed)		0.070
		N	11	11
	House	Correlation Coefficient	0.565	1.000
		Sig. (2-tailed)	0.070	
		N	11	11

4.4. Influence of Bole Lemi I Industrial Park and Eastern Industry Zone characteristics on employees environmental quality of life

This study sought to understand how the characteristics of the government-owned (BLIP) and the privately-owned (EIZ) industrial parks influence their employees' environmental quality of life. As discussed in the previous chapters, Ethiopia is developing private and government-owned industrial parks throughout the country. These industrial parks have different characteristics which have an influence on their employees' environmental quality of life.

As learned from the literature review, industrial parks share characteristics common, and some unique characteristics are noted only at specific industrial parks. These characteristics might influence the environmental quality of life. As indicated in Table 1 under section 2.1, industrial parks share characteristics such as their (1) ownership, (2)location, (3)size, (4)proximity to good transportation, (5)physical footprint, (6)infrastructure, (7)toxins that industrial activities might produce, (8)skill needed by their employees, (9)park specialization, (10)land of development, (11) master plan, (12)having a single management or administration entity, and (13)service they offer (Siegel, 2019; UNIDO, 2019; Farole & Akinci,2017; UNIDO, 2012). Also, Sosnovskikh (2017), identified proximity, value creation, and the business environment as characteristics of industrial parks in Russia. Hence, for this study to understand the influence that the characteristics of industrial parks have on the environmental quality of life, the common characteristics of industrial parks are employed. According to the survey and key informant interviews in Bole Lemi I Industrial Park and Eastern Industry Zone, all of these characteristics of industrial parks influence the environmental quality of life except having a single management or administration entity and service they offer. The following sections discuss the characteristics of industrial parks that are related or have an influence on the environmental quality of life. These consists of spatial and non-spatial characteristics.

4.4.1. Ownership and Infrastructure Provision

As described in chapter three, Bole Lemi I Industrial park and Eastern Industry Zone are government-owned and privately owned industrial parks. Bole Lemi I Industrial park was developed by the Industrial Park Development Corporation. In contrast, Eastern Industry Zone was developed by a private developer

called Jiangsu Youngyuan Investment Co. Ltd. Youngyuan Investment Co. Ltd is fully responsible for the development, construction, management, and operation of the Eastern Industry Zone. The literature review has shown that the environmental quality of life is sometimes linked with infrastructure and service provision (Westaway, 2009). The provision of every infrastructure or service inside industrial parks depend on the ownership of industrial parks due to their differences in incentives and management/administration because the success of industrial parks depends on efficient and approachable administration (Farole & Akinci, 2011).

The ownership of Bole Lemi I Industrial park and Eastern Industry Zone has affected the level of satisfaction of their employees on the environmental quality of life regarding the indicators (section 4.1) included in this study. Table 4 under section 4.1 has shown the difference between the level of satisfaction on the environmental quality of life of respondents in Bole Lemi I Industrial park and Eastern Industry Zone. From table 4, we can see the difference in the availability of the services and the respondents' satisfaction with those services. In this regard, the respondents' satisfaction in the government-owned industrial park is lower than the privately-owned industrial in water and sanitation, waste disposal, café/restaurants, green/open spaces, and training centers, and higher in recreational areas, clinic, and first aid services. However, for house, break rooms and employee transport there is a similar level of satisfaction in both industrial parks. In relation to the indicators, the government-owned industrial park (BLIP) is better in terms of providing healthcare facilities and recreational areas. While the privately-owned industrial park (EIZ) is better in providing living and leisure facilities. This provision of facilities is also linked with infrastructure provision.

According to Farole & Akinci (2011) & UNIDO (2012), privately owned industrial parks offer better facilities and amenities. Privately owned industrial parks generally have been more profitable and have had a better social and environmental quality of life than government-owned industrial parks worldwide (UNIDO, 2012). However, in this study, both industrial parks have better performance with several facilities related to the environmental quality of life.

BLIP



EIZ

Figure 19 Infrastructure and services inside both industrial parks (source: pictures taken by research assistant)

In terms of infrastructure, the compound of Bole Lemi I Industrial park and Eastern Industry Zone consists of office buildings, shops, banks, lounges, and infrastructure (factory sheds, roads, electricity, water, and telecom services) fire department, police station. However, there are facilities like exhibition health center, public toilet and shower, power supply system, greenery, and industrial warehousing, which are found only in one of the industrial parks.

From the advantages of industrial parks, infrastructure, factory buildings, and utilities which are easier to access and consistent, are compulsory for employees and investors (Farole & Moberg, 2014). Companies need at least some infrastructure such as electricity, telephone, internet, water, sewage treatment, transportation, and residence for employees to locate their investment (UNIDO, 2012). In this regard, Bole Lemi I Industrial park and Eastern Industry Zone are located near urbanized areas. Although both industrial parks are superior to each other, they include necessary infrastructure and services. Infrastructure and services like telephone, internet, water, sewage treatment, transportation, and residence for employees are present inside both industrial parks. For the case of Bole Lemi I Industrial park, there is no electricity inside the compound but use a substation in the neighboring area, whereas for Eastern Industry Zone, clinic is unavailable, which causes dissatisfaction on the respondents due to its absence. However, due to the location of the industrial parks they use, some of the services were absent; the industrial parks use the infrastructure from the immediate neighborhood.

4.4.2. Location (proximity to urbanized areas)

The provision of infrastructure also depends on the location of the industrial park and the land it was developed in. Bole Lemi I Industrial park is located in the capital city of Ethiopia, Addis Ababa covering 156 hectares of land. Eastern Industry Zone is located in between two towns called Debre zeyit and Dukem near Addis Ababa, covering 500 hectares of land (see Figures 3 and 4 for locations). Linking back to the environmental quality of life, people's perception, or level of satisfaction on their environmental quality of life depends on the indicators such as the availability and satisfaction of healthcare, educational, living, leisure, transportation facilities, etc. For these, the location of industrial parks is of great significance.

Looking at the location of both industrial parks, they are found in near proximity to a developed neighborhood. Even though companies inside both industrial parks provide transportation services for their employees, the location or proximity to urbanized areas helps the employees to access the industrial parks easily even if they are not using the provided transportation. Based on the survey, most of the respondents of Bole Lemi I Industrial park were happy about the industrial park's location being near an urbanized area due to the opportunity to get good transportation and even walk to commute. Respondent 19 (BLIP)- "*I think it would be good if the time was changed. I am sometimes late and use public transport because the industrial park is near a developed area where I can access transportation easily*." Respondent 9 (EIZ)- "*I live not too far from Eastern Industry Zone, so I don't use the provided transportation mostly I walk."* In addition to the respondents, the key informants also explained the effects of the industrial park's location (proximity to urbanized areas) over the employees' environmental quality of life in relation to the land of development.

One of the main things to consider in choosing industrial parks is the availability of a large supply of human resources at a reasonable cost and quality of life and services (UNIDO, 2012). From this perspective, Farole & Akinci (2017), has revealed that industrial parks near cities that are easily accessible to markets have the best performance but have a concern about increasing living costs. In this regard, Bole Lemi I Industrial park is located in the capital city of Ethiopia, Addis Ababa, near an urbanized area and airport. Only one company inside the industrial park provides living areas for its employees, in which the majority of the respondents residing there were satisfied. However, for Eastern Industry Zone, the industrial park provides rental houses at a fair price to its employees.

4.4.3. Land of development

Initially, the land of development of both industrial parks was in a greenfield which is outside a developed or an expansion area (see figures below 20 & 21). Greenfield sites are undeveloped areas within or outside a city, usually on agricultural land. They usually do not have infrastructure and are not connected to the infrastructure in the surrounding areas, and they can also cause extended commutes for employees. The current development of the areas around Bole Lemi I Industrial park and Eastern Industry Zone comes in conjugation with the construction of the industrial parks (see figures 20 & 21 below). Key informant 1 (BLIP)- "*I do not think it has a lot of effect for Bole Lemi I Industrial park since the infrastructure development in the surrounding area came up with the industrial park." The surrounding area is now well urbanized, and there are good houses, good facilities and a lot of people living around. But of course, on the other hand, it affects since we don't have all the services related to the mentioned indicators of environmental quality of life we use them from the surrounding area. For instance, we don't have we do not have telecommunication and electricity services in the industrial park, but other industrial parks have. We are then using the development in Goro (a nearby urbanized area). They have districts and substations to provide us with quick services. Additionally, suppose you take Mekelle Industrial Park (10 km away from the city center) and Dire Dawa Industrial Park (20 km away from the city center) industrial parks. In that case, they are very far from an urbanized area. So, I guess they face such kind of extreme problems*". However, in Eastern Industry Zone, even if the industrial park was built

in a greenfield, services are not an issue since it is located near an urbanized area. Key informant 2 (EIZ)- "*Even though Eastern Industry Zone is built on agricultural land of development is not far from a city. It is found almost in the center of Debre Zeit and Dukem towns. The problem is not with the land of development but with the fact that it was not intended in the first place. Since the park is now more than ten years old, it was something to think about.*"

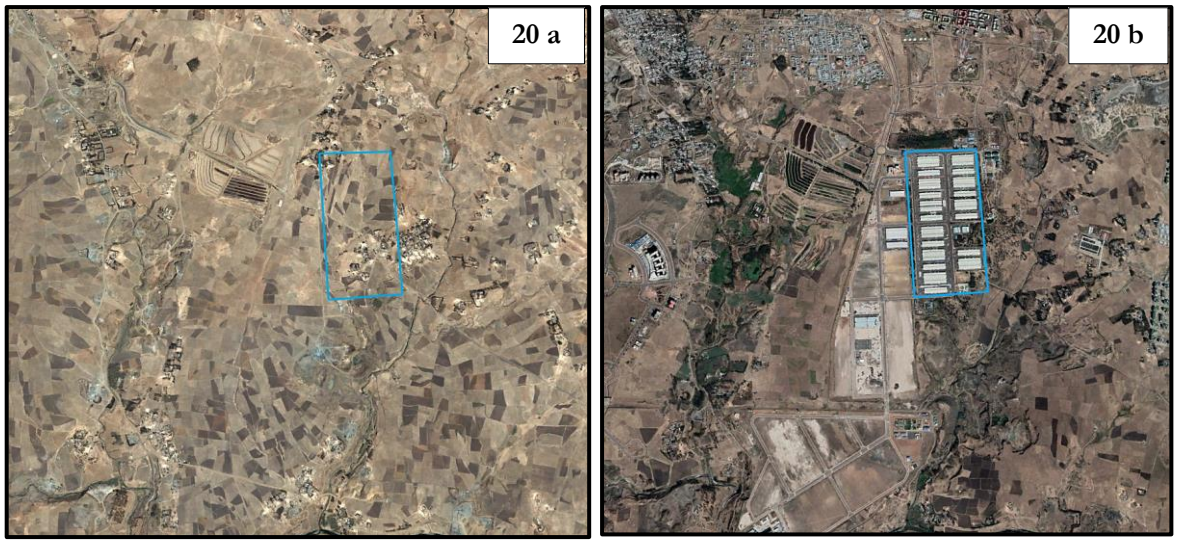

Figure 20 Before (20a) and After (20b) the construction of BLIP

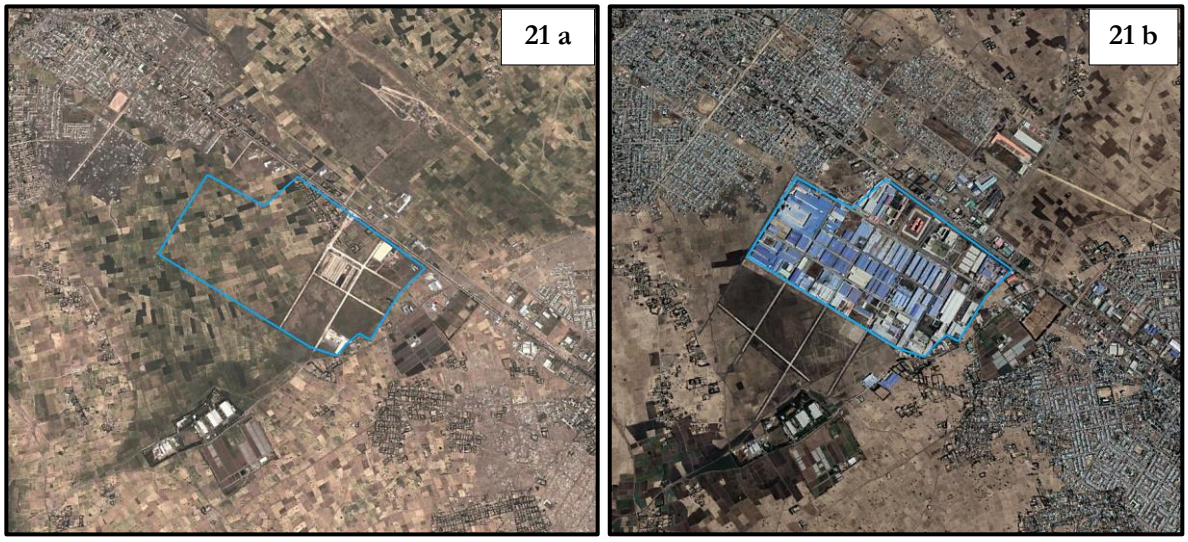

Figure 211 Before (21a) and After (21b) the construction of EIZ

4.4.4. Proximity to good transportation and size

As explained in the previous section and as shown in Figures 20 & 21, the industrial parks were built in agricultural land with almost no infrastructure. But they were not far away from an urbanized area. Currently, the surrounding areas are developed following the development of the industrial parks. This helps the industrial parks to be accessible from different sides of the neighboring locations.

Transportation is also one of the indicators of the environmental quality of life. The respondents were asked whether they use the transport that their working company provides or not. Some of them don't use the

provided transportation due to the lower number in quantity and the departure time (section 4.3.2.5). They use public transportation or walking to commute. Respondent 2 (BLIP)- "*Even though I use this transport sometimes, I prefer not to, because it is not sufficient for all the employees, so I use public bus*." Respondent 9 (BLIP)- *Because sometimes I waited for a long time, and I could not get a chair to sit, and I use taxi and walking"*. Respondent 9 (EIZ)- *I live not too far Eastern Industry Zone, so I don't use the provided transportation mostly I walk*."

In addition, in relation to transportation the size of the Eastern Industry Zone was mentioned by the employees when asked about their satisfaction with transportation. The large size of the industrial park makes it difficult to access facilities throughout the compound. For instance, Respondent- 1(EIZ) "*It would be nice if there were more vehicles that could provide quantity adjustment and were accessible to all the workers and they would also give service inside Eastern Industry Zone because the compound is very large*." Respondent- 15 (EIZ) "*I work at the very end part of the Eastern Industry Zone, and I always feel tried reaching there, I could be satisfied if there was a transportation service inside*." When can also note from the pictures below that both industrial parks are not comfortable to walk due to lack of tree shades (see figure 21). Even though the compound of Bole Lemi I Industrial park is less in size than Eastern Industry Zone, the orientation and accessibility are not comfortable to access easily.

Bole Lemi I Industrial Park

Eastern Industry Zone

Figure 22: Road infrastructure inside Bole Lemi I Industrial park and Eastern Industry Zone (source: photos taken by research assistant)

According to Farole & Akinci (2011b), the size and cost of industrial parks should also be in line with business and market needs and expectations and accessibility. The small size greatly facilitates access to key infrastructure. This study has found that the size of the Eastern Industry Zone has affected the employees' environmental quality of life with respect to accessibility and transportation. Thus, the respondents were dissatisfied.

4.4.5. Park specialization (Industry focus) and Toxins that industrial activities might produce

As indicated in chapter three, Bole Lemi I Industrial park specializes in textile and apparel and has an export-oriented production. Eastern Industry Zone specializes in mixed sectors such as textile, leather products, and building materials. Depending on the industry focus, the toxins that industrial activities might produce differ. In this study, the perception of the respondents on their subjective environmental quality of life varies based on their working companies. A small number of respondents were facing health problems due to pollution and noise. Respondents 4 (BLIP)" *I don't really know the reason, but I was sick since I started working here*." Respondents 17 (BLIP) "*I have been sick due to a noise coming from a machine*." Respondents 19 (BLIP) "*I have been ill many times. There is a smell coming from some companies and toilets*". Respondents 2 (EIZ)" *The liquid they use for watering plants is probably toilet water and smells a lot*." Respondents 29 (EIZ) "*The cause of my sickness was a little bit noise from machines*." Respondents 31 (EIZ) "*Before I have been suffering from ear sickness because of noise disturbance that comes with big cars."*

Studies have shown that the primary concern of people residing inside or near industrial parks is air pollution and noise pollution. For example, a study by Sopsuk et al. (2013), has shown that the environmental quality of life among people living close to the gas refinery, power plant, and areas of organic industries area and where people were distinctively disturbed by various types of pollution and unpleasant odors. Different industry sites cause different problems depending on the process and substance released from each of them. For this study, the majority of the respondents do not face any health-related problems due to pollution, but this needs further study.

4.4.6. Skill needed by their employees

Depending on the sector of the industry, the skills required by employees differ. To support this, companies in Industrial Park provide training for their employees. The trainings are designed to provide short-term training and skill improvement programs and should be designed to fill skill gaps and current needs (FDRE Ministry of Industry, 2013b). Training has also proven to have a positive impact on the stability of the workforce. They also feel more motivated to further develop themselves to earn better salaries and move to better positions and, ultimately, improve their quality of life (FDRE Ministry of Industry, 2013b).

As discussed in section 4.3.2.4, most of the companies inside Bole Lemi I Industrial park and Eastern Industry Zone provide training for their own employees. However, the respondents in Bole Lemi I Industrial park and Eastern Industry Zone are not very satisfied or satisfied with the training facilities provided since the training centers are not sufficient for all the employees, the lessons are interrupted, and

there are also some companies which don't provide the trainings. Respondent 7 (BLIP) "*I think there are training centers, but I don't use them because the lessons are not important for me*." Respondent 14 (BLIP) "*There are training centers, but they are not sufficient. We can upgrade our skills with this training if they were well-organized*". Respondent 8 (EIZ) "*the trainings are sometimes in local language, and I can't understand Amharic*." Respondent 27 (EIZ) "*It will always be a good thing if more training centers are built in the industrial park since they are not sufficient."*

5. CONCLUSION

This study has been conducted to understand how the characteristics of industrial parks influence the environmental quality of life of their employees, by measuring the environmental quality of life of employees in government-owned and privately-owned industrial parks. This chapter aims to summarize the finding and draw attention on main issues for further studies.

According to the first sub objective and research questions under it this study has identified the characteristics of industrial parks that might have an influence on the environmental quality of life, and environmental quality of life indicators related to industrial parks from current literature review. In the second sub objective, subjective and objective environmental quality of life has been measured followed by the influence of the characteristics of industrial parks on the environmental quality of life. As indicated under section 4.1 (table 4) the level of satisfaction of the respondents on their environmental quality of life varies in government-owned (BLIP) and privately-owned (EIZ) industrial parks. The privately-owned (EIZ) industrial park is better in the subjective environmental quality of life while the government-owned (BLIP) industrial park is better in the objective environmental quality of life. This is because the respondents' level of satisfaction in the privately-owned (EIZ) industrial park has a higher mean score in most of the indicators of the environmental quality of life. The objective indicators of the environmental quality of life were about the presence of absence of infrastructure and/or services, the government-owned (BLIP) industrial park excelled since in the privately-owned (EIZ) industrial park does not have clinic.

The characteristics of both industrial parks have a positive and negative impact (section 4.4). Based on the findings of this study the park specialization, toxins that industrial parks might produce, infrastructure provision skill needed by employees and size of the industrial park have negatively affected the employees environmental quality of life. On the other hand, the ownership, proximity to urbanized area and good transportation have positively affected the employees environmental quality of life.

At first, this study aims to employ several indicators of environmental quality of life such as landscaping, sport facilities and level of safety but due to less access inside the industrial parks this was impossible. Also, it was not possible to get information about the characteristics of industrial parks such as the physical footprint and having a master plan. So, we recommend further investigation of the environmental quality of life by adding more indicators to capture a better understanding. As indicated in chapter 2, in addition to this, current studies have only studied the subjective environmental quality of life since they developed a perceived EQOL scale. Also, there is a scanty of research that incorporates both subjective and objective environmental quality of life further studies should be studied.

There were limitations during the data collection process for this study, firstly, some of the employees and administrative bodies of the Bole Lemi I Industrial Park were not willing to participate in the survey due to their concern that someone could give inappropriate comments before the construction of the houses was completed. Furthermore, due to Covid-19 there was lower access to employees and the compound. The employees surveyed were only chosen by managers of both industrial parks. Moreover, there was a problem accessing the master plan of both industrial parks and secondary data (office information and cannot be shared).

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7. APPENDICES

Appendix A- Survey for employees in Bole Lemi I Industrial Park

The gender of the employee
Male ☐ Female ☐

1. What is your age?

……

2. May I ask about your income?

…… ……..

3. Where do you live?
    a. Inside Bole Lemi I Industrial Park
    b. Outside Bole Lemi I Industrial Park

Part 1 Questions for employees living inside Bole Lemi I Industrial
Part 1.1 Living Facilities (House, water and sanitation, waste disposal, provision, quality, and access)

1. Are there any living facilities provided by Bole Lemi I Industrial Park that you use?
    a. Yes there are b. Yes but i don't use them c. Not available
2. How satisfied are you with these living facilities?

Living Facilities (House, water and sanitation, waste disposal, provision, quality, and access)					
House	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Water and Sanitation	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Waste Disposal	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

3. Can you tell me which of the living facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

4. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 1.2 Physical environment, and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality and access in the working environment)

5. Are there any leisure/recreational facilities provided by Bole Lemi I Industrial Park that you use?
   a. Yes there are b. Yes but i don't use them c. Not available
6. How satisfied are you with these physical environment, and recreational facilities?

Working, the physical environment and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality, and access in the working environment)					
Cafes/Restaurants	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Recreational Areas	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Green/Open spaces	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Break Rooms	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

7. Can you tell me which of the working, the physical environment and recreational facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

8. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

9. Have you ever had health problems or disturbances due to the noise, pollution, or any other pollutants related to Bole Lemi I Industrial Park?
   a. Yes b. No

7.1. If yes, what was the cause of these problems?……

……

Part 1.3 Healthcare Facilities (healthcare center provision, quality, and access)

10. Are there any health care facilities provided by Bole Lemi I Industrial Park?
    a. Yes there are b. Yes but i don't use them c. Not available
11. How satisfied are you with these healthcare facilities?

Healthcare Facilities (healthcare center provision, quality, and access)					
Clinic	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
First aid services	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

12. Can you tell me which of these healthcare facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

13. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 1.4 Educational Facilities (school and training center provision, quality, and access)

14. Are there any educational facilities provided by Bole Lemi I Industrial Park?
    a. Yes there are b. Yes but i don't use them c. Not available
15. How satisfied are you with these educational Facilities?

Educational Facilities (school and training center provision, quality, and access)					
Training Centers	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

16. Can you tell me which of these educational facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

17. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Research Assistant (Thank the participant for their participation, time, and response)

Part 2 Questions for employees living outside bole lemi 1 industrial park.

Part 2.1. Physical environment, and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality and access in the working environment)

1. Are there any leisure/recreational facilities provided by Bole Lemi I Industrial Park that you use?
   a. Yes there are b. Yes but i don't use them c. Not available
2. How satisfied are you with these working, physical environment and recreational facilities?

Working, the physical environment and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality, and access in the working environment)					
Cafes/Restaurants	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Recreational Areas	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Green/Open spaces	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Break Rooms	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

3. Can you tell me which of the working, the physical environment and recreational facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

4. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 2.2 Healthcare Facilities (healthcare center provision, quality, and access)

5. Have you ever had health problems or disturbances due to the noise, pollution, or any other pollutants related to Bole Lemi I Industrial Park?
   b. Yes b. No

   5.1. If yes, what was the cause of these problems?……
   ……

6. Are there any health care facilities provided by Bole Lemi I Industrial Park?

a. Yes there are b. Yes but i don't use them c. Not available

7. How satisfied are you with these healthcare facilities?

Healthcare Facilities (healthcare center provision, quality, and access)					
Clinic	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
First aid services	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

8. Can you tell me which of these healthcare facilities provided by Bole Lemi I Industrial Park are very necessary for you?

…….
…….
…….

9. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 2.3 Educational Facilities (school and training center provision, quality, and access)

10. Are there any educational facilities provided by Bole Lemi I Industrial Park?

a. Yes there are b. Yes but i don't use them c. Not available

11. How satisfied are you with these educational Facilities?

Educational Facilities (school and training center provision, quality, and access)					
Training Centers	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

12. Can you tell me which of these educational facilities provided by Bole Lemi I Industrial Park are very necessary for you?

……
……
……...

13. Which urgent improvements do you think should be made to those facilities?

……
……
……...

Part 2.4 Transportation (transportation provision, quality and access)

14. Is there any provision of transportation service by your working company?
    a. Yes there is b. Yes but i don't use it c. Not available
15. How satisfied are you with the transportation services by your working company?

Transportation (transportation provision, quality, and access)					
Employee transport	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

16. Which urgent improvements do you think should be made to this transportation facility?

……...
……..
……...

17. If you don't use the employees transport what type of transportation do you use to come to your workplace/commute?
    a. Walking b. Cycling c. Public Transport d. If other, please specify……..
18. Why don't you use the provided transportation services?

……
……
……...

19. How much time do you travel from work to home?
    a. Less than 30 minutes b. 30 minutes – 1 hour c. 1 hour – 2 hours d. More than 2 hours

Research Assistant (Thank the participant for their participation, time, and response)

Appendix B- Survey for employees in Eastern Industry Zone

The gender of the employee
Male ☐ Female ☐

1. What is your age?

……

2. May I ask about your income?

…… ……..

3. Where do you live?
   ii. Inside Eastern Industry Zone
   iii. Outside Eastern Industry Zone

Part 1 Questions for employees living inside Eastern Industry Zone

Part 1.1. Living Facilities (House, water and sanitation, waste disposal, provision, quality, and access)

4. Are there any living facilities provided by Eastern Industry Zone that you use?
   a. Yes there are b. Yes but i don't use them c. Not available
5. How satisfied are you with these living facilities?

Living Facilities (House, water and sanitation, waste disposal, provision, quality, and access)					
House	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Water and Sanitation	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Waste Disposal	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

6. Can you tell me which of the living facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

7. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 1.2 Physical environment, and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality and access in the working environment)

8. Are there any leisure/recreational facilities provided by Eastern Industry Zone that you use?
   a. Yes there are b. Yes but i don't use them c. Not available
9. How satisfied are you with these physical environment, and recreational facilities?

Working, the physical environment and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality, and access in the working environment)					
Cafes/Restaurants	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Recreational Areas	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Green/Open spaces	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Break Rooms	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

10. Can you tell me which of the working, the physical environment and recreational facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

11. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

12. Have you ever had health problems or disturbances due to the noise, pollution, or any other pollutants related to Eastern Industry Zone?
    d. Yes b. No

12.1. If yes, what was the cause of these problems?……
……

Part 1.3 Healthcare Facilities (healthcare center provision, quality, and access)

13. Are there any health care facilities provided by Eastern Industry Zone?

a. Yes there are b. Yes but i don't use them c. Not available

14. How satisfied are you with these healthcare facilities?

Healthcare Facilities (healthcare center provision, quality, and access)					
Clinic	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
First aid services	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

15. Can you tell me which of these healthcare facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

16. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 1.4 Educational Facilities (school and training center provision, quality, and access)

17. Are there any educational facilities provided by Eastern Industry Zone?

a. Yes there are b. Yes but i don't use them c. Not available

18. How satisfied are you with these educational Facilities?

Educational Facilities (school and training center provision, quality, and access)					
Training Centers	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

19. Can you tell me which of these educational facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

20. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Research Assistant (Thank the participant for their participation, time, and response)

Part 2 Questions for employees living outside Eastern Industry Zone.

Part 2.1, Physical environment, and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality and access in the working environment)

20. Are there any leisure/recreational facilities provided by Eastern Industry Zone that you use?
    a. Yes there are b. Yes but i don't use them c. Not available
21. How satisfied are you with these working, physical environment and recreational facilities?

Working, the physical environment and recreational Facilities (physical environment is about the pollution, noise,... and the recreational and green areas provision, quality, and access in the working environment)					
Cafes/Restaurants	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Recreational Areas	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Green/Open spaces	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Break Rooms	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

22. Can you tell me which of the working, the physical environment and recreational facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

23. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 2.2 Healthcare Facilities (healthcare center provision, quality, and access)

24. Have you ever had health problems or disturbances due to the noise, pollution, or any other pollutants related to Eastern Industry Zone?
    e. Yes b. No

    5.1. If yes, what was the cause of these problems?……
    ……

25. Are there any health care facilities provided by Eastern Industry Zone?

a. Yes there are b. Yes but i don't use them c. Not available

26. How satisfied are you with these healthcare facilities?

Healthcare Facilities (healthcare center provision, quality, and access)					
Clinic	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
First aid services	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

27. Can you tell me which of these healthcare facilities provided by Eastern Industry Zone are very necessary for you?

…….
…….
…….

28. Which urgent improvements do you think should be made to those facilities?

…….
…….
…….

Part 2.3 Educational Facilities (school and training center provision, quality, and access)

29. Are there any educational facilities provided by Eastern Industry Zone?

a. Yes there are b. Yes but i don't use them c. Not available

30. How satisfied are you with these educational Facilities?

Educational Facilities (school and training center provision, quality, and access)					
Training Centers	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
Other	If other please provide the name of the facility inside the box below and choose the level of satisfaction				
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied
	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

31. Can you tell me which of these educational facilities provided by Eastern Industry Zone are very necessary for you?

……
……
……...

32. Which urgent improvements do you think should be made to those facilities?

……
……
……...

Part 2.4 Transportation (transportation provision, quality and access)

33. Is there any provision of transportation service by your working company?

    b. Yes there is b. Yes but i don't use it c. Not available

34. How satisfied are you with the transportation services by your working company?

Transportation (transportation provision, quality, and access)					
Employee transport	Very Satisfied	Satisfied	Moderate	Dissatisfied	Very Dissatisfied

35. Which urgent improvements do you think should be made to this transportation facility?

……...
……..
……...

36. If you don't use the employees transport what type of transportation do you use to come to your workplace/commute?

    b. Walking b. Cycling c. Public Transport d. If other, please specify……..

37. Why don't you use the provided transportation services?

……
……
……...

38. How much time do you travel from work to home?

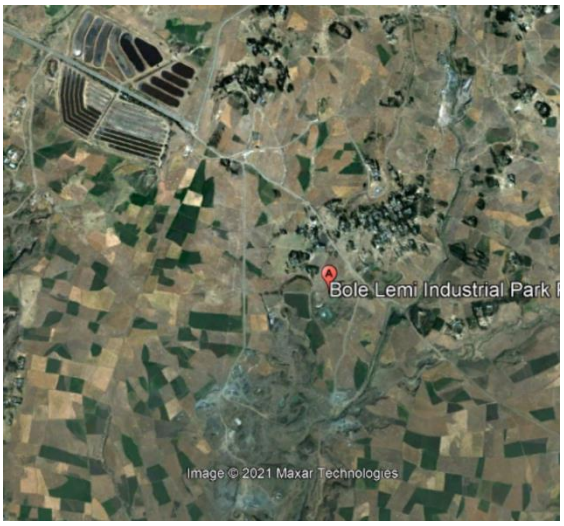
    b. Less than 30 minutes b. 30 minutes – 1 hour c. 1 hour – 2 hours d. More than 2 hours

Research Assistant (Thank the participant for their participation, time, and response)

Appendix C- Bole Lemi I Industrial Park Key Informant Interview I

Part 1 Questions for Bole Lemi I Industrial Park branch office manager

1. Studies mentioned that there is the provision of facilities such as education and health care facilities in Ethiopian industrial parks. What kind of facilities are available within Bole Lemi I Industrial Park in which the employees make use of?
2. Are the facilities you mentioned sufficient, and do you think the employees of Bole Lemi I Industrial Park are satisfied enough with these facilities? Why?
3. What kind of improvements do you think should be made according to employees satisfaction?
4. Do you think the fact that Bole Lemi I Industrial Park was built on green land has affected the availability or provision of these facilities? Why?



Bole Lemi I Industrial Park in 2010

Bole Lemi I Industrial Park in 2021

Thank the participant for their participation, time, and response

Appendix D- Eastern Industry Zone Key Informant Interview II

Part 1.4 Questions for Eastern Industry Zone branch office manager

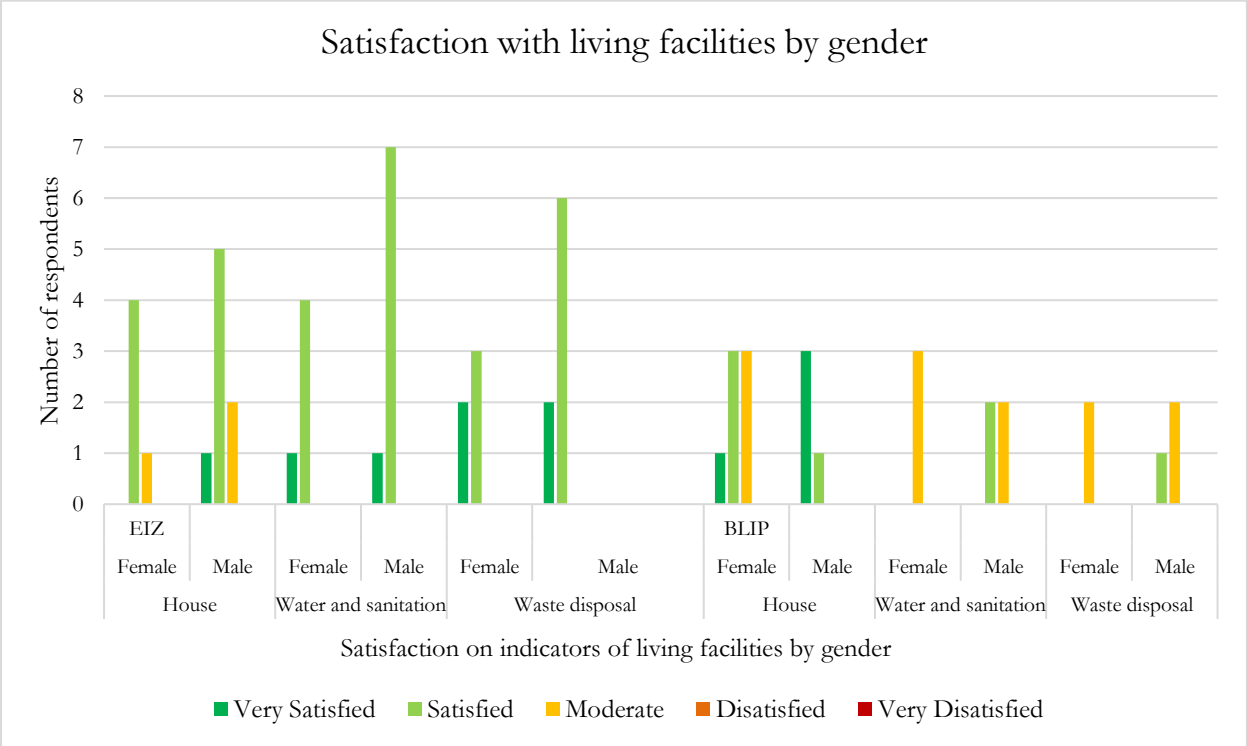
1. Studies mentioned that there is the provision of facilities such as education and health care facilities in Ethiopian industrial parks. What kind of facilities are available within Eastern Industry Zone in which the employees make use of?
2. Are the facilities you mentioned sufficient, and do you think the employees of Eastern Industry Zone are satisfied enough with these facilities? Why?
3. What kind of improvements do you think should be made according to employees satisfaction?
4. Do you think the fact that Eastern Industry Zone was built on green land has affected the availability or provision of these facilities? Why?

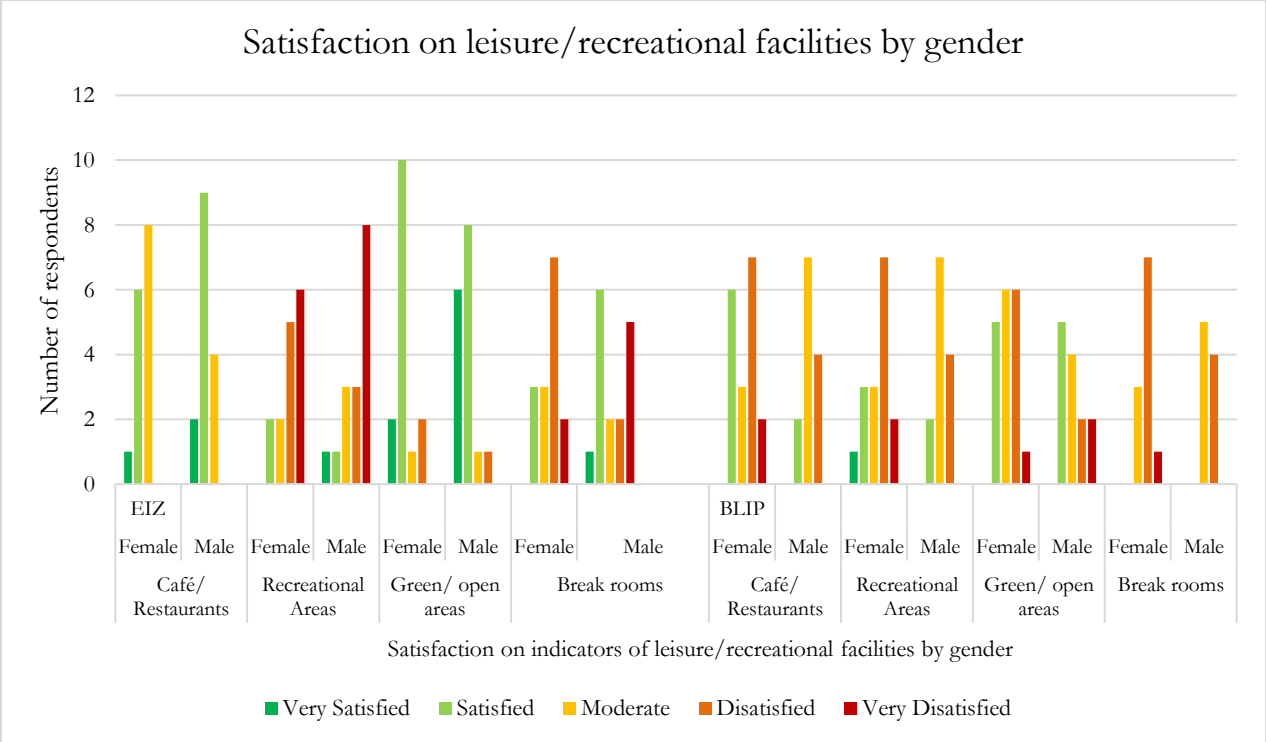
APPENDIX E

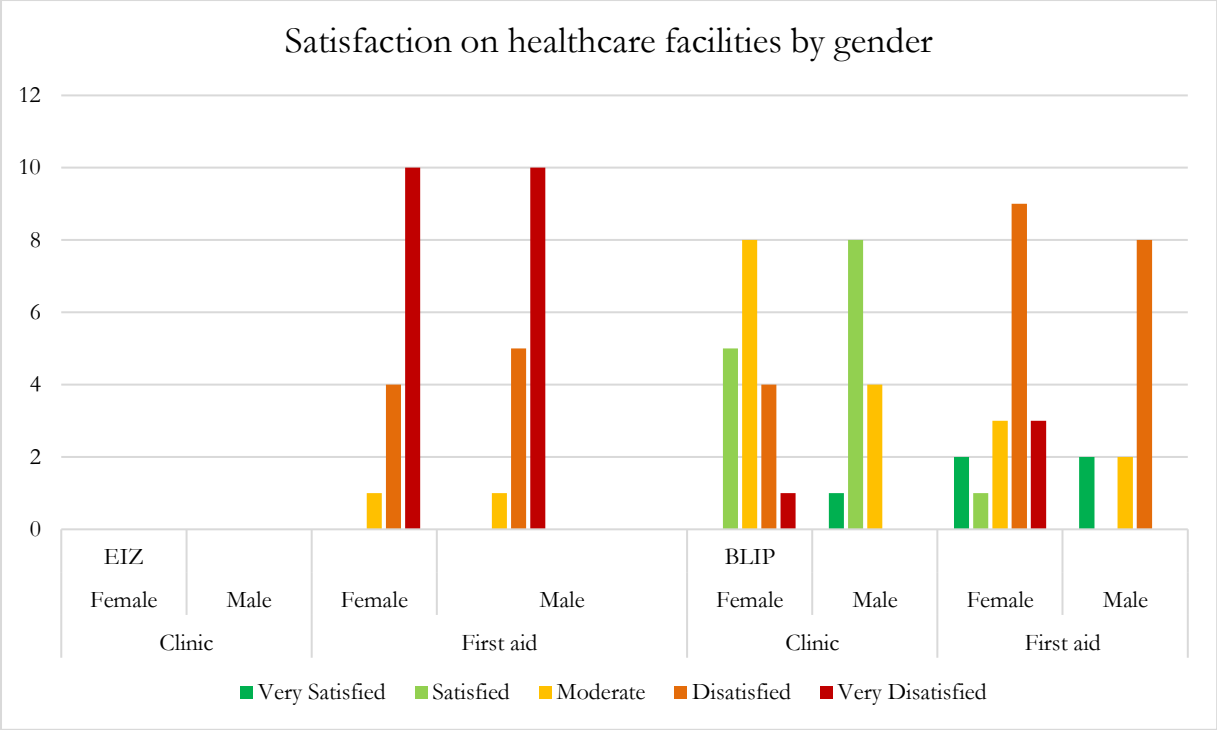
		Characteristics of Bole Lemi I Industrial Park employees		Characteristics of Eastern Industry Zone employees	
	Classification	Percentage (%)	Quantity	Percentage (%)	Quantity
Age	< 29	48.38	15	22.5	7
	29 - 35	29.03	9	54.8	17
	36 – 42	16.12	5	22.5	7
	> 42	6.45	2	-	-
Income per month	< 3000	51.61	16	-	-
	3000 - 7999	25.8	8	-	-
	8000 - 13000	12.9	4	-	-
	> 13000	9.6	3	-	-
Gender	Male	41.93	13	51.6	16
	Female	58.06	18	48.4	15
Living area	Living inside	35.48	11	41.9	13
	Living outside	64.51	20	58.1	18

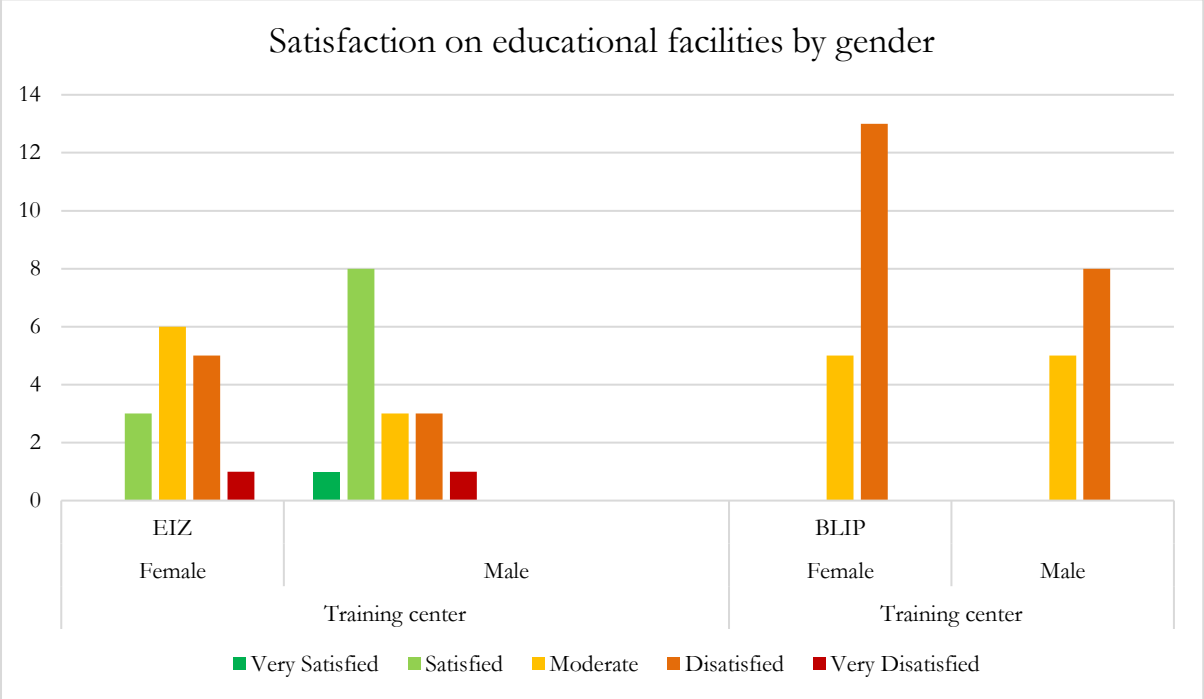
	Environmental quality of life	Mean satisfaction score	
		BLIP	EIZ
Living facilities	House	1.9 (n=11)	2.1 (n=13)
	Water and sanitation	2.7 (n=11)	1.8 (n=13)
	Waste disposal	2.6 (n=11)	1.6 (n=13)
Recreational/leisure facilities	Café/restaurant	3.2 (n=31)	2.3 (n=31)
	Recreational areas	3.4 (n=31)	4.0 (n=31)
	Green/open spaces	3.1 (n=31)	2.0 (n=31)
	Break rooms	3.6 (n=31)	3.3 (n=31)
Healthcare facilities	Clinic	2.7 (n=31)	-
	First aid services	3.5 (n=31)	4.5 (n=31)
Educational facilities	Training centers	3.6 (n=31)	2.9 (n=31)
Transportation facilities	Employee transport	2.3 (n=20)	2.2 (n=18)

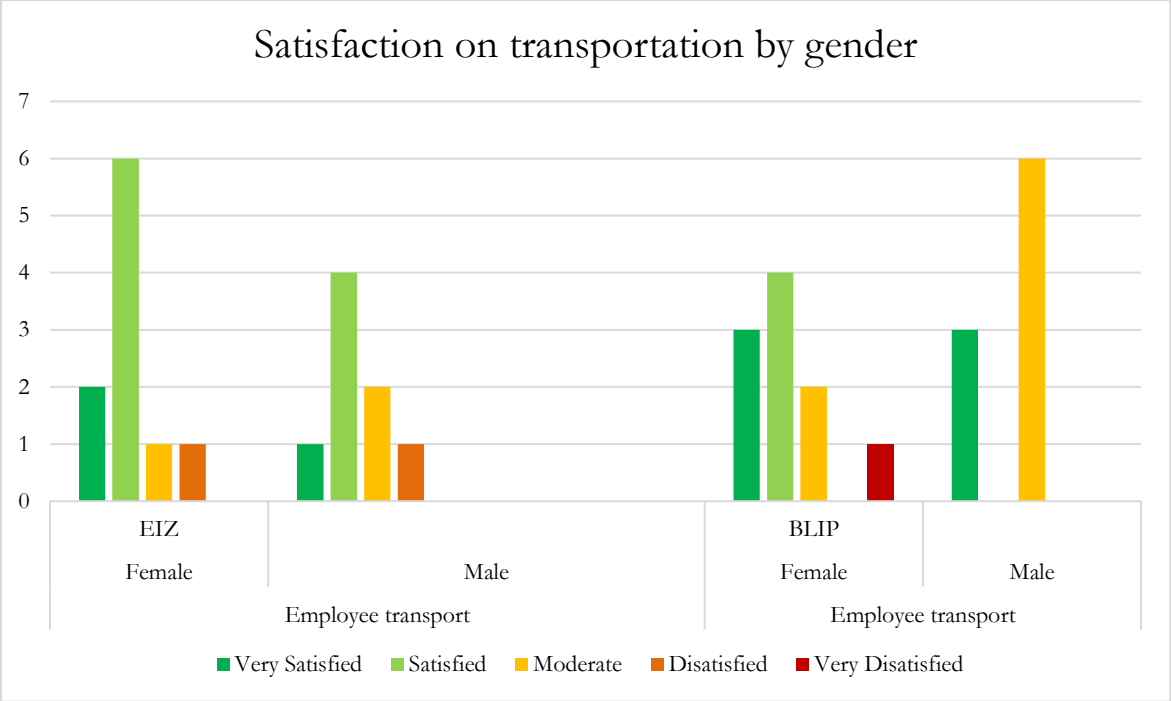
APPENDIX F


Satisfaction with living facilities by gender
Number of respondents
0
1
2
3
4
5
6
7
8
EIZ
BLIP
Female
Male
House
Water and sanitation
Waste disposal
Satisfaction on indicators of living facilities by gender
Very Satisfied
Satisfied
Moderate
Disatisfied
Very Disatisfied


Satisfaction on leisure/recreational facilities by gender
Number of respondents
0
2
4
6
8
10
12
EIZ
BLIP
Female
Male
Café/ Restaurants
Recreational Areas
Green/ open areas
Break rooms
Satisfaction on indicators of leisure/recreational facilities by gender
Very Satisfied
Satisfied
Moderate
Disatisfied
Very Disatisfied


Satisfaction on healthcare facilities by gender
12
10
8
6
4
2
0
EIZ
Female
Male
Female
Male
BLIP
Female
Male
Female
Male
Clinic
First aid
Clinic
First aid
Very Satisfied
Satisfied
Moderate
Disatisfied
Very Disatisfied


Satisfaction on educational facilities by gender
14
12
10
8
6
4
2
0
EIZ
Female
Male
BLIP
Female
Male
Training center
Training center
Very Satisfied
Satisfied
Moderate
Disatisfied
Very Disatisfied


Satisfaction on transportation by gender
7
6
5
4
3
2
1
0
EIZ
Female
Male
Employee transport
BLIP
Female
Male
Employee transport
Very Satisfied
Satisfied
Moderate
Disatisfied
Very Disatisfied