The Power of Imperfection

China-Ethiopia Industrial Parks as the Medium for Local Vitalization
The Case of Eastern Industry Zone, Dukem, Ethiopia

Graduation Project Report | MSc Urbanism | TU Delft | 2022/23
Jiaying Wu | 5345936

Colophon

The Power of Imperfection
China-Ethiopia Industrial Parks as the Medium for Local Vitalization
The Case of Eastern Industry Zone, Dukem, Ethiopia

MSc Graduation Project - Report 2022/23
Urbanism Track

Author
Jiaying Wu

Student Number: 5345936

Research Studio
Planning Complex Cities TU Delft
MSc Architecture, Urbanism and Building Sciences:
Urbanism track
Department of Urbanism
Faculty of Architecture and the Built Environment
Delft University of Technology

Mentor Team
First mentor: Gregory Bracken | Spatial Planning & Strategy
Second mentor: Claudiu Forgaci | Urban Design

13/06/2023
Delft, The Netherlands

Acknowledgements

This two-year journey in TU Delft was like a wonderful dream of my life. I am now the person I once never envisioned being, and I especially like who I am now!

This past year, I was working on my graduation project, which revolved around the construction of a Chinese overseas industrial park in Ethiopia, and I faced a lot of uncertainties and challenges from the very beginning of the topic selection. I am really grateful to Gregory Bracken and Claudiu Forgaci for their support and help, as well as their encouragement all the time. Whenever I felt confused, they always gave me precise and valuable advice, not only guiding me academically, but also sincerely encouraging me when I was not confident enough. Secondly, I would like to especially thank my family for their support and attachment to me, whose unconditional love has supported me to pursue my passion. Even though they are far away from Xinjiang, China, and for some reason were not able to attend my final presentation, I know that our hearts are always together. In addition, I would like to thank Nan Ma, my friend at the University of Ethiopia, who I would not have been able to complete the fieldwork and questionnaires for the project so smoothly if I had not been lucky enough to meet him. Although there is still a lot of room for improvement in this project, I hope this is a good start to inspire others to pay attention to such spaces and to really do something for the well-being of people from all perspectives.

Then I have friends I would like to thank: Jian Yuan, Tianyi Gu, Yuxin Yang, Jingfang Zhang, Hao Liu, Chongchong Li, Ziqi Deng, Ruijun Zheng, Kemeng Zhao, Sinian Li, Bai Xiao and other friends who have helped me and cared for me, both in the Netherlands and in China.

I feel energized when I am once again at an important point in my life and I have a very clear dream that I want to accomplish. Finally, I would like to thank myself for walking from Xinjiang to Nanjing, then to Qingdao, and then to the Netherlands, each step has been lucky and solid. I hope I can continue to live a good life in the future, doing what I like and being with the people I love!

Contents

Abstract

Exchanges between China and Africa involving political, economic, scientific and cultural aspects have a long history and are constantly updated according to the practical needs of both sides. The high degree of complementarity has led to China-Africa deepening cooperation, which has been accompanied by the emergence of new industrial clusters, the shift in the interest of new investors, and the movement of new immigrant groups. Nevertheless, differences in historical traditions, social culture, and religious beliefs between immigrant groups and native groups, as well as the possible inequalities in economic power and international discourse between the two sides, often lead to controversial ways of cooperation and negative interactions.

According to the current mode of China-Africa capacity cooperation, industrial parks, as the main spatial carrier, have become the main platform for cooperation between China and African countries. The volume of industrial parks and the impact they bring to the host countries are no longer limited to affecting local economic development as the scale of investment continues to expand, but in most studies, such foreign co-built industrial parks are still treated as an instrument, and the focus of relevant studies is mainly on their promotion of local industrialization. As an entity with economic, social, spatial, and governance attributes that occupies a large area, has a high construction intensity, and has intensive flows of elements, the integration, and interaction between industrial parks and local cities is a direction that can be explored with many new perspectives and strategies.

So the aim of this study is, to use the China Eastern Industry Zone(EIZ) in Ethiopia as a case, to explore integrated strategies to foster regional vitalization in Dukem, Ethiopia via an incremental approach. Firstly, through literature research, mapping and comparative analysis, it is found that the impact of the Eastern Industry Zone on local urbanization and industrialization has penetrated into various aspects of socio-economic, spatial and governance. And the challenges and difficulties at the current stage are complex and intertwined. Therefore on-site surveys and questionnaires were used to analyze the demands of different local groups for the construction and operation of the Eastern Industry Zone, thus establishing the core position of this study to consider industrial park projects as an external opportunity to promote endogenous local development.

Then, based on literature research, comparative analysis and statistical analysis, the local capacity is assessed in three dimensions: spatial, socioeconomic and governance. Through scenario analysis, a vision is proposed, followed by the planning process to delve further into four cross-scale strategic action plans for industrial parks as an active medium for local vitalization. Finally, by analyzing the bottom-up spatial patterns, local activities, and stakeholders in local industrial communities in Dukem, focusing on the interaction and interface between industrial space and urban space, design guidelines for industrial communities are proposed, which is applied to the unbuilt Phase Two area of the Eastern Industry Zone for design testing.

Key Words

Ethiopia, industrial park (IP), pattern language, participation, partnerships, regional vitalization

List of Terms

Abbreviations

AU	African Union
ASEAN	Association of Southeast Asian Nations
CCP	Comprehensive Cooperative Partnership
EIC	Ethiopian Investment Commission
EIZ	Eastern Industry Zone
ETCZ	Economic and Trade Cooperation Zones
EU	European Union
FDI	Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
FOCAC	Forum on China-Africa Cooperation
IP	Industrial Park
IPDC	Industrial Parks Development Coorporation
JECC	Joint Ethiopia-China Commission
MOFCOM	Ministry of Commerce of the People's Republic of China
OETCZ	Overseas Economic and Trade Cooperation Zone (China)
PRC	People's Republic of China
SEZ	Special Economic Zone
SSA	Sub-Saharan Africa
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization
WB	World Bank

Definitions

Industrial Park: an industrial park can be defined as a tract of land developed and subdivided into plots according to a comprehensive plan with or without built-up (advance) factories, sometimes with common facilities and sometimes without them, for the use of a group of industrialist. (UNIDO, 1997, p.10)

Special Economic Zone: geographically delimited areas within which governments facilitate industrial activity through fiscal and regulatory incentives and infrastructure support. (World Investment Report, 2019, p.128)

Overseas Economic and Trade Cooperation Zone (China): industrial parks that are independent legal entities and receive investment from and are established overseas by Chinese-owned companies that are registered in the territory of the People's Republic of China (excluding Hong Kong, Macao and Taiwan) and have independent legal status. COCZs should be equipped with complete infrastructure, and have a clear industrial development strategy, and provide sound public services, promote industrial concentration and play a catalytic role for local development. (MOFCOM, 2010)

Medium: an agency or means of doing something. (Oxford Languages)

Figure 1: Location of Ethiopia
in Africa
Source: Author, 2023

01 INTRODUCTION

1.1 Introduction

The phenomenon of global migration is becoming more and more common as the changes in the international socio-economic and political-institutional environment. And this social mobility is accompanied by a new series of investments, resources and ideological flows on a global scale. Among them, the flow of elements between China and Africa, one a socialist country with a large population with a giant economy and the other a complex continent with numerous potentials and risk factors, has gradually attracted the curious and wary attention of the world as both sides have grown and expanded in pace. In fact, from the developments in recent years, there seems to be a certain mindset about the interaction between China and Africa. For example, many people think that once an agreement is signed between the two governments, the industrial park project can be landed immediately. But the real situation is actually much more complicated. But from another point of view, the complexity of the situation also implies that there are more opportunities that may arise.

In this context, industrial parks, as an important platform and spatial carrier for establishing economic partnerships between China and African countries, have contributed a lot to the rapid development of China's economy and are now adopted by many African governments as special areas for applying special investment policies. Among them, the Ethiopian government strongly hopes to attract foreign direct investment and promote the development of its economy through this model, drawing on the successful experience of China and other countries in East and Southeast Asia in the construction and operation of industrial parks. The case study of this project, Eastern Industry Zone, is the first industrial park pilot project in Ethiopia. It can be said that the gradual improvement of industrial park-related policies and regulations in Ethiopia is closely related to the practice of the Eastern Industry Zone. In addition, the influence of the Eastern Industry Zone is not only in industrial clustering, since its establishment in 2007, it has attracted more than 80 enterprises, provided nearly 20,000 jobs, and contributed to the formation of the surrounding Dukem town.

In the current relevant research, most of the studies mainly focus on the power relations, policy directions, and social conflicts between China and African countries in terms of economic cooperation from economics and sociology, and lack integration with spatial-level research. Even though some Chinese scholars have worked on the planning of Chinese overseas industrial parks, they have mainly focused on the application of the Chinese planning system and have not discussed the real role of these industrial parks in different regions in a local context. Hence, this project will aim to explore the strategies of using industrial parks as the active medium for regional vitalization based on the real background and information of the Eastern Industry Zone from three dimensions: socioeconomic, spatial and governance. Spatial planning will be one of the important tools, focusing on the interaction between the industrial park itself and the local networks and the multi-scale investigation of the role of the industrial park, trying to stimulate the endogenous development of the local area.

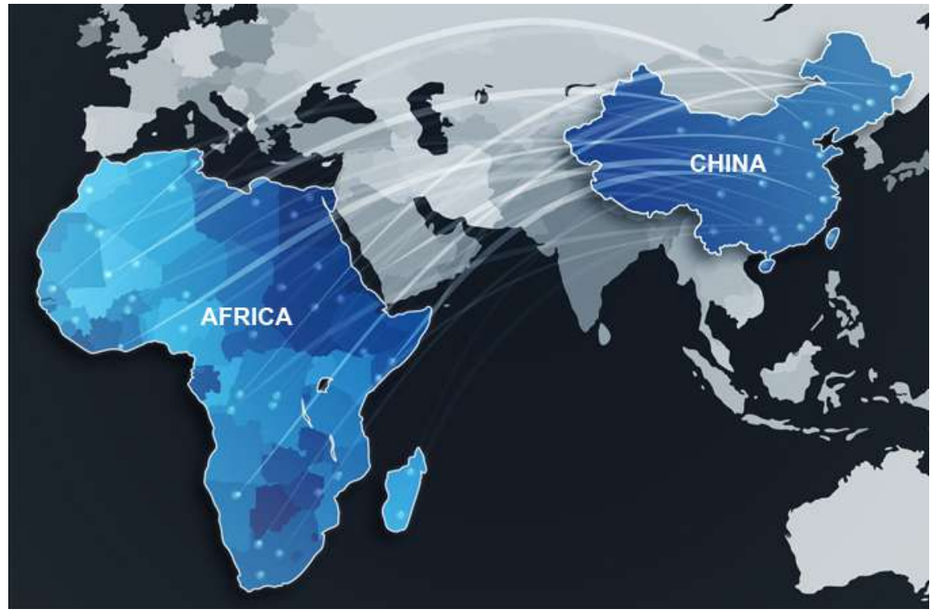


Figure 2: China-Africa relations diagram
Source: studies.aljazeera.net/en

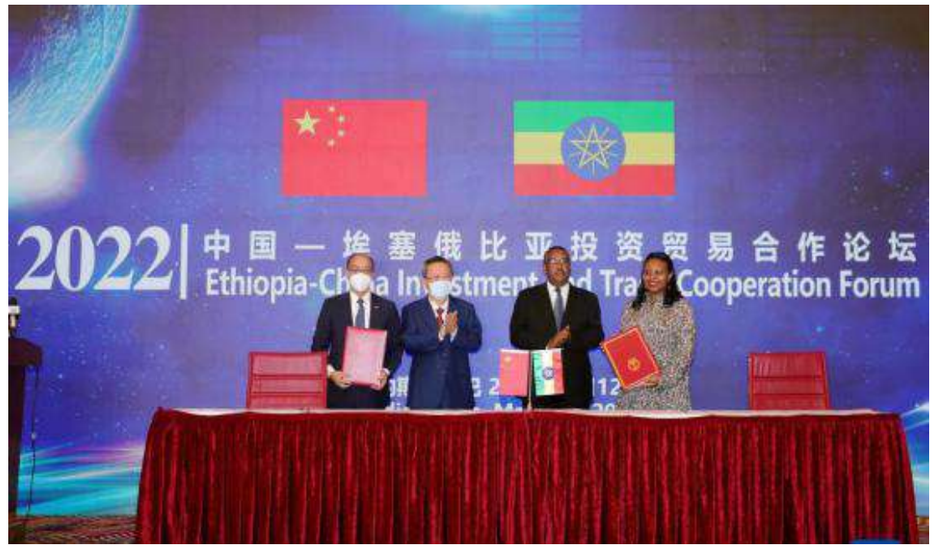


Figure 3: Ethiopia-China Investment and Trade Cooperation Forum kicks off, 2022
Source: en.ndrc.gov.cn/news/pressreleases/202206/t20220621_1329445.html

1.2 Global Context

1.2.1 Historical Background of China-Africa Relations

Relations at the national government level:
In addition to the historical exchanges, contemporary China-Africa relations commenced with the state visits of Chinese Premier Zhou Enlai to ten African countries between 1963 and 1964. The primary objective of these visits was to denounce imperialism, colonialism, racism, and expansionism, while simultaneously advocating for global peace and reinforcing solidarity between China and African countries. These efforts were aligned with the fundamental principles of the inaugural Asia-Africa Conference held in Bandung in 1955. Although the planned second conference slated for 1965 was ultimately canceled, the prevailing inclination towards South-South collaboration since the 1960s remained unstoppable. Subsequently, in 1978, China's reform and opening-up policy, spearheaded by Deng Xiaoping (*Figure 1*), profoundly impacted the global economic landscape. This transformative initiative catapulted China from a predominantly agrarian and impoverished society to the second-largest economy worldwide in a remarkably short span of forty years. Under the umbrella of the Open Door Policy reforms, China's approach to Africa encompassed both political and economic dimensions, transitioning gradually from a government-led model to promoting global expansion among domestic enterprises.

Simultaneously, the 1960s to 1970s marked the pinnacle of the African nationalist movement that emerged in the aftermath of World War II, resulting in the attainment of independence and sovereignty for numerous colonies. However, during the initial years of independence, in the 1980s, the Western powers introduced a global structural adjustment program, coercing African countries into acceptance to secure financial loans. In this context, African nations sought to enhance their economic cooperation with China as a means to liberate themselves from the shackles of Western loans accompanied by stringent conditions.

During the 1990s, China embarked on the gradual establishment of a socialist market economy, with a firm commitment from the Chinese government to foster openness to the global arena and enhance China's capacity to leverage international markets. Coinciding with this, African countries were undergoing economic liberalization and privatization, as the process of economic integration across Africa gained momentum, leading to evolving aspirations for cooperation with China. Consequently, numerous innovative models of economic collaboration emerged between China and Africa, such as joint ventures between Chinese and African enterprises, backed by policy and financial support from both governments, along with an increase in personnel and technical training programs facilitating exchanges between China and Africa.

In 2000, in response to the impact of economic globalization, the Forum on China-Africa Cooperation (FOCAC) was established with the primary objective of bolstering economic and trade cooperation between China and Africa while fostering mutual development. This milestone development (*Figure 2*) facilitated triennial ministerial meetings, enabling the expansion of collaboration between China and Africa across multiple domains, including politics, economy, education, health, culture, and science and technology, all in accordance with the evolving specific requirements of both sides. In 2013, Chinese President Xi Jinping proposed the Belt and Road Initiative, envisioning the creation of a community of shared destiny. This initiative also serves as a novel platform to further propel the deepening cooperation between China and Africa, with a focus on advancing common development objectives.

The significant degree of complementarity, the increasing interactions, and the pragmatic approaches between China and Africa have presented crucial opportunities for fostering such partnerships in the future. However, it is worth noting that the present dynamics, with China's economy and emerging power, have raised concerns regarding the potential dominance of China in China-Africa cooperation. With controversial issues gradually emerging on economic power, labor and other issues, China-Africa relations seem to be at a critical juncture in need of urgent renewal. Moreover, while government-to-government cooperation is moving to a new level, civil society cooperation is still in a state of lacking a systematic framework, especially in the practice field. So how to activate this bottom-up development force will be one of the main issues discussed in this project.

Figure 4: Deng Xiaoping (1904-1997), the chief architect of China's reform and opening-up
Source: www.reformdata.org/records/1978.shtml

Figure 5: The first Ministerial Conference of FOCAC was held in Beijing on October 10-12, 2000
Source: AFP PHOTO/Stephen SHAVER

Figure 6: Senegalese and Chinese workers at the construction site
Source: foreignpolicy.com/

Relations at the civil level:
Since 1904, some 200,000 Chinese laborers have been trafficked to the African continent to work in the gold mines of South Africa, on plantations and farms in Tanzania and Mauritius, and on road and rail sites in the Congo and Senegal. The Chinese then settled in various African countries, either forming families with locals or bringing their families from China to Africa, making them a special group of Chinese immigrants. After the founding of New China, with the development of transportation and communication technology, and the rise of China in the world market, the Chinese diaspora in Africa made contact with relatives in their homeland. Renewed relations created a portal through which African demand for low-price consumer goods could flow. Chinese businessmen in Africa, with contacts in China, brought in skilled industrial engineers and technicians such as mechanics, electricians, and carpenters.

There is another type of Chinese immigrant who, after China's reform and opening up, has turned their attention to Southeast Asia and Africa due to increased competition in various industries at home. They found that there was a huge market demand for manufacturing products such as cell phones and small machinery and equipment in these regions, so they started a multinational business, accumulating capital by peddling sub-standard but inexpensive Chinese products in these regions, and then making new investments in these regions. These people belong to the group of private businessmen who travel to Africa spontaneously, and the industries they operate are mostly retail or manufacturing of daily commodities. And they would form their own private chambers of commerce to help each other.

In recent years, as the number of infrastructure construction projects won by China in Africa has increased, a large number of Chinese workers, project managers, and scholars on study tours have gone to Africa for periods ranging from a few months to a few years. (*Figure 3*) This group is characterized by constant movement as the project progresses, and most of them are temporary migrants. They will live together to form temporary communities, and their use of space tends to be more flexible and diverse.

In short, there is a great potential for more frequent and more types of spontaneous China-African interaction, although there are many informal activities and ways of cooperation.

Figure 7: China-Africa Trade (Jan 2022)
Source: UN Comtrade

Figure 8: Africa's trade with the US, China, and the EU (2002-2019, in USD billion, current prices)
Source: SAIS-CARI and Eurostat.

Country	Tatal stock (US $ bn)	Percent of Chinese FDI in Africa
South Africa	6.1	13.8%
DRC	5.5	12.5%
Angola	2.9	6.5%
Zambia	2.8	6.5%
Ethiopia	2.5	5.6%
Ghana	1.8	4.1%
Total six countries	21.6	49.1

Table 1: Main recipients of Chinese FDI (2019, in USD billion)
Source: UNCTAD and China-Africa Research Initiative

1.2.2 China's Economic Engagement in Africa

Currently, China and Africa are in a state of mutual need in terms of economic development - China is seeking resources for its growing economy and consumption, and African countries are seeking funds to develop their infrastructures. 1995 China's internationalization and the 2001 Chinese entry into the World Trade Organization (WTO) paved the way for private companies in China to increasingly connect with, import from, and export to the China-African markets. And the establishment of SEZs abroad was thought to be a powerful tool for this Chinese internationalization, including its presence in Africa. And China overtook and surpassed the United States in 2009 to become the largest trading partner of Africa. And Chinese trade with Africa has increased fivefold since 2001.

"China is now the biggest foreign player in Africa. It's Africa's largest trade partner, the largest infrastructure financier, and the fastest growing source of foreign direct investment. Chinese entrepreneurs are flooding into the continent, investing in long-term assets such as factories and heavy equipment." (Sun, I. Y., 2017)

In terms of trade, low-priced but good-quality manufacturing products such as machinery, electrical, and consumer goods exported from China to Africa (compared to local manufacturing products) allow African customers to raise their purchasing power but it is negative for improving the competitiveness of local companies. In the other direction, Africa mainly exports raw materials such as mineral ores, petroleum, and agricultural products to China. China is now investing in Africa mainly in infrastructure, telecommunications, manufacturing, food and textile industries. And by establishing OECCZs in Africa, a new kind of manufacturing has emerged in Africa and is managed by the Chinese, with African workers producing exports for Chinese, as well as European, American and Japanese customers.

1.2.3 The World Bank and China's SEZs Experience

The 2008 economic and financial crisis served as a turning point that prompted the World Bank to identify China as an exemplar for Africa, with a comprehensive approach encompassing poverty alleviation, reform of property rights, privatization, trade liberalization, opening up to foreign investment, and Special Economic Zones (SEZs). This recognition led to the publication of several reports, shedding light on the potential benefits and implications of adopting such a model. Additionally, the World Bank undertook a critical examination of SEZs, specifically their relevance to Africa, while also considering the role of Chinese investment in the development and operation of SEZs across the African continent.

"The World Bank is working closely with the China Export-Import Bank to bring China's development experience to other developing countries through staff exchanges and joint pilot projects in Africa." (Thierry Pairault, 2022)

Justin Yifu Lin, the former Chief Economist and Senior Vice President of the World Bank, played a pivotal role in establishing the China-Africa Capacity Cooperation project and has been actively advocating for its implementation. In early 2009, Lin put forward a visionary concept akin to a "New Marshall Plan," emphasizing infrastructure development as a fundamental pillar for global recovery. Lin firmly believes that cooperation between China and Africa holds significant potential to achieve a mutually beneficial outcome. (Oqubay, A., & Lin, J. Y., 2019)

One notable aspect underscored by Lin is the noteworthy contribution of special economic zones (SEZs) to China's economic progress, presenting a replicable model for Africa. Shenzhen, China, stands out as an emblematic case of a successful SEZ. SEZs are designated zones created by a host country within its own territory, strategically designed to attract foreign investment and stimulate local development. The spatial concentration of industries within SEZs, coupled with accompanying specialized legal frameworks, forms the cornerstone of effective industrial and developmental policies. Lin's advocacy highlights the significance of embracing SEZs as an integral part of Africa's economic growth and development strategy.

Figure 9: World Bank Publications (around 2008)
Source: www.worldbank.org/en/research/brief/publications

1.2.4 African Industrialization and Industrial Parks

Africa's rapid urbanization has been accompanied by an increasing level of industrialization. According to the African Development Bank Group in 2019, Africa is home to 5 of the 10 fastest-growing economies in the world, but this growth is unsustainable and noninclusive since it is mostly driven by the export of unprocessed commodities with little value addition. So it is time for African countries to transform and upgrade their industry. The African Development Bank has adopted an industrialization strategy for Africa 2016–2025:

① Foster successful industrial policies;
② Attract and channel funding into infrastructure and industry projects;
③ Grow liquid and effective capital markets
④ Promote and drive enterprise development
⑤ Promote strategic partnerships in Africa
⑥ Develop efficient industry clusters across the continent
(African Development Bank & African Development Bank Group., 2019)

Thus, it can be seen that the industrial park model and the African development strategy are a perfect match. The industrial park model is applied mainly for industrial development, but the development of industrial parks also goes through stages from primary to advanced. In the beginning, the industrial park focused on its economic function and was usually located in the more peripheral parts of the city due to the negative environmental impact. As companies gather and expand, new residential areas and services are built in and around the industrial parks to solve the commuting problems of employees. With the further development of industrial parks and the transformation and upgrading of industries, they gradually develop into science and technology parks and business parks, with less environmental impact and greater industrial added value. Therefore, in this project, the industrial park will be studied as a model that is dynamically changing at the spatial, socio-economic, and governance levels, and based on the historical changes of the case, a future-oriented and progressive development strategy will be proposed based on its current situation.

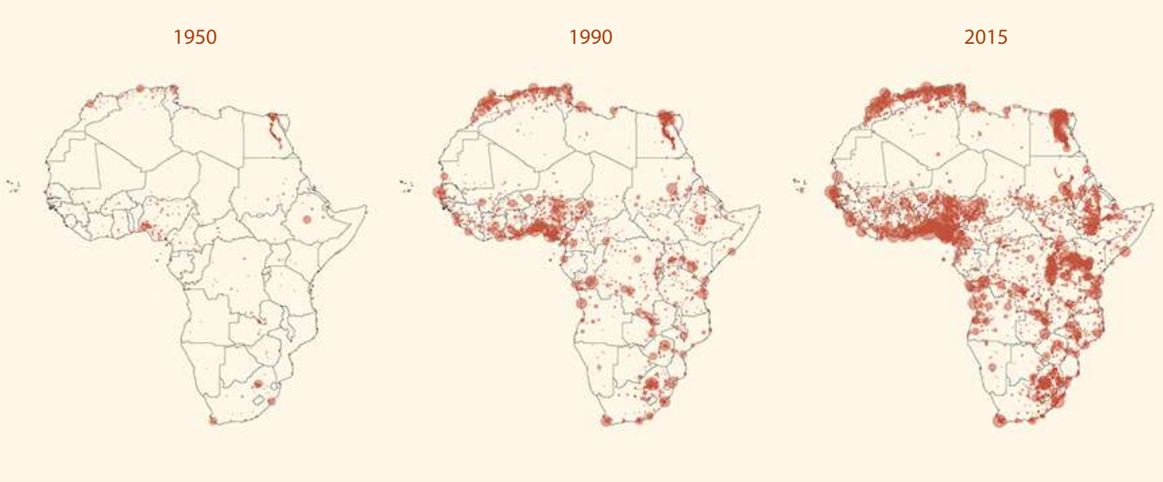


Figure 10: Level of urbanization in Africa 1950, 1990, 2015
Source: Sahel and West Africa Club Secretariat

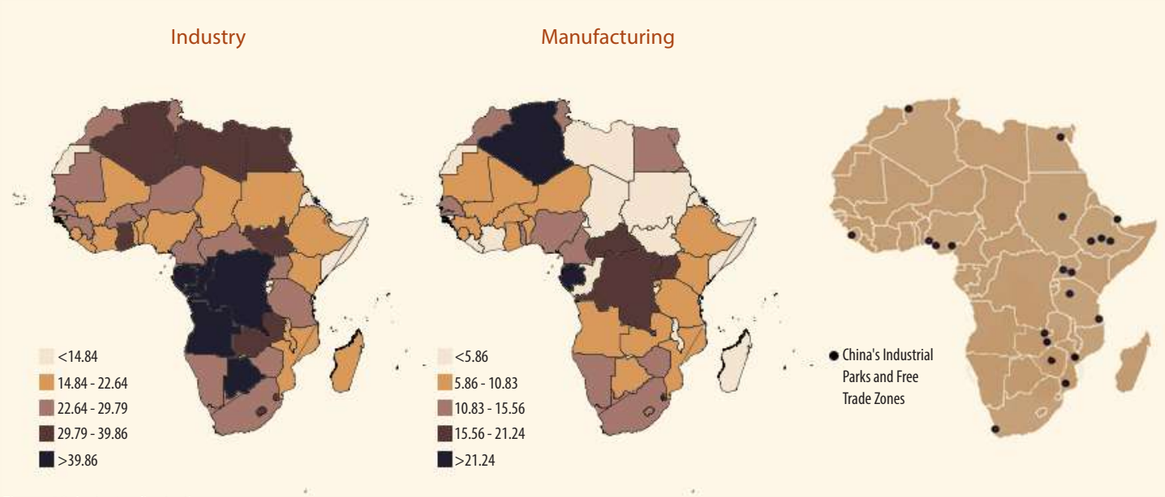


Figure 12: Industry (including construction), value added (% of GDP) in Africa (2015)
Source: The World Bank Data

Figure 13: Manufacturing, value added (% of GDP) in Africa (2015)
Source: The World BWank Data

Figure 14: China's Industrial Parks and Free Trade Zones in Africa
Source: Silk Road Briefing

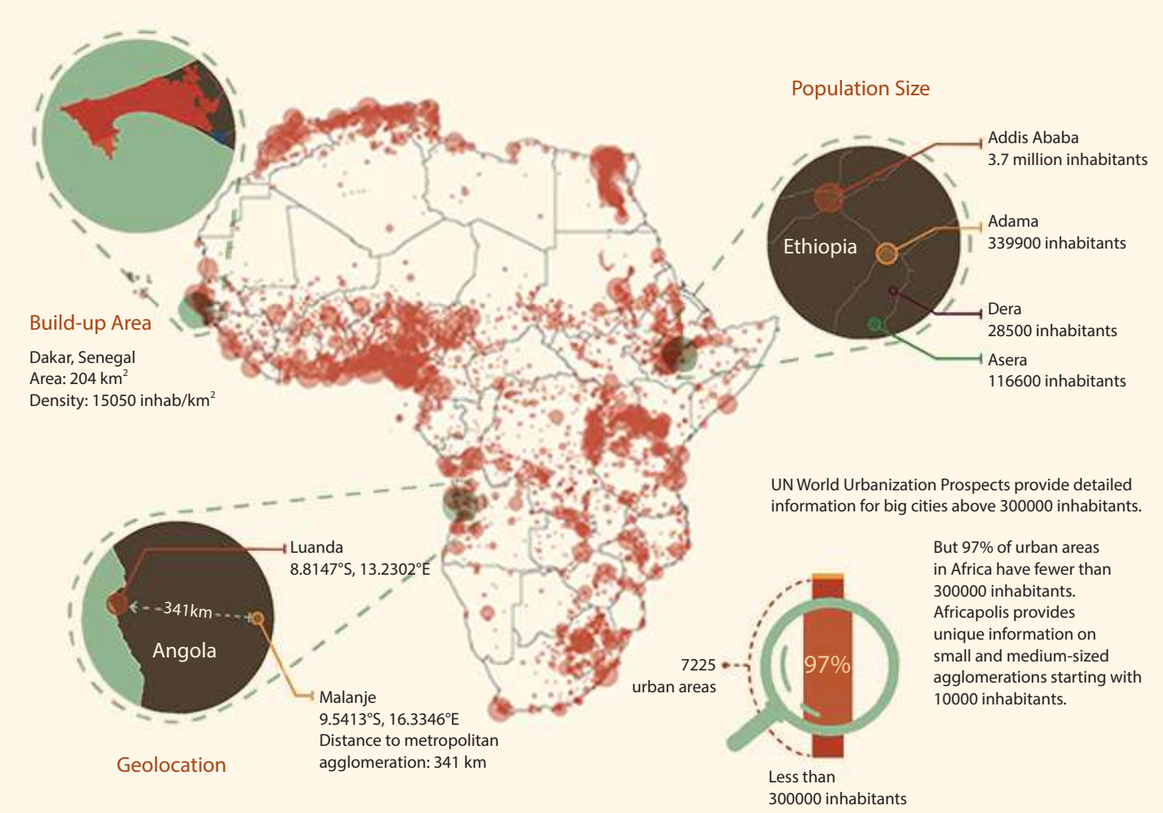


Figure 11: Urban dynamics in Africa (2015)
Source: The OECD Sahel and West Africa Club's Africapolis platform

Figure 15: Huge industrial unit on the outskirts of Cairo, belonging to the Egyptian Refining Company (ERC)
Source: Modern Diplomacy, 2020

1.3 Ethiopia Context

1.3.1 Historical Background of Ethiopia-China Relations

China's diplomatic ties with Ethiopia were established in 1970, marking the beginning of their bilateral relationship. In 1991, following a change in government, Ethiopia's leadership demonstrated a strong inclination towards Eastern Asian nations, forging partnerships with countries in the region. This strategic shift was driven by Ethiopia's desire to glean valuable development insights from the successful transformation of these nations, as they transitioned from agrarian to industrial-based economies successfully.

Significantly, since 2000, Ethiopia has undergone remarkable economic growth, accompanied by a deepening of economic ties with China. During this period, Ethiopia emerged as the fastest-growing economy in Africa, drawing inspiration from China's economic development model and receiving substantial investment from China. Consequently, China has emerged as one of Ethiopia's primary economic partners. The inception of the Comprehensive Cooperative Partnership (CCP) in 2003 further accelerated the pace of bilateral relations, leading to the signing of additional agreements encompassing socioeconomic, political, and technical cooperation between the two nations.

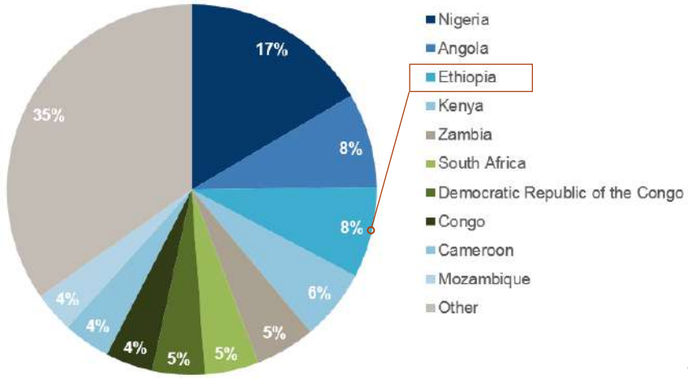


Figure 16: Locational distribution of Chinese investment in Africa
Source: Chinese Investment Tracker, AEI, 2018

1.3.2 China's Involvement in Ethiopia

Because Ethiopia's domestic policies have demonstrated relative stability, a robust market could be established for Chinese goods and favorable conditions could be offered for the growth of Chinese enterprises, with policy support at the government level on both sides, Ethiopia quickly attracted the interest of both Chinese SOE investors and private investors. Additionally, Ethiopia boasts advantages such as a labor force characterized by low costs. As a result, China's economic involvement in Ethiopia has gradually increased. In 2018, Ethiopia has become one of China's largest investment partners on the continent. (*Figure 14*) According to some evidence provided by the World Bank, Chinese companies have created a large number of jobs for Ethiopians, with a 19% increase in employment since 2008.

China's approach towards Ethiopia differs from that of the EU, which classifies Ethiopia as an aid recipient. China has forged a distinctive economic partnership with the Ethiopian government, combining aid with official financial flows, Foreign Direct Investment (FDI), and bilateral trade. To facilitate and promote Chinese investments in Ethiopia, the Joint Ethiopia-China Commission (JECC) was established in 1998, bringing together Ethiopia's Ministry of Finance and Economic Development (MOFED) with China's Ministry of Finance and Commerce. The JECC serves as a coordination platform for fostering economic and technical cooperation between the two countries. Since 2000, the volume of Chinese investment in Ethiopia has witnessed a steady increase, taking the form of two primary modalities: joint ventures and Chinese-owned investments, which are mainly centered on sectors such as manufacturing, real estate, telecommunications, and infrastructure. As of 2022, FDI from China is the largest, as seen in *Table 2*. And according to Ethiopian Policy Studies Institute (PSI), to attract more FDI inflow, the industrial park projects could be a helpful instrument. (PSI, 2022)

	Country of Origin	No. of Operational Projects	% of JV Share with Ethiopians	Capital Investment (Million Birr)	Permanent Employment
1	China	1,005	12.2	45,372.6	172,789
2	India	287	25.4	6,405.4	27,750
3	United States	202	35.1	2,294.7	5,990
4	Turkey	133	24.8	12,113.6	17,442
5	Sudan	131	20.6	1,360.6	4,632
6	Netherlands	125	52.8	3,880.2	8,364
7	Britain	114	39.5	1,500.5	4,938
8	Italy	101	51.5	1,109.2	14,729
9	Saudi Arabia	98	51.0	19,056.0	22,970
10	France	60	53.3	3,498.7	2,562
11	Germany	59	47.5	950.4	2,697
12	Israel	52	36.5	779.9	6,679
13	South Korea	45	0.0	675.7	3,353
14	Canada	38	39.5	320.5	887
15	Yemen	38	26.3	247.4	1,182
16	Egypt	35	51.4	1,404.3	2,166
17	Kenya	30	0.0	476.9	1,260
18	Pakistan	30	0.0	1,124.7	2,356
19	UAE	30	53.3	761.1	1,084
20	Sweden	28	46.4	218.2	894
Sum (top 20)		2,641	-	103,547.6	304,724
Share of Top 20 (%)		79.5	-	72.1	81.4
Sum (other countries)		682	-	40,069.95	69,650.7
Grand Total		3,323	-	143,617.5	374,374.7

Table 2: Top 20 Countries of Origin for Operational FDI Projects (1992-2020) in Ethiopia
Source: EIC., 2022

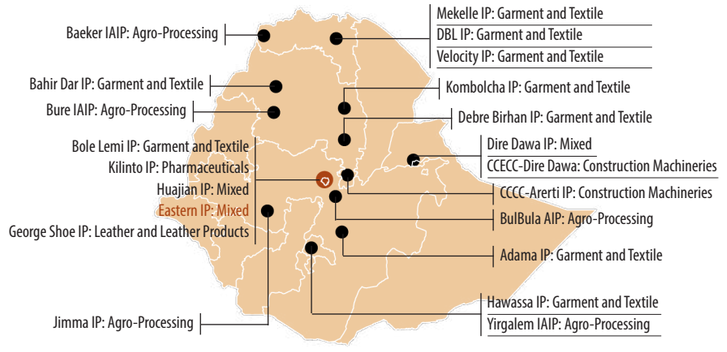


Figure 17: Map of Industrial Parks in Ethiopia (as of 2021)
Source: EIC, 2021

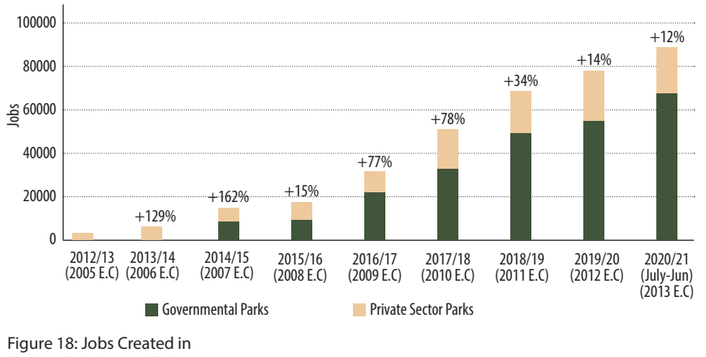


Figure 18: Jobs Created in Ethiopia's Industrial Parks
Source: IPDC and EIC.
Note: E.C = Ethiopian calendar.

1.3.3 Industrialization & Industrial Park Development in Ethiopia

Initially, Ethiopia focused on agriculture as the main catalyst for its post-war economic growth from 1995 to 2015. However, since 2010, the country has increasingly prioritized the development of the manufacturing sector to drive sustained economic growth and facilitate structural transformation. (Arkebe Oqubay, 2019) And the five-year plans are very critical policy tools, especially including Growth and Transformation Plan I, 2010/11-2014/15 (GTP-I), Growth and Transformation Plan II, 2014/15-19/20 (GTP-II). In terms of industry, GTP-I mainly focused on micro and small enterprises development, medium and large industries development, industrial zones development, and public enterprises management and privatization. (Ethiopian Ministry of Finance and Economic Development, 2010) However, the results of the implementation showed that the achievements in the manufacturing sector were lower than expected. So GTP-II has high hopes of achieving significant progress in the manufacturing sector to fulfill national ambitious goals. In addition, one-stop service (OSS) and Industrial parks (specialized) are also key policy instruments, which are facilitative for FDI and manufacturers. (Arkebe Oqubay, 2019) And the development of industrial parks is aimed to promote export-oriented manufacturing sub-sectors, subsidized facilities (land, sheds, bank services), one-stop government services, and skills development.

Industrial park is a spatial-based development policy, widely used to address investment climate constraints and to pilot investment climate reforms that allow governments to experiment with reforms. (The World Bank, 2022) Drawing on the experience and strategies of East Asian countries in the construction of special economic zones and industrial parks, the construction of industrial parks in Ethiopia started in 2007 with the Eastern Industry Zone project as the first pilot. (*Figure 17*) By 2021, Ethiopia had a total of 13 operational public industrial parks (IPs) and five private IPs and three government-owned industrial parks and one privately-owned industrial park under construction. The public IPs primarily concentrate on light manufacturing industries, particularly apparel and leather products, with an emphasis on catering to the export market. On the other hand, private IPs encompass a variety of sectors ranging from apparel to cement and steel, serving both domestic and export customers. By 2021, all industrial parks in the country had already generated around 90,000 jobs. These parks have played a significant role in the creation of new formal private-sector jobs. (*Figure 16*)

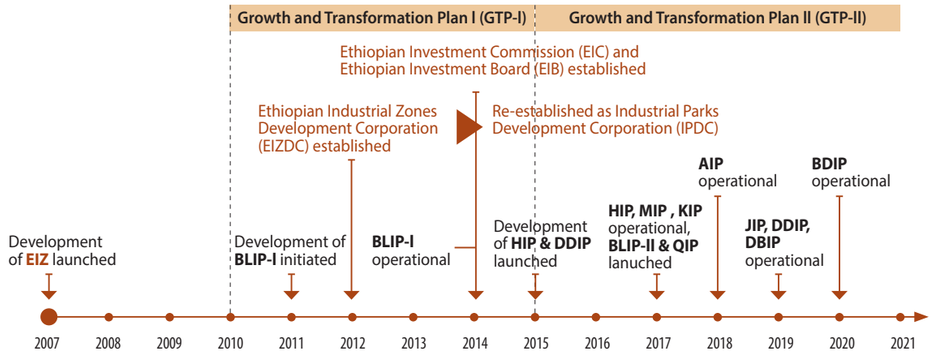


Figure 19: Key Milestones of Ethiopia's Industrial Park Program
Source: World Bank representation based on data from IPDC.
Note: BLIP-I = Bole Lemi I IP; BLIP-II = Bole Lemi II IP; DBIP = Debre Berhan IP; DDIP = Dire Dawa IP; HIP = Hawassa IP; IP = industrial park; JIP = Jimma IP; KIP = Kombolcha IP; MIP = Mekelle IP; QIP = Kilinto IP.

The development of industrial parks in Ethiopia has progressed through different stages. In 2007, the first industrial park-Eastern Industry Zone was established by a private investor from China. This initial park aimed to attract foreign private investment and serve as a learning experience for the development and operation of industrial parks. Formally introducing the industrial park concept, it was included in Ethiopia's first Growth and Transformation Plan (GTP-I, 2010-2015). However, significant attention was given to industrial parks during the subsequent GTP-II (2015-2020). This phase increased the emphasis on industrial parks and set sector-specific targets, with the objective of positioning Ethiopia as a leading player in light manufacturing across Africa. In 2015, the Ethiopian government also introduced a revised industrial park policy to tackle the country's socioeconomic development challenges, further enhancing the industrial park development efforts.

The development of industrial parks in Ethiopia involves multiple stakeholders, including regulatory bodies, developers, operators, and enterprises. The regulatory entities responsible for overseeing industrial parks are the Investment Board and the Ethiopian Investment Commission (EIC). The EIC plays a crucial role in streamlining and ensuring the efficient operation of the regulatory environment for industrial parks. It directly reports to the Prime Minister. Developers can be either private, public, or engage in public-private partnerships (PPPs). After the establishment of IPDC in 2014, the infrastructure and other services in the industrial park will be in charge of it. The operator is responsible for the daily provision of services to investors, tenants, and residents within the industrial park. This includes marketing, leasing or subleasing of land and/or buildings, solid waste removal and treatment, maintenance, security, and other necessary services. For details on their roles, see *Table 3*. (Weldesilassie, A. B., Gebreeyesus, M., Abebe, G., & Aseffa, B., 2017)

Name of Institution	Mandates, Roles and Responsibilities
Ethiopia Investment Board	Strategic decisions and approval
Ethiopia Investment Commission	Regulatory and licensing body. It also does investment/export promotion.
Industrial Park Development Corporation	Acts as a developer, and operator, leads national IP development master plan, prepares serviced land bank for private developers, and enforces infrastructure provision up to the border.
Ministry of Industry	Industry extension
Service Providers (Customs, banks, EEPCO, Ethio-telecom, etc.)	Services provision
Competent Authorities	Provide public utility services
Ministry of Environment and Forestry	Regulates environmental impact of IPD

Table 3: Key IP institutional stakeholders and their roles
Source: Weldesilassie, A. B., Gebreeyesus, M., Abebe, G., & Aseffa, B., 2017

Industrial Zone	Developer	Location	Size	Status
Bole Lemi I	Government / IPDC	15 km SE of Addis Ababa center	156 ha; 20 factory sheds	Fully operational
Bole Lemi II	Government / IPDC	Adjacent to Bole Lemi I	186 ha; 15 sheds and parcels of land planned	Under construction
Kilinto	Government / IPDC	20 km S of Addis Ababa center	308 ha with possibility of expansion	Under construction
Hawassa	Government	175 km S of Addis Ababa	270 ha	Phase I - Fully operational
Dire Dawa	Government / IPDC	East of Addis Ababa, 300 km from Djibouti	1,500 ha	Under construction
Komboleha	Government / IPDC	North of Addis Ababa, near Dessie	1,000 ha	Completed but has not started production yet
Mekelle	Government / IPDC	Mekelle	1,000 ha	Completed but has not started production yet
Adama	Government / IPDC	Adama	675 ha	Planned
Jimma Industrial Park	Government / IPDC	Jimma	350 ha	Planned
Bahir Dar Industrial Park	Government / IPDC	Bahir Dar	350 ha	Planned
Air Lines Logistics Park	Government / IPDC	Addis Ababa	200 ha	Planned
Awash Arba Industrial Park	Government / IPDC	Awash area	225 ha	Planned
Andido Industrial Park	Government / IPDC	Andido	425 ha	Planned
Bishoftu Industrial Park	Government / IPDC	Bishoftu	180 ha	Planned
Asayta Semera Industrial Park	Government / IPDC	Asayta	274 ha	Planned
Eastern Industry Zone	Jiang Su Qi Yuan Group (China)	South of Addis Ababa, Dukem	500 ha in total; 11 sheds	Phase I - Fully operational
Huajian Shoe City	Huajian	Jemo area inside Addis Ababa	138 ha	Under construction
Gaizo	JV of Ayka & Government	Jemo & Gulale areas	3 factories	Planned
Kingdom Linen	Kingdom Group (Hong Knog, China)	South of Addis Ababa	30 ha	Planned
Ethio Turk Intrenational Industrial City	Akgun Group (Turkey)	35 km of Addis Ababa	1,300 ha in total	Planned
George Shoe City	George Shoe (Taiwan, China)	Mojo	50 ha	Under construction

Table 4: List of existing and planned industrial zones in Ethiopia
Source: Weldesilassie, A. B., Gebreeyesus, M., Abebe, G., & Aseffa, B., 2017

1.4 Motivation

The project stems from a reflection on the middle space between receiving only assistance and relying entirely on oneself. This issue was once a major dilemma for China, and is a choice that many countries in Africa are facing today. How are developing countries to stand firm in the wave of globalization? If it is difficult to avoid external forces, is there a win-win possibility rather than passive resistance? And in countless related choices and practices, these flows of resources, capital, products, people, etc., all the time exert their own influence on various scales from global to small town.

In the case of Ethiopia, for example, the strong government chose to learn from the advanced experience of East Asian countries in developing their economies, but at the same time focused on guiding the endogenous development of its industries. On this basis, the role of industrial parks, a model that has contributed greatly to China's fast-growing economy and is now chosen by the Ethiopian government, is explored in this project. With the construction of industrial parks, many enterprises and populations are attracted to the industrial parks and their surroundings, gradually forming special industrial towns. This spatial phenomenon is well worth studying in the present context of multilateral cooperation in the context of socio-economic impacts, spatial design and governance systems.

Moreover, out of my personal ambition, I hope that this project will generate a discussion, even if only a little, among people from different fields and regions, which will be an opportunity for us to reflect on whether the so-called "assistance" currently given to Africa around the world really has a sustainable and positive impact on its economic and social development. I hope that the people of Africa can really achieve their own integrated local development.

1.5 The Case of Eastern Industry Zone

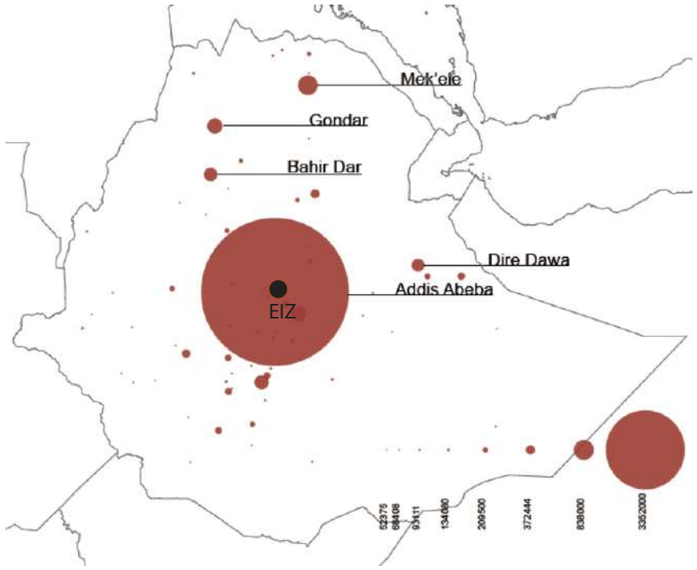


Figure 20: Map of the population in Ethiopia
Source: Grenestedt, A., Kobylakiewicz, B., Crijns, F., Yilmaz, H., van Eijs, M., de Ridder, M., ... & Shia, Z. M., 2021

Looking at the map of population distribution in Ethiopia (*Figure 18*), it presents very unequal results. By 2020, there are more than 4,000,000 inhabitants living in Addis Ababa, the capital of Ethiopia, while the second largest city, Mekelle, has only 440,000 inhabitants. Thus, Addis Ababa is the rightful metropolis of Ethiopia, where all kinds of resources and elements converge. An important transportation corridor, the Addis Ababa-Djibouti port transportation corridor, also begins here. In this project, the Eastern Industry Zone is located on this corridor, in the Dukem-Debre Zeyit region, which is also a key node along this corridor.

Convenient transportation and proximity to the metropolis (the right distance for lower land rents), the strategic location of the Eastern Industry Zone has led it to operate in a way that allows it to quickly integrate resources from all sides and to play a role that goes beyond the ordinary industrial park and is more closely linked to local urbanization and industrialization.

Figure 21: Map of railway system in Ethiopia
Source: Grenestedt, A., Kobylakiewicz, B., Crijns, F., Yilmaz, H., van Eijs, M., de Ridder, M., ... & Shia, Z. M., 2021

Figure 22: Location of Eastern Industry Zone
Source: Author, 2023

The main reason for choosing Eastern Industry Zone as the case study is that it is the first industrial park in Ethiopia, established during Ethiopia's first Growth and Transformation Plan (GTP-I) (2010–15). It was started by a private developer and operator from China as a result of a bilateral governmental agreement between the two countries with the goal to attract investments from China. Its construction has also seen the most critical decade (2010-2020) of Ethiopia's policy exploration around industrialization and industrial park development. And as a result of its construction and operation, it has prompted the population from other parts of Ethiopia to gather in the region, resulting in the emerging small town of Dukem. (See Chapter 2.1, *Figure 33* for more details)

Eastern Industry Zone is located in Dukem, Oromiya region, about 30 kilometers southeast of Addis Ababa, the capital of Ethiopia. Also to the southeast of it is a town larger than Dukem - Debre Zeyit, with a population of about 180,000 in 2021. It was developed and operated entirely by the Chinese, and the park plan was also designed by a Chinese design firm commissioned by the park. About the local incentives, besides the provision of land at an extremely favorable rate—an annual rate of 1 Ethiopian birr (around US$0.05) per square meter for 99 years—the Ethiopian government also agreed to provide all the necessary infrastructure outside the zone and to cover the cost of 30 percent of the internal infrastructure. Founded in 2007, since the initial investment was not so smooth, it was not until 2010 that the first company, the Zhongshun Cement Company, was hosted. The EIP started by focusing on the production of construction materials as well as light industries, including the production of pharmaceuticals, electronics, chemicals, and leather. However, this is now widely diversified, but the textile and apparel industry remains the sector that generates the most employment in the park. (*Table 5*)

Figure 23: The gate of Eastern Industry Zone, Dukem, Ethiopia
Source: e-eiz.com

The planned area for Eastern Industry Zone is 500 hectares (233 ha for Phase One, and 267 ha for Phase Two) and the title deed covering the area of 400 hectares has been issued from the local land administration. Currently the Phase One (233 hectares), out of the total 500-hectare planned area, has already been operational. (*Figure 22*)

Figure 24: The spatial plan of Eastern Industry Zone, made in 2009
Source: e-eiz.com

By 2018, Eastern Industry Zone has completed the construction of a water supply system, sewage system, power supply system, road system, standard-type workshops, office buildings, greening, 252,000 KV substation, sewage treatment station and other facilities in the Phase One area. More than 80 enterprises have settled in the park, providing about 14,700 jobs for the local community and paying a total of US$80 million in taxes.

In addition to the political and economic impact of the Eastern Industry Zone, its implementation has been accompanied by an influx of people from other parts of Ethiopia to the two towns surrounding the industrial park. Now it is not just a space for production, but it is intertwined with the surrounding towns on both visible and invisible dimensions and plays a role in the capital's megalopolis.

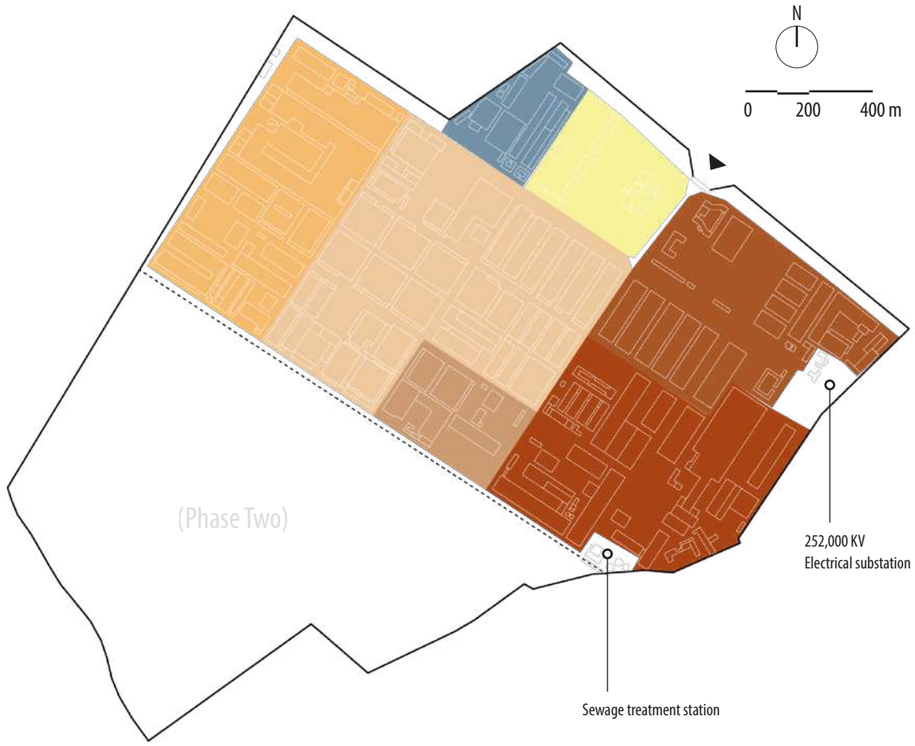


Figure 25: Land use in Phase One of EIZ
Source: Author, 2023

Business Field of companies in EIZ	Number
Textile & Garment	24
Construction & Building Material	11
Plastic Products	9
Car Assembly & Spare Part	5
Shoes & Bags/Leather	3
Food	2
Soap & Detergent	2
Print & Paper	2
Wood Products	2
Aluminum Products	2
Pharmaceutical	1
Electronic Products	1
Ceramic Products	1
Machinery Rental	1
Hotel Service	1
Total	67

Table 5: Business field of companies in EIZ in 2017
Source: Selam Gebeyehu, 2017

Figure 26: Employee dormitory in the Eastern Industry Zone
Source: Photoed by Nan Ma, 2023

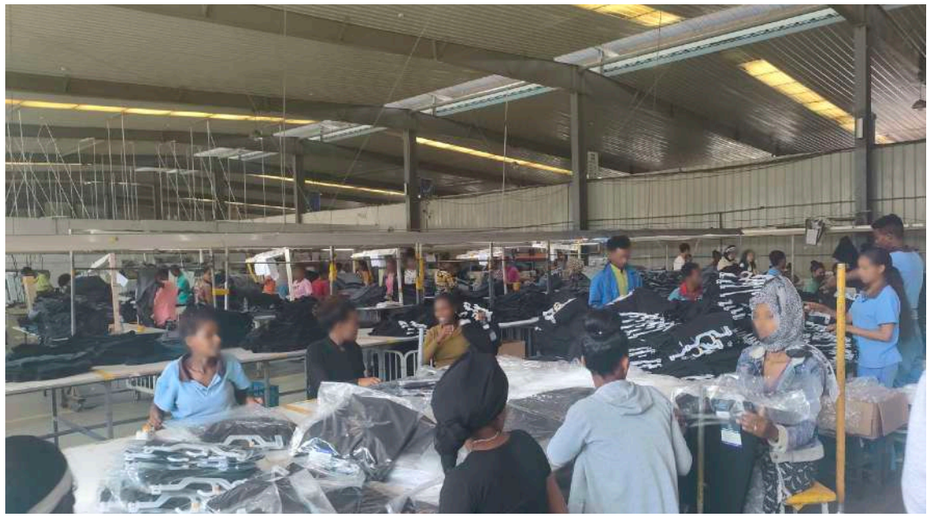


Figure 27: Scene inside the garment factory in the Eastern Industry Zone
Source: Photoed by Nan Ma, 2023

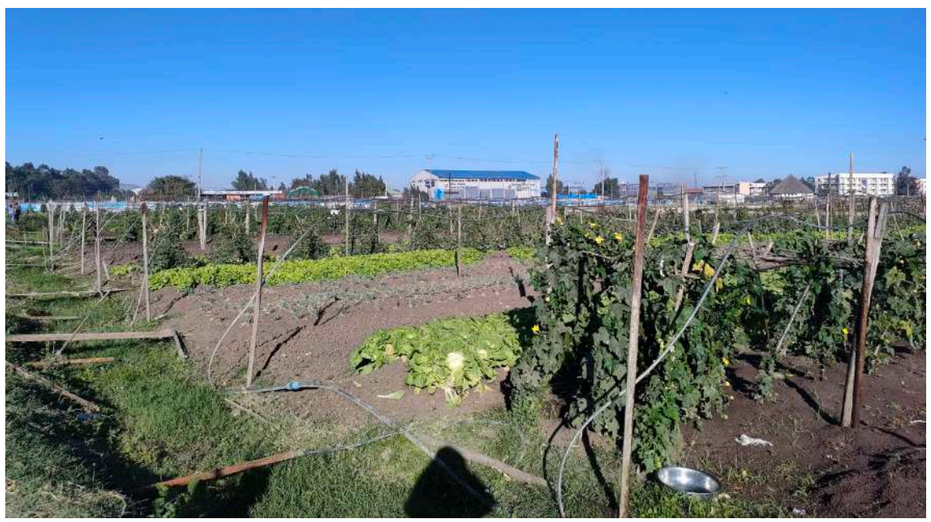


Figure 28: Vegetable field in the Eastern Industry Zone
Source: Photoed by Nan Ma, 2023

Figure 29: Huajian's shoe factory in Eastern Industry Zone
Source: www.dailymaverick.co.za/article/2019-02-04-ethiopias-industrial-parks-hard-yards-but-whats-the-alternative/

02 PROBLEM FIELD

2.1 Current Situations

2.1.1 Multi-scale Dynamic Complexity

An important characteristic of this research is the exploration of the role of the Eastern Industry Zone at multiple scales. It is well known that within the larger city region, different places, or hierarchical areas, perform different and complementary functions, so they interact through commuting, trade, information, or other flows. (Parr, J. 2005) Thus, in Addis Ababa, a mega-city region covering a population of almost 3 million, the Eastern Industry Zone, 30km from its center, is embedded in this hierarchy. EIZ, as only China's overseas economic and trade cooperative zone in Ethiopia at the national level, and also the only Chinese-invested park in Ethiopia with access to the Ethiopian local market, will have both local and transnational impacts.

The macro scale is defined by the distribution, size and structure of cities in Ethiopia. EIZ is right in Addis Ababa's sphere of influence. Also, since Ethiopia is a landlocked country, the port of Djibouti, located to its northeast, is very crucial for its trade and transportation. EIZ is one of the key nodes of the important economic and transportation corridor Addis Ababa-Dire Dawa-Djibouti port, based on rail and road.

Figure 30: Location of Addis Ababa-Dire Dawa-Djibouti corridor
Source: Author, 2023

The mesoscale includes the EIZ and the two surrounding towns, Dukem and Debre Zeyit, covering approximately 200,000 inhabitants. Dukem is relatively small and most of the residents are mainly engaged in agriculture. With the establishment of EIZ, many people from other regions of Ethiopia have moved here in search of new and stable job opportunities. Debre Zeyit is a resort town, due to its better landscape resources, such as lakes. It also has better public services such as schools, hospitals, and sports fields than Dukem. Due to the establishment and operation of the Eastern Industry Zone, the boundary between these two towns has been gradually dissolved. This trend of gradual integration of industrial space and urban space has already been demonstrated at the mesoscale.

On the micro-scale, this study is not limited to the scope of the existing Eastern Industry Zone, but also pays attention to its surrounding environment, especially emphasizing the transitional space between the local community and the industrial space. The industrial park is not a single production space with a huge volume, although in the first phase of the current Eastern Industrial Park, living space and other service spaces account for a very small proportion. Simply and rudely dividing the industrial park from the city with walls and fences is a negative approach both spatially and socially. With the continuous expansion of surrounding towns, the buffer area between industrial parks and cities is a focus destined to be explored.

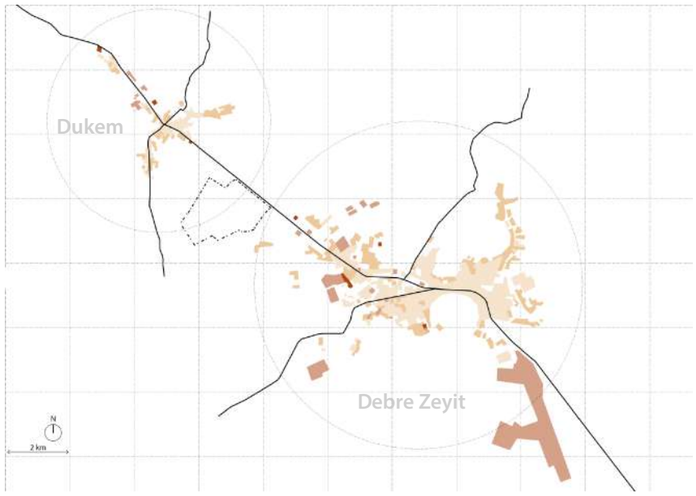
Figure 31: Macro scale - Addis Ababa megacity region
Source: Author, 2023
Note: Data from Google Earth

Figure 32: Mesoscale - EIZ, Dukem and Debre Zeyit
Source: Author, 2023
Note: Data from Google Earth

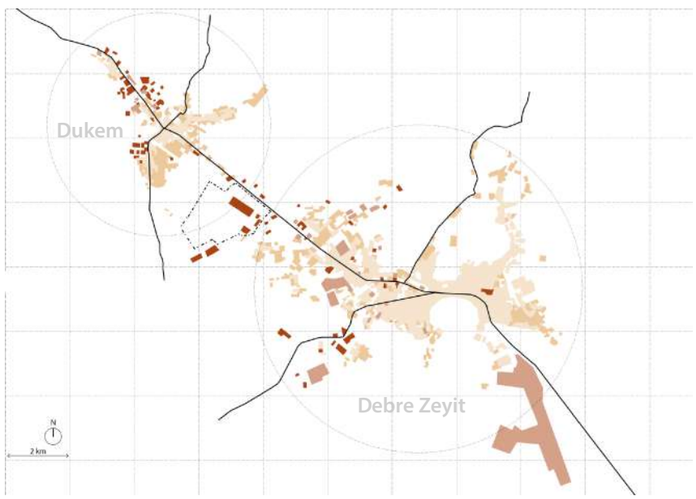
Figure 33: Micro scale - EIZ and surrounding environment
Source: Author, 2023
Note: Data from Google Earth

2000

2005



2010



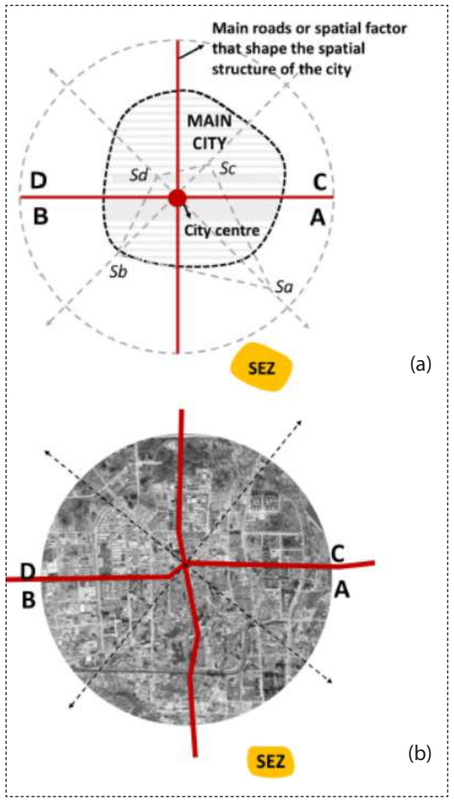
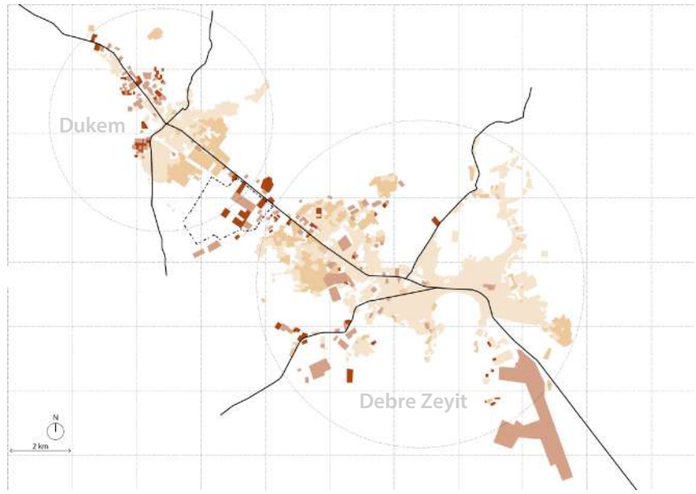


Figure 34: Assessing the spatial impact of an SEZ
Source: J Xu & X Wanf, 2020
Note: (a)How to divide and name the built-up area of a city; (b) An example

According to *Figure 32*, this spatial model is used by J Xu and X Wang in their research on assessing the spatial impact of a special economic zone. The city is divided into 4 concentric sectors by primary roads or major rivers, and within each sector spatial features are assessed over time and urban expansion. Thus the main expansion direction of the city can be effectively analyzed and predicted. (J Xu & X Wanf, 2020) In this project, this model is used for reference to describe and analyze the impact of the establishment of the Eastern Industry Zone on the expansion of Dukem and Debre Zeyit.

As can be seen from *Figure 33*, the establishment of the EIZ led to a significant boost in local employment. Prior to its establishment, there was minimal growth in job-intensive land use in the two cities, with only a 2.8 percent increase between 2000 and 2005. However, after 2007, the EIZ started operating and attracting industrial activities, and the rate of job-intensive land use expansion accelerated. Between 2005 and 2010, it grew by 30.8 percent, and from 2010 to 2015, it further increased by 58.5 percent. Job-intensive land use usually refers to the utilization of land

2015



2020

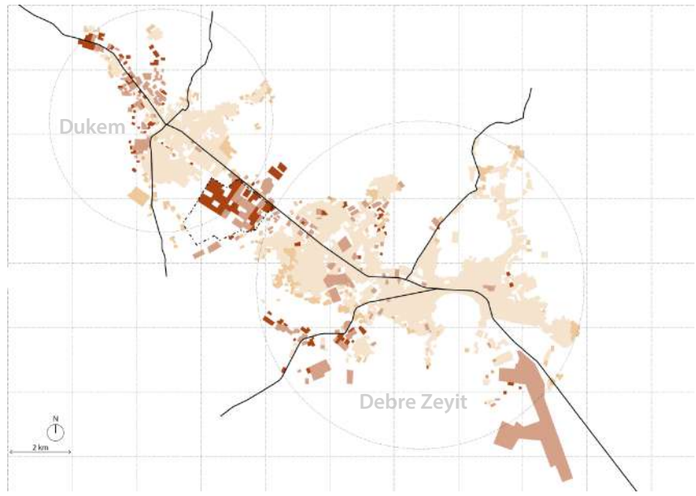
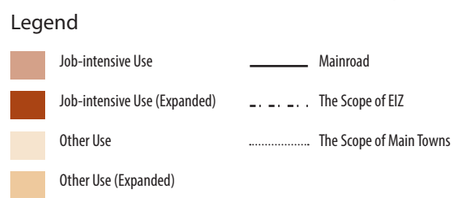


Figure 35: Urban expansion in the Dukem-Debre Zeyit Region between 2000 and 2020
Source: Author, 2023
Note: Reference to Google Historical Maps



Type	Number	Capital ($)	Employment
Industry & Manufacturing	423	17,811,954,354	22,221
Agro Processing	46	315,768,407	1,711
Commerce	120	686,427,910	3,484
Service	19	38,343,331	608
Total	608	18,852,494,002	28,024

Table 6: Type of Investment by Employment and Capital
Source: Dukem Town Investment Office, 2020

for economic activities that generate a significant number of employment opportunities. So this type of land use typically involves industries or sectors that require a large workforce to operate effectively. Examples of that include manufacturing plants, industrial parks, logistics centers, commercial establishments, and other business ventures that create substantial employment opportunities within a given area. (X Wang, D Shen, G Yu, T Nie & Y Kou, 2013) So in this project, the industrial park and these local industrial clusters are all job-intensive environments. And based on the changes in the series of images, local factories tended to cluster around the EIZ to seek better sharing of infrastructure, especially the provision of power.

In addition, the arrival of labor from distant rural regions, enticed by the employment prospects offered by the concentrated investors, has led to considerable housing demand. The construction of housing and related public service facilities has also increased rapidly in the past decade. But it is worth noting that the attraction of the Eastern Industry Zone is more in the attraction of job-intensive activities, which will also provide new opportunities for the cluster development of local micro and small manufacturing enterprises. But the centers of the two towns will remain separate.

2.1.2 A Strong Top-down Implementation

First of all, the political background of the establishment of the Eastern Industry Zone was the strong determination of both governments to promote cooperation between China and Ethiopia. According to the interview and investigation, although the Eastern Industry Zone belongs to a private Chinese developer, due to the political system in China and other reasons, it was the government of the province he came from and the higher level of the Chinese government that led behind it. From the initial negotiations to the signing of the agreement and the start of the location process for the industrial park, all of these activities took place at the government level. With a clear direction and active involvement from the Chinese government and investors, the establishment of the industrial park has been driven by a strong central authority. This top-down approach ensures effective coordination, efficient decision-making, and streamlined execution of the project.

After site selection, the implementation phase begins with the allocation of resources and the mobilization of Chinese companies to set up operations within the industrial park. The Chinese government provides financial support, technical expertise, and necessary incentives to attract businesses to invest in the park. Additionally, Chinese enterprises often play a significant role in financing, constructing, and managing the park's infrastructure, including roads, power supply, and communication networks. The top-down approach ensures efficient coordination between Chinese investors, government agencies, and local authorities.

On the other hand, there are also some implied risks. The top-down approach has indeed resulted in the limited involvement of local stakeholders and communities in decision-making processes. This led to a lack of inclusivity and reduced opportunities for local input in shaping the development of the industrial park. Local concerns and preferences were not adequately addressed. As the Ethiopian government was eager to carry out the pilot industrial park back then, the site selection of EIZ was only considered a flat and open area and occupied a lot of agricultural land. Although the compensation negotiation with local farmers was the responsibility of the local government, there were some cases where opinions were not unified. This could lead to social and cultural tensions in the future.

In addition, the top-down approach also has the potential to lead to unequal distribution of benefits. The majority of economic gains are accrued by foreign investors rather than benefiting the local population. Although the products of the Eastern Industry Zone can be allowed to enter the Ethiopian domestic market, according to the results of the questionnaire survey, the local people still think that this share is very small and hope to increase it.

Another risk stems from the impediment of top-down approaches to knowledge and technology transfer. Chinese managers and local workers have become a common corporate configuration. Limited opportunities for local workers to actively participate in decision-making and management roles may hinder their capacity to acquire valuable skills and experience.

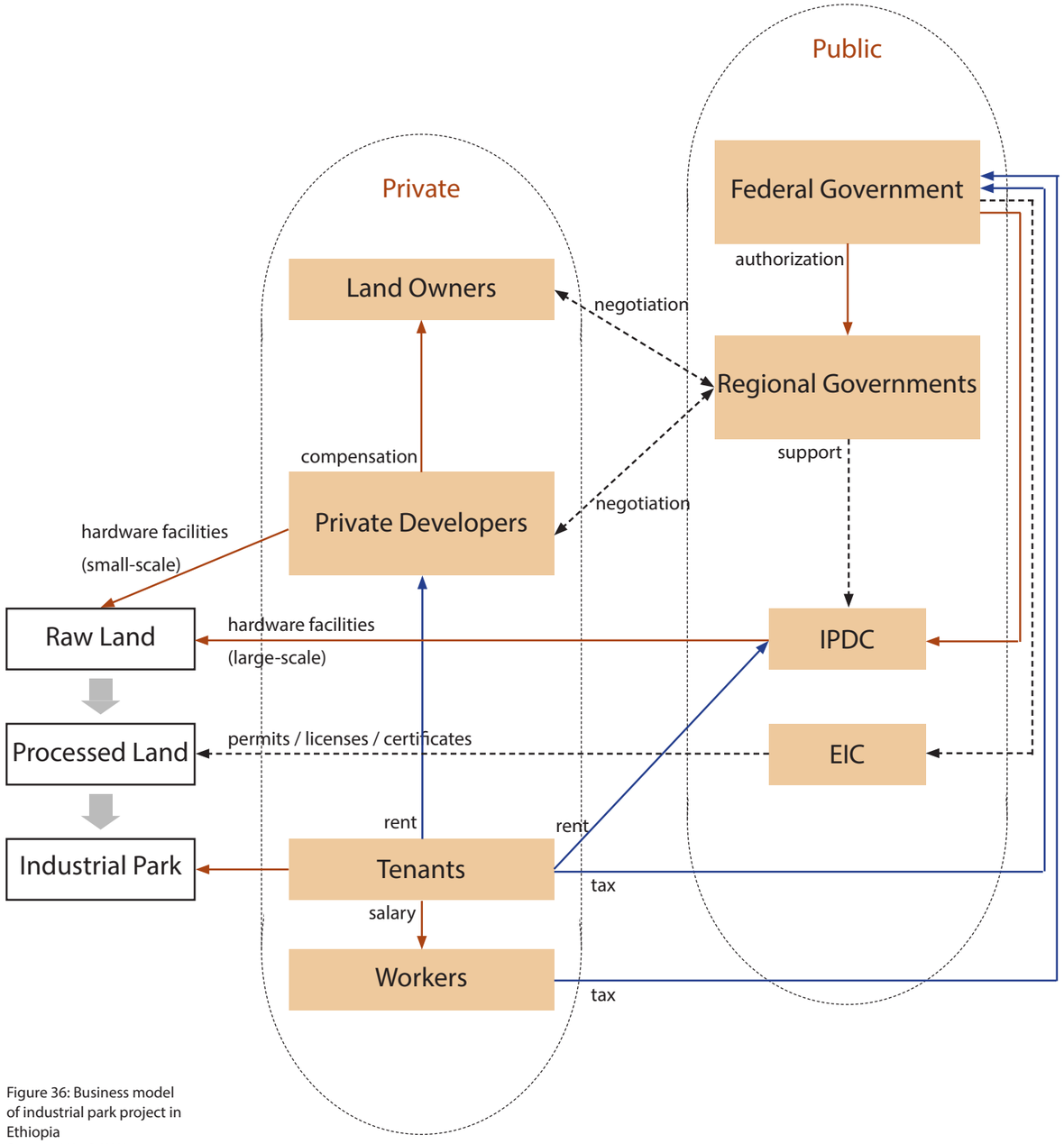


Figure 36: Business model of industrial park project in Ethiopia
Source: J Xu & X Wang, 2020

Note:
(1)Modified in part by the author based on interviews and research. For example, compensation is paid by the developer, but not directly by the developer to the landowner, but by the local government as an intermediary.
(2)The construction process of the Eastern Industry Zone is not as shown in the figure, because the establishment of IPDC and EIC was later than the start of the EIZ project.

2.1.3 Difficulty of Reconciling Different Interests

Two fieldwork and the interview have been conducted in order to understand and collect the most realistic information. (Details can be found in the appendix.) In general, although the demands of different groups are dynamic and changing, it is basically certain that none of the groups currently affected by the Eastern Industry Zone is completely satisfied with the status quo.

For Ethiopia's national government, the EIZ did not meet the government's high expectations and ambitious targets, and that is why it redirected its Industrial Park strategy toward publicly owned and developed industrial parks. Dukem local government and Chinese developers found it difficult to mobilize new investors due to the strict foreign (currency) exchange controls in Ethiopia and the supply of infrastructure services is not consistently stable. And *the Tigray War* in Ethiopia between November 2020 and November 2022 has caused foreign investors to lose some of their confidence in the local investment environment.

In addition, there were also issues around land acquisition for the industrial park, including a lack of transparent due process for communities resettled for the parks' construction. At that time, the site of the park occupied part of the farmers' land, and it was up to the Ethiopian government to handle the compensation and resettlement of the farmers. However, this process did not seem to satisfy the dispossessed farmers and led to their dissatisfaction with the construction of the industrial park later. At the same time, the entry of a large number of foreign products into the local market and the competition from foreign companies has brought impact on some of the local industries that are already in their infancy. The inequality in economic power makes the competition not bring positive benefits. And there is no complete vocational skills training system in Ethiopia during the construction and development of industrial park projects. The real situation is that Chinese managers manage the companies and supervise the production process. Local workers do a lot of repetitive and mechanical work, especially in the textile sector. However, this inadvertently hinders the opportunities for local workers to develop their own careers.

There is also a problem with workers' commuting. Currently, although there are employee dormitories built in the EIZ, the accommodation provided is far from adequate. A large number of local workers have to commute long distance for lower rents. Although the Ethiopian government has proposed a housing plan " Integrated Housing Development Plan (IHDP)", it was not integrated with the industrial park when it was built, resulting in no public housing projects in the surrounding areas. Of course, the lack of government funding is also a major issue. Moreover, foreign investors and companies currently have too much power in the industrial park development process, and the strong presence of both governments does not allow local companies, local communities, unions, etc. to participate equally in the decision-making process related to the industrial park, even though many adjustments and changes are relevant to them. But in fact, being able to mobilize these groups to participate in the integration of the industrial city is the key to achieving local vitalization.

Stakeholders		Value	Power	Interest	Addition
Government	Ethiopia Federal Government	Administrative management, promoting comprehensive development from the macro level	Formulation and supervision of related laws, policies and regulations	Economic growth, FDI attraction, poverty reduction	-
	Ethiopia Regional Government		Supervision and implementation of related laws, policies and regulations	Regional development, human capital, technology transfer	Oromia Regional government, Dukem government, Debre Zeyit government
	Chinese National Government	Coordination at the national level	Ensure the stability and integrity of external partnerships	Economic cooperation, export promotion and market access	-
EIZ developers & operators (Chinese private companies)		Responsible for the support system, business ecosystem, regulatory compliance in EIZ	Development expertise, infrastructure provision, management and operations	Investment returns, occupancy and tenant satisfaction	-
Company owners	Companies in EIZ	Job creation, tax creation, technology transfer	Economic power, innovation power, corporate social responsibility	Cheap labor, preferential tax policy, better business environment	Mainly Chinese private companies
	Local companies	Job creation, tax creation, entrepreneurship		Cheap labor, more support and protection policies, better business environment	-
workers	Migrant workers	New lifestyle and culture	Collective bargaining power, skill and productivity	Better living and working conditions, higher salaries, access to training and education	Mainly Chinese workers
	Local workers	Local lifestyle and culture			-
Local citizens (in Dukem-Debre Zeyit area)		Local lifestyle and culture, social and community development	Social and community power	More job opportunities, cheaper products from EIZ to local markets	-
Investors		Financial support	Financial power	Investment returns and a safe and stable investment environment	-
Financial institutions	Ethiopian institutions	Investment and maximum return	Financial power, risk management power, investment advisory	Investment opportunities, market expansion, long-term partnerships	-
	International institutions	Investment, knowledge sharing, policy guidance, networking and partnerships			Typical example: World Bank
NGOs (mainly about environment, human right, community)		People's welfare and environmental protection	Advocacy power, monitoring and accountability	Social and environmental impact of the EIZ, community development and welfare	-
Planners / designers / Research and Academia		Technical expertise and knowledge sharing, interface of all stakeholders	Suggestion and guidance for space planning and design, and industry-city integration	Better space and environmental quality, more equitable cooperation and interaction mechanism of various stakeholders, more concise and efficient governance procedures	
Chambers of Commerce	ECCSA	Support the development of the private sector in Ethiopia	Business networking and support, marketing, training and skill development	Domestic and international exchanges of goods and services	Ethiopian Chamber of Commerce and Sectoral Associations (ECCSA)
	Chinese Chamber of Commerce	Promote bilateral trade and investment between China and Ethiopia		Help Chinese companies understand the local market, navigate regulatory requirements, and explore export opportunities.	Will also participate in educational and training programs

Table 7: Stakeholder analysis
Source: Author, 2023

2.2 Conflicts

2.2.1 Spatial Dimension

Conflicts in this dimension exist mainly between various types of activities and various types of spaces.

- ① The huge spatial scale in the industrial park destroys the overall urban fabric of the area, especially in terms of the size of buildings, streets, and blocks.
- ② The infrastructures in the EIZ, such as substations and sewage treatment facilities are now shared with the surrounding areas, but require a fee for use. The overall infrastructure level of the surrounding areas is low, and the infrastructure network shows fragmentation.
- ③ The area near the industrial park is distributed with a large number of informal settlements and accompanied by a large number of informal markets. The agglomeration of informal activities contain the risk of insecurity. For example, in the interviews with the surrounding residents, when asked about their views on removing the walls of the industrial park, most of them thought that it was impossible because there would be many thieves entering the park.

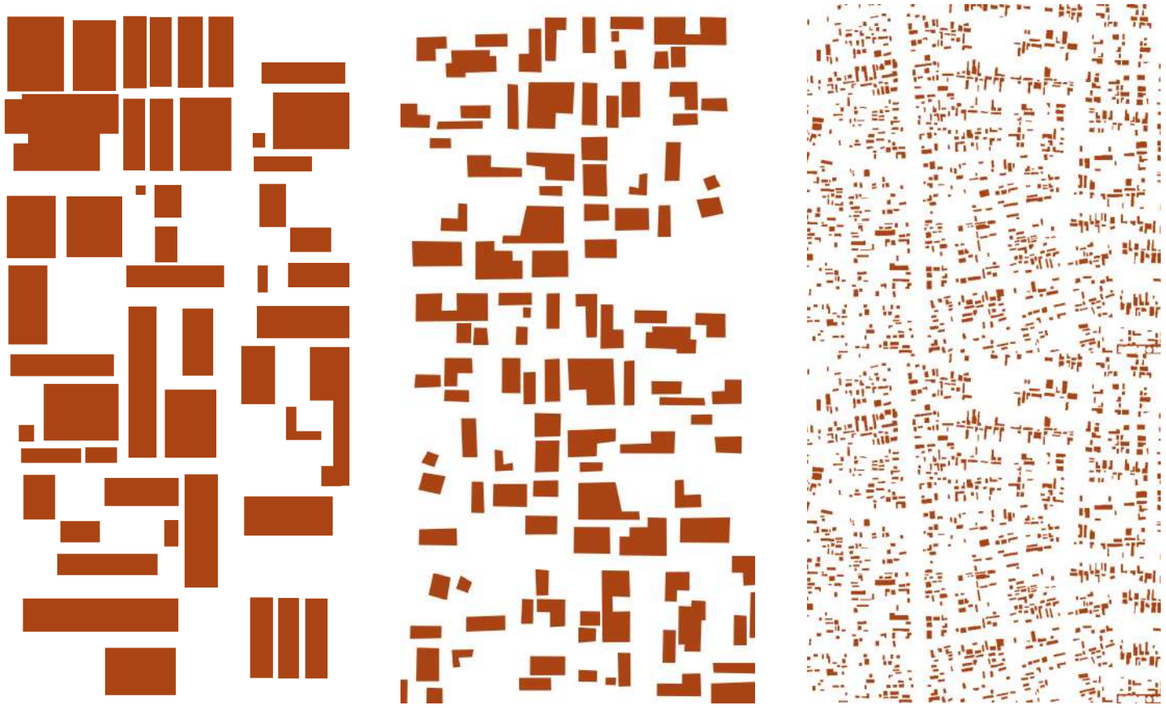


Figure 37: Scale comparison between the inside of the industrial park, the surrounding residential area, and the local industrial area
Source: Author, 2023

Figure 38: Existing fence system around the EIZ
Source: Author, 2023

Figure 39: Photos of existing fences around the EIZ
Source: Photoed by Nan Ma, 2023

Figure 36 and *Figure 37* show the existing barbed wire fence system around the Eastern Industry Zone. These fences not only divide the inside and outside of the industrial park, but also protect the facilities in the industrial park from thieves or other damages. In the first fieldwork, some local residents were asked the question "What do you think, if the fence around the industrial park will be removed in the future?" The typical answer was "That's impossible. There will be a lot of thieves coming in, so it's not safe." From this point, we can also see the existing conflicts between improving the quality of space, increasing the interaction between the inside and outside of the industrial park, and safety issues. To some extent, this also reflects the inequality in the distribution of resources locally.

2.2.2 Socioeconomic Dimension

According to the UNIDO report about economic zones in ASEAN, which is exactly where Ethiopia is looking to learn from the industrial park development experience, as countries achieve a higher stage of economic development, the development of industrial parks will also enter a new phase and the flow of the elements involved will become more complex. At present, the Eastern Industry Zone is still in the early stage of industrial park development, focusing almost exclusively on economic and employment data.

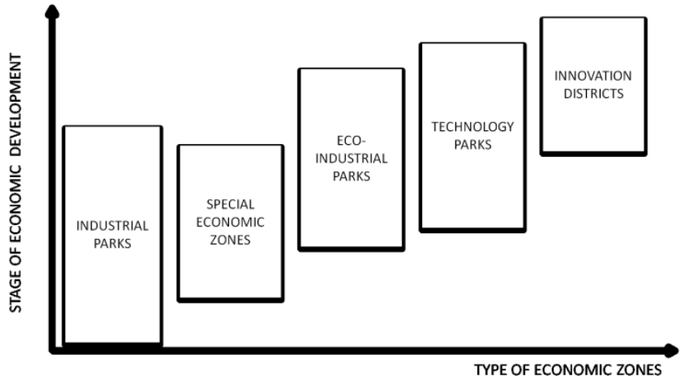


Figure 40: Economic zones and stage of economic development
Source: UNIDO, 2015

On the other hand, at the time of the implementation consultations, the Ethiopian government gave the power to set the rules for industrial access to Chinese developers in order to attract developers and investors from China. This inevitably led to Chinese developers prioritizing the demand for the relocation of their own industries and their desire to access the European market through Ethiopia. The previous decision resulted in the present-day Eastern Industry Zone, which is mainly light industry but mixed with other multiple industries, and its choice of industries is not integrated with the Ethiopian government's industrial development plan. This is certainly not good for local vitalization. For example, the huge demand for vaccines and the backwardness of the country's vaccine manufacturing level, as revealed by the pandemic, should serve as a reminder for Ethiopia to choose the priority industrial sectors with limited funds.

And the environmental impact of production processes should not be mended after economic development goals have been reached. Through some case studies, it was learned that some countries in Africa do not have well-developed standards for controlling environmental pollution in industrial parks. As a result, some foreign investors have shipped old machines that can no longer be used in their countries because of increased environmental standards to African countries to continue producing their products. Escaping poverty is indeed a top priority for most African countries, but not at the expense of the natural environment.

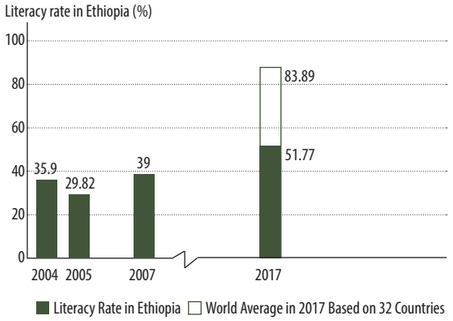


Figure 41: Literacy rate in Ethiopia
Source: www.theglobaleconomy.com/Ethiopia/Literacy_rate/

Another problem lies in the contradiction between the level of local education and work skills and the needs of industrial development. The vicious circle is gradually revealed through the advancement of projects such as the Eastern Industry Zone. As can be seen from *Figure 39*, Ethiopia's average literacy rate was still much lower than the world average in 2017, and this is only a basic indicator to measure its domestic education level. The lack of quality of the schools and the quality of teaching staff are the main factors to undermine the quality of education in Ethiopia. (Zinabu Samaro Rekiso, 2019) However, the local ability to exploit the opportunities available in the international trade cooperation and global economy depends very much on reversing the poor state of education, especially in higher education and innovation and science research. (T. Gebre-Egziabher & Edlam Abera Yemeru, 2019) Although this problem is not caused by the construction of foreign industrial parks, in the process of operating the Eastern Industry Zone, if the traditional "Chinese manager-local worker" working relationship is to be improved, the local workforce needs to be built to meet the needs of industrial development. Then the first task is to invest in education, knowledge and innovation systems for more equitable partnerships. This not only requires that the local government's policy formulation should be tilted in the direction of improving the education level, but also requires foreign investors to assume corresponding social responsibilities in knowledge sharing and technology transfer.

2.2.3 Governance Dimension

On the basis of the author's interview on November 25, 2022 with Zhao Shengbo, a Chinese scholar who focuses on the planning of Chinese overseas industrial parks and has made several field trips to the Eastern Industrial Park, it is understood that although the Ethiopian government is committed to attracting foreign direct investment, it does not interfere with the operation and management of the park during the implementation of the Eastern Industry Zone. This kind of interaction only exists between the government and foreign developers and does not seem to really benefit the local area. In line with the communication with local residents in Dukem and Debre Zeyit, it was learned that most of the residents actually believe that how the Eastern Industry Zone develops is irrelevant to them. If they do not work there and do not know anyone who works there, they do not care about the future of EIZ. This is mainly due to the fact that the relevant resident groups are not involved in the process of development and construction of EIZ, and the lack of public participation leads to people's indifferent attitude toward decision-making.

Regarding the controversial issues that have been surrounding the China-Africa Industrial Park, such as the relationship between Chinese managers and local workers, the main reason for these is that the relevant procedures and information are not fully transparent. This is understandable, however, because as the first experimental foreign-invested industrial park in Ethiopia, neither side has sufficient experience to deal with the full procedural process. As the Eastern Industry Zone is getting on the right track, the relevant information should be made public to facilitate understanding and supervision from the third party.

In addition, in terms of governance and institutional capacity building, Ethiopia has made great achievements in the construction and development of industrial parks since 2007. The most important of these is the establishment of IPDC and EIC, which have become agencies between the government and the industrial park, making all processes related to the implementation of industrial park projects more efficient. However, there is still a considerable distance to cover in forging stronger connections between governments, development partners, education systems, and the private sector. The goal is to establish a network of well-staffed, sustainable, and efficiently managed institutions capable of providing high-quality services to citizens. There is still much work to be done in this regard.

2.3 Problem Statement

In the context of rapid urbanization, multiple forces have participated in the process of African industrialization, of which the cooperation between Ethiopia and China is increasingly closer and more interdependent. And the industrial park model, as an important form of spatial aggregation, is being widely applied in Ethiopia to attract foreign investment and promote employment. Take the China Eastern Industry Zone in Ethiopia as an example, which has created nearly 20,000 jobs since construction. The benefits generated in terms of agglomeration of production factors have shown both sides the potential of the industrial park for economic development, but at the same time, some problems have emerged.

Due to differences in historical traditions, social culture, and religious beliefs between immigrant groups and local groups, as well as possible inequalities in economic strength and international discourse power, there are often negative situations where the two sides cannot communicate, understand or even trust each other. And as an important spatial carrier for economic-social relationships, the industrial park emphasizes production only; huge scale destroys the continuity of local fabric; spatial isolation and fragmentation, as well as closed management, have also led to industrial parks that are not very deeply embedded in the local socio-economic network; imperfect systems of environmental standards and management regulations lead to environmental damage and operational inefficiencies.

Furthermore, the overall industrial planning of the park is based on the industrial development plan formulated by the Ethiopian government, while the spatial planning is completely dominated by foreign developers after the government leases the land to them. Even if the idea of "integrating surrounding towns and designing a mixed special zone" is proposed, the current implementation process is almost without the participation of other stakeholders. This simple and short-sighted operation only serves rapid economic development, but in the long run, it is not conducive to a dynamic environment for social integration and co-innovation. When this boom passes and industries continue to move, the local area will lose its current advantages and opportunities.

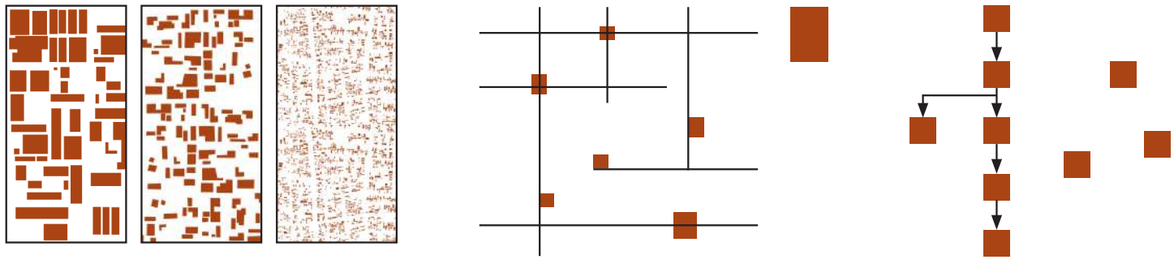


Figure 42: Diagrams of problems
Source: Author, 2023

Figure 43: Borders of EIZ, surrounding informal settlements and vacant spaces
Source: Google 3D Map

Figure 44: Photos of the internal road of the EIZ
Source: www.e-eiz.com/

Figure 45: Photos of the road in Dukem
Source: Thomson Reuters Foundation/Tom Gardner

Figure 46: Buildings in Dukem
Source: Photoed by Nan Ma, 2023

Figure 47: Factories in EIZ
Source: www.e-eiz.com/

Figure 48: Supervision of the production process
Source: /www.businessoffashion.com/articles/news-analysis/made-in-ethiopia-fashions-next-sourcing-hub/

Figure 49: Government decision making
Source: www.ipdc.gov.et/news/post/8/

Figure 50: Elias Sime (b.1968 Addis Ababa, Ethiopia)'s artwork
Source: www.jamescohan.com/public-exhibitions/elias-sime-at-st-louis-art-museum

03 METHODOLOGY

3.1 Research Aim & Conceptual Framework

In the context of Ethiopia's rapid urbanization and industrialization, with the deepening international cooperation between Ethiopia and China, the industrial park model could be exploited as a positive medium to stimulate local potential and achieve regional vitalization in Dukem-Debre Zeyit area in Ethiopia.
The aim of the research is to examine and understand the dynamics and impacts of the integration between industrial activities and the surrounding urban areas, taking Eastern Industry Zone as the case. And it also seeks to identify the opportunities, challenges, and potential strategies for mixed, sustainable, and inclusive city-industry integration, and local endogenous development, taking into account the interests of different stakeholders, such as the government, private businesses, and local communities.

Transformation of the current negative model of cooperation between China and Ethiopia into a more sustainable partnership will be realized. Furthermore, optimization of the governance system would stimulate bottom-up dynamics. Ultimately, after utilizing design testing to simulate the interface and interaction between urban sprawl and industrial park development, the research aims to contribute to policy-making and spatial planning and explore the generalization of relevant design guidelines to other similar foreign industrial park projects.

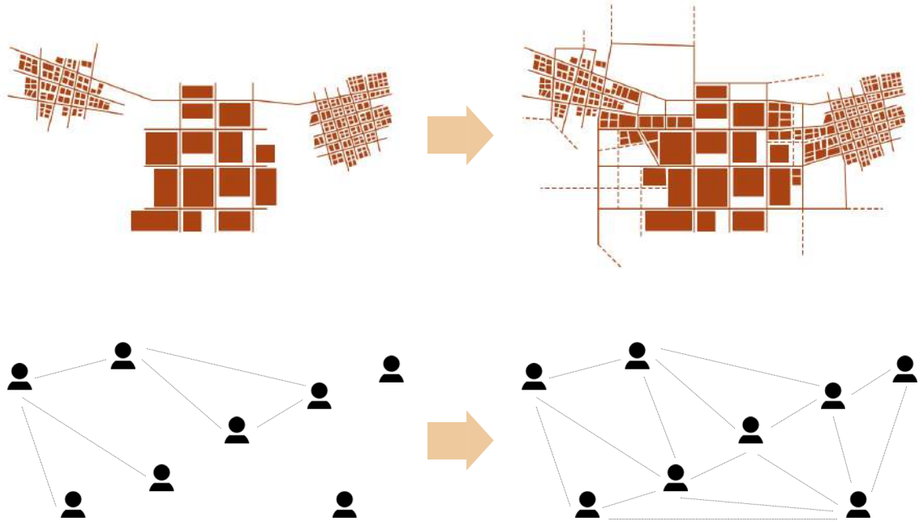


Figure 51: Diagrams of aims
Source: Author, 2023

Consistent with the research aim, the conceptual framework demonstrates how the variables are organized together in this research to achieve the goal of regional vitalization. Firstly changing contexts and trends, and interactions across spatial scales would affect the whole process and are also fundamental. Eastern Industry Zone (EIZ) and related elements would be regarded as external opportunities, injected into the local area. The three processes of spatial planning, socioeconomic integration, and governance optimization will influence each other, with sustainability, justice and cooperation as the basic principles and with an incremental approach. The possible outcomes will also influence the previous process again through reflection and adjustment.

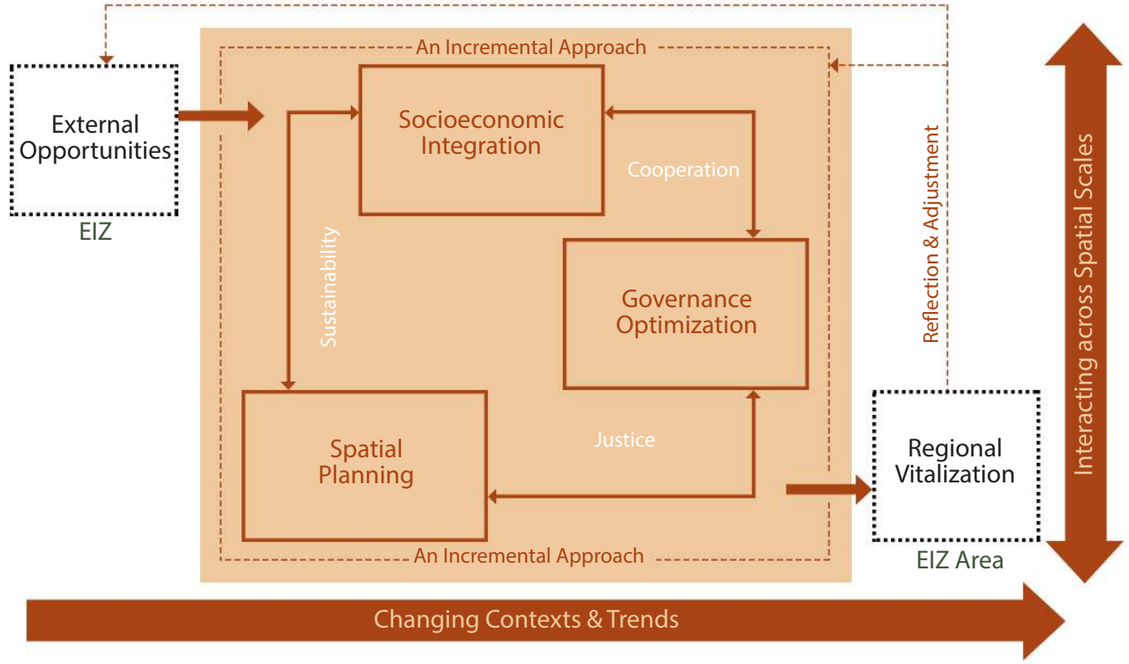


Figure 52: Conceptual framework
Source: Author, 2023

3.2 Reaerch Questions

Main Research Question	Sub Research Question	Method	Deliverable
How to exploit external opportunities in Ethiopia, taking Eastern Industry Zone as the medium, to achieve regional vitalization?	challenges What are the main challenges faced by EIZ Area in achieving city-industry integration?	Interviews / Questionnaires / Literature Research / Mapping	Diagrams of conflicts / Maps of town expansion / Maps of current elements in and around EIZ
	demands What are the demands for development among different groups in EIZ Area?	Interviews / Questionnaires / Literature Research / Comparative Analysis	Graphs showing the results of fieldwork / Diagrams of relationships among stakeholders / Power and interest grid
	capacities What are the socioeconomic, spatial and governance capacities in EIZ Area to promote regional endogenous development?	Scenario Analysis / Mapping / Comparative Analysis / Statistical Analysis	Scenarios with different decisions / Maps of capacities / Lists of factors / Present of vision
	strategies How can industrial parks act as a positive medium to participate in the process of regional vitalization?	Network Approach Analysis / Policy Analysis / Research by Design / Option Test and Evaluation	A cross-scale strategic framework / 4 strategic action plans / A master plan on mesoscale / 2 pilot projects on micro-scale

Table 8: Research questions
Source: Author, 2023

3.3 Methodology

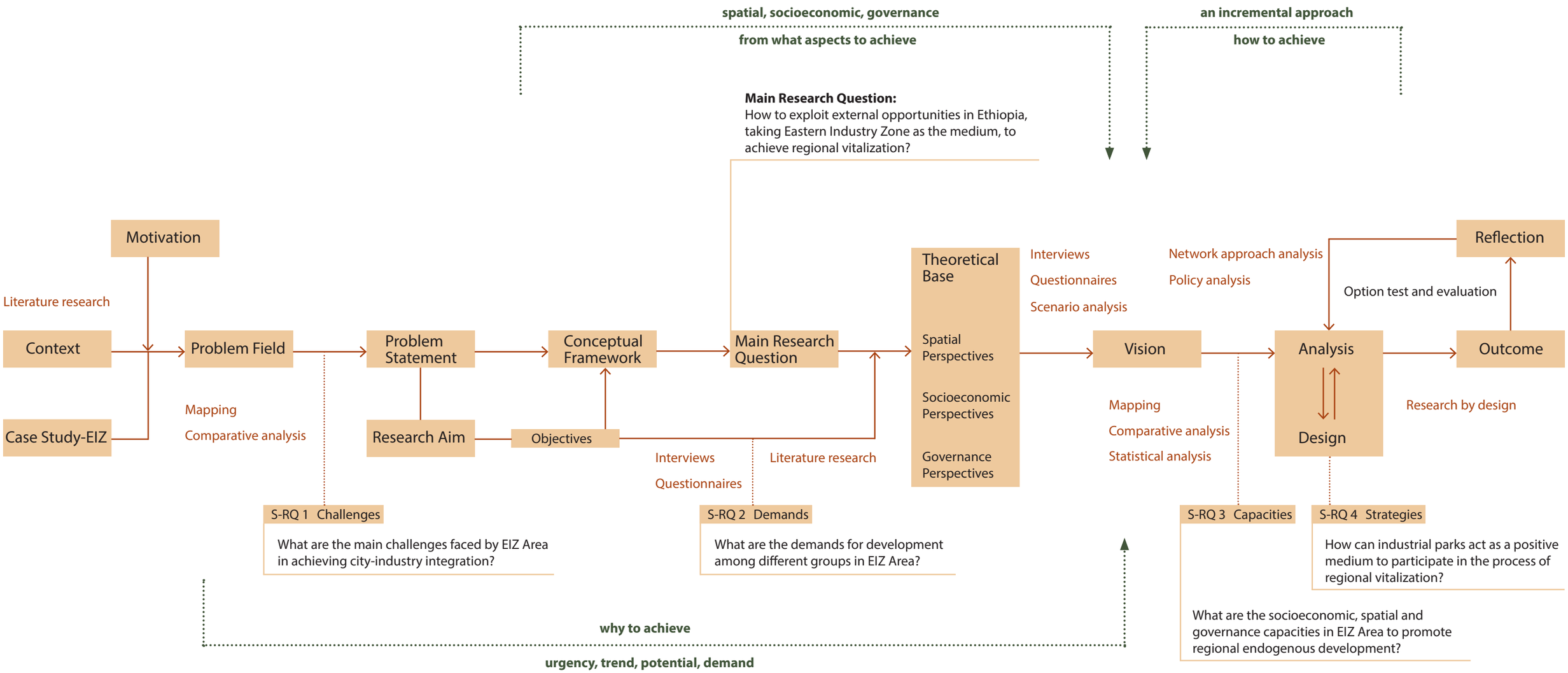


Figure 53: Methodology
Source: Author, 2023

In the project, research methods shown in *Table 9* have been applied in different research phases to answer the research questions.

Research Methods	Research Stage	Purpose of Using
Literature research	Global and Ethiopian contextual studies; problem field studies; conflict studies; theoretical base; the evolution of the industrial park model	To establish context by exploring the existing theories, concepts, and findings; identify knowledge gaps; provide evidence and support for the arguments.
Interviews	Problem field studies; research and analysis of the current situation of EIZ; research aim and problem statement	To obtain detailed and in-depth information about the planning and construction of the Eastern Industry Zone from the viewpoint of the Chinese planning researcher.
Questionnaires	Problem focus; analysis of local workers' and local residents' demands; scenario building and vision	To collect opinions and suggestions from local residents and workers at EIZ on the development of the industrial park to fully understand the demands of the locals.
Statistical analysis	Analysis of the results of the questionnaires	To summarize and describe the results of questionnaires.
Mapping	Context studies; problem focus; analysis of current conditions of EIZ and surrounding towns; analysis of local capacities;	To visualize data to identify spatial patterns, distributions, or trends about the development of IP at different scales.
Comparative analysis	Case studies; scenario building; assessment of the strategies (current status and future)	To analyze trends in the development of IP and learn practical experience on the whole process of IP projects.
Policy analysis	Global and Ethiopian contextual studies; problem focus; conflict studies; analysis of local capacities; strategic action plans	To identify spatial patterns and trends of development of IP; inform policy recommendation; provide evidence for strategies.
Scenario analysis	Scenario building and vision	To explore the potential consequences and impacts of different scenarios; inform strategic action plans and design test.
Network approach analysis	Strategic action plans	To explore structural patterns; identify cooperative relationships.
Research by design	Strategic action plans ; assessment of the strategies; design test	To analyze design challenges and opportunities; to test and evaluate design solutions; to create innovative design outcomes.

Table 9: Research methods
Source: Author, 2023

Note:
(1)In this project, one formal interview was conducted with a Chinese researcher. Other communications occurred during the fieldwork.
(2)In the first fieldwork, 7 questionnaires were distributed to residents of the two towns. In the second fieldwork, 30 were distributed, 10 to workers in the EIZ and 20 to residents of the towns.

Qualitative research aims to address questions concerned with developing an understanding of the meaning and experience dimensions of humans' lives and social worlds. (Fossey, E., Harvey, C., McDermott, F., & Davidson, L. 2002) In this project, interviews, fieldwork, and literature research would be taken into use. Especially in answering the first two sub-research questions about the real challenges in Dukem, Ethiopia and the demands of different groups for development locally, the interviews and fieldwork are able to create a deeper connection between the author and different stakeholders, including but not limited to Chinese developers, Chinese industrial park research scholars, Ethiopian scholars working with China, Ethiopian workers, Ethiopian residents, etc. And the literature research is able to show the development of different concepts and perspectives from industrial economy, industrial ecology, sociology and spatial planning, so that the author can explore the research gaps. Meanwhile, literature research can support the scientific nature of the research structure by revealing the relevant development laws and influencing factors.

Quantitative research is a type of research that is explaining phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics). (Creswell, 1994) And the questionnaire and related statistical methods will be used in this project. Although there are great difficulties in implementing the questionnaire method in the specific context of the EIZ area, such as lack of trust with the respondents and language barrier, this approach is quite helpful for the authors to study the characteristics of the various stakeholders and the complex relationships between them. Also the author obtained data from a Chinese scholar studying African industrial parks from a questionnaire he conducted in 2018 at the Eastern Industry Zone, which will be reanalyzed to complement the current study Besides, quantitative methods will also be used to answer the third sub-research question, regarding the capacity of the EIZ area. Relevant geographic data, demographic data, industrial economic data, employment data, etc. will be collected and analyzed. The results of the analysis will be applied to construct an assessment framework for evaluating the performance of the Eastern Industry Zone.

This project also involves comparative, mapping, scenario, policy analysis, and network approach as related analytical methods. Comparative analysis will be used to compare the case - Eastern Industry Zone with other industrial parks. Regarding the selection of the comparison object, it will be determined in relation to the research questions and the typicality of the object in question. And policy analysis will include an analysis of the existing policies in Dukem, Ethiopia and an analysis of possible policy adjustments and their outcomes. This is also a good example of an important feature of this studio - Planning Complex Cities - which explores formal institutions such as policy implementation mechanisms, obligatory intergovernmental cooperation, and informal institutions such as voluntary community participation in the planning process. Scenario analysis would be applied to present the vision. Scenario analysis is a method for predicting the possible occurrence of an object or the consequences of a situation, assuming that a phenomenon or a trend will be continued in the future (Kishita et al., 2016). This method makes it possible to compare the results of conservative development with those of radical development, or those focusing on economic growth with those focusing on social integration. Among the different possibilities, the author will present an integrated vision of the EIZ area based on value choices. The network approach analysis is a set of integrated techniques to depict relations among actors and to analyze the social structures to explain social phenomena better. (A.M. Chiesi, 2001) In this project, at the social level, the network among stakeholders will be the focus of research to support the subsequent optimal design of the institutional system. And at the spatial level, networks of infrastructure and energy will also be analyzed. Finally, the mapping would be a clear and useful way to analyze spatial features at different scales and at different times.

Research by design is used to describe the various ways in which design and research are interconnected when new knowledge is produced about the world through the act of designing. The methodology aims to generate desirable, maybe unexpected, urban perspectives in place of probable, but less desirable, urban developments. (Hauberg, 2011) One of the motivations for this study is the desire to explore new site-specific approaches, in Dukem, Ethiopia, for which there is practically no relevant paradigm to refer. So research by design is the most appropriate method. This method seeks to partially subvert the traditional "research-defining the program-design" process by using spatial design as a tool to explore the potential of the site and as a means of communication and negotiation between all parties involved. This will provide a process of multiple feedback.

3.4 Timeline Planning

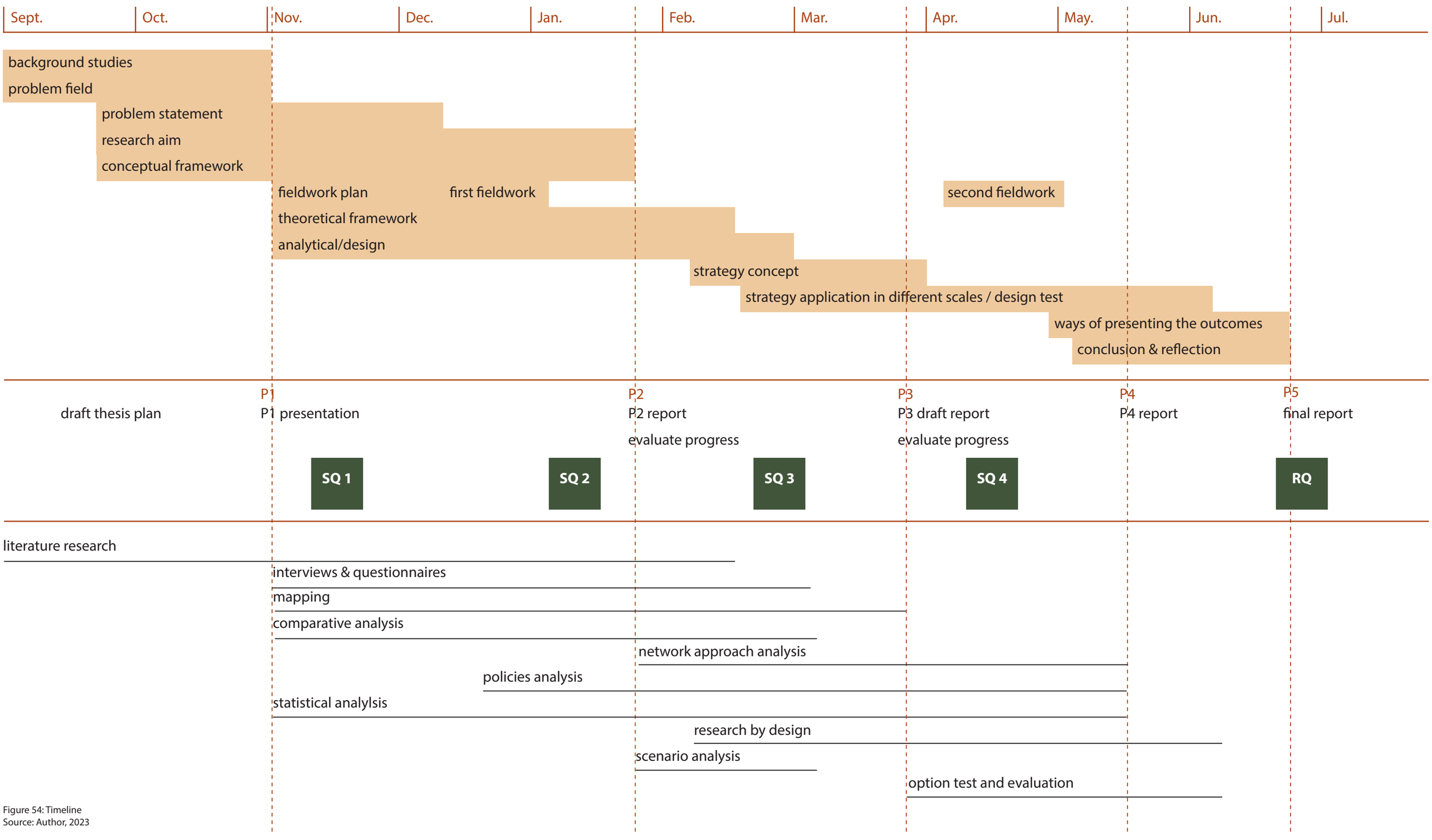
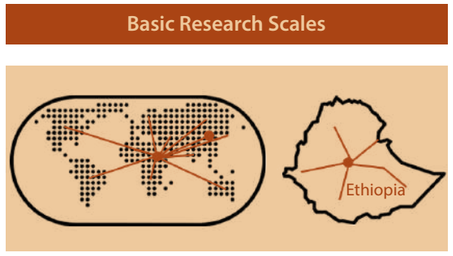


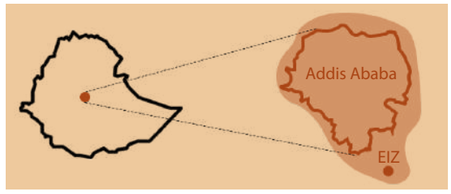
Figure 54: Timeline
Source: Author, 2023

3.5 Basic Research Scale



XL: Transnational/national networks

At this scale, the study focuses on international cooperation around industrial park projects, regarding the model of cooperation between China and Ethiopia and its sustainability. Knowledge and innovation networks will also be explored.

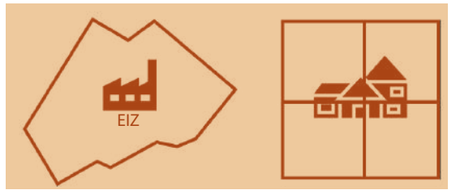


L: Addis Ababa metropolitan area

At this scale, regional infrastructure networks, such as transportation systems, energy systems, macro-scale layouts of industrial clusters, and distribution of resources will be focused on. Macro-scale impacts will also act on the Eastern Industry Zone from three aspects: socio-economic, spatial, and governance.

M: Dukem-Debre Zeyit area

At this scale, the interaction and interface between industrial space and urban space will be the focus of research. The relationship between transportation systems, land use, urban expansion and industrial spatial expansion, industrial distribution, distribution of public services, and different specific stakeholders will be explored.



S: EIZ/urban communities

At this scale, the spatial patterns summarized through the previous study will be applied to small-scale urban blocks to explore the spatial transition between urban communities and the industrial park. Secondly, since the second phase of the EIZ is still vacant, the design of theliving area in the industrial park will be proposed to explore new strategies that are more suitable for the integrated development of industry-city.

Figure 55: Diagrams of different research scales
Source: Author, 2023

3.6 Data Management & Ethical Consideration

The types of data used in this project are data from questionnaires, qualitative data from interviews, photos, videos, geographic data (from open geographic information platforms), economic data (from literature and official statistical reports). The data obtained through the questionnaire will not involve specific personal information, such as name, address, contact information, etc. Age range and gender data will be collected. Before the interview, the interviewee was informed of the topic, research objectives, and research questions of this study, and consent was obtained. The photos and videos have been processed to prevent infringement of the portrait rights of those photographed. And the contents are mainly public spaces in towns, such as streets, squares and green spaces, as well as public spaces in the Eastern Industry Zone, not including any private areas. All data will be stored in TU Delft One Drive. During the active phase of research, the project leader will oversee the access rights to data (and other outputs), as well as any requests for access from external parties. At the end of the project, anonymous data might be used or published for future studies, and these anonymous or aggregated data will be uploaded to 4TU.ResearchData with public use.

With regard to ethical considerations, first, for all fieldwork, participants are fully informed of the background of this project, the research objectives, the research questions, the results, and the specific purpose of their participation before they are conducted. This will be done in strict compliance with Ethiopian privacy regulations. All sensitive personal information will not be collected to avoid possible future identification of individuals. And because Ethiopia is a diverse country with many different cultures and languages, certain topics may be considered taboo or culturally inappropriate to discuss. Local guides will be invited to help with translation to ensure adequate communication with the participants during the fieldwork. At the same time, the local cultural and social context will be well understood before the fieldwork is conducted, and the participants will be free to express their opinions or suggestions during the communication process without being led or restricted in any way.

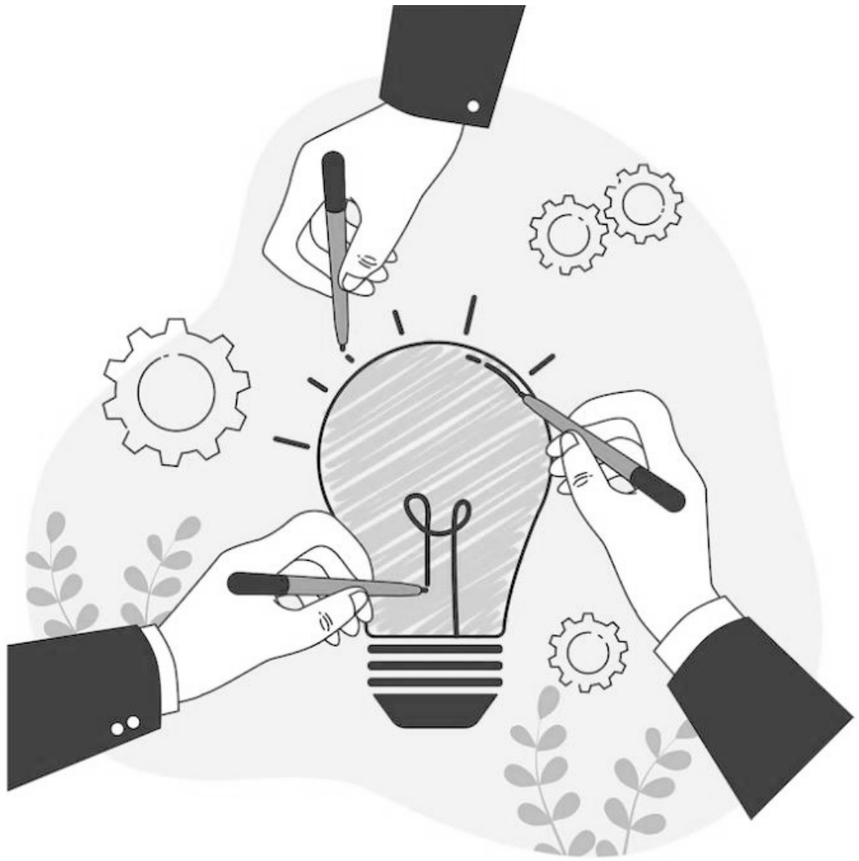


Figure 56: Collab concept illustration
Source: www.freepik.com/

04 THEORETICAL BASE

4.1 Socioeconomic Perspectives

4.2 Spatial Perspectives

4.3 Governance Perspectives

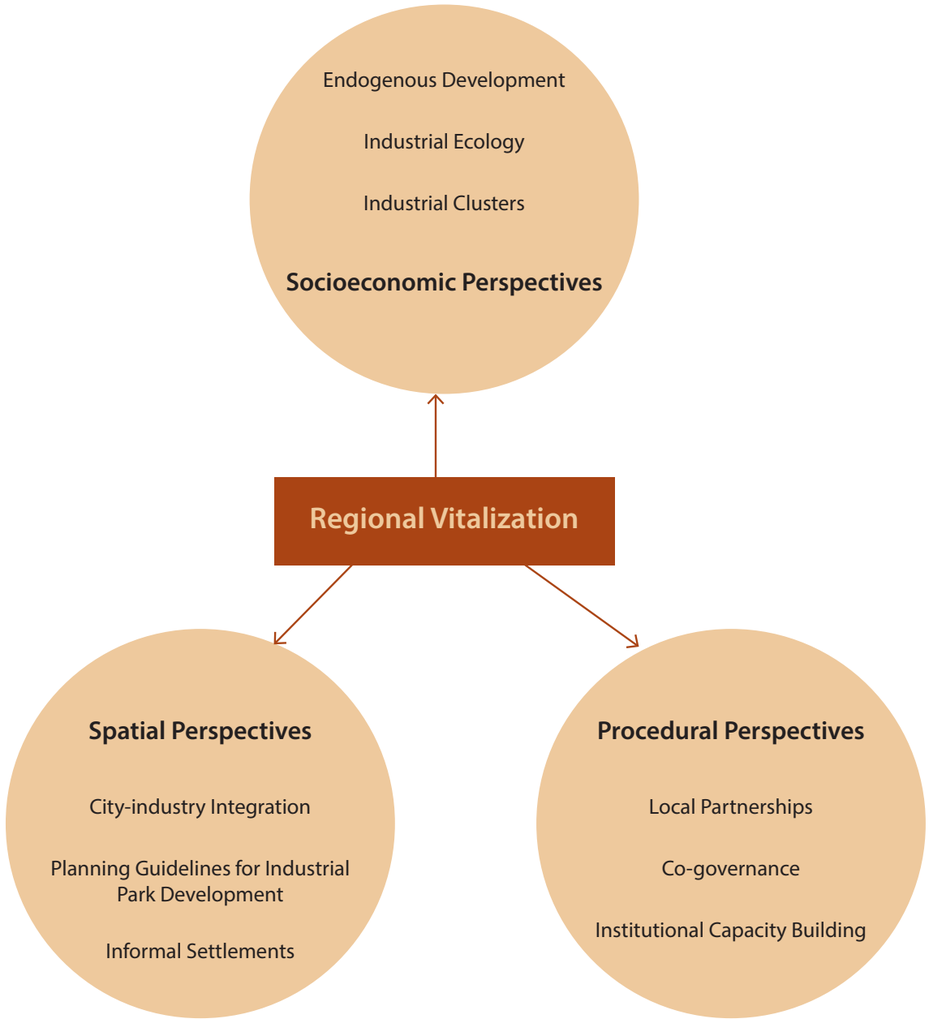


Figure 57: Diagram of theoretical framework
Source: Author, 2023

The research aim of this project is to achieve regional vitalization in Eastern Industry Zone area, in Dukem, Ethiopia. According to the objectives, regional vitalization is interpreted as the construction of economy, politics, culture, ecology, and people's well-being aiming at realizing the comprehensive development in this area by systematically allocating and efficiently managing various developmental elements, such as population, land, and industry. This is not the same as revitalization, because Dukem itself is an emerging town that is gradually taking shape due to the implementation of the Eastern Industry Zone. The relevant theoretical support is shown in Figure 59, and regional vitalization is explored from three perspectives: socioeconomic, spatial, and procedural to discover the theoretical roots and elaborate the relevant connotations. This will also guide the project in planning a more sustainable and inclusive future for the EIZ area from these three dimensions.

4.1 Socioeconomic Perspectives

4.1.1 Industrial Clusters

Definition:
Industrial clusters gained significant attention from scholars in the 1990s. However, during that time, there was a lack of consensus and some confusion regarding the definition of industrial clusters. Agglomeration, as a common phenomenon, naturally leads to the emergence of various types of agglomerations in large urban areas, starting with human agglomerations and followed by social and economic ones (Gordon & McCann, 2000). Different locations exhibit different degrees of economic advantage depending on the characteristics of agglomeration, and the convergence of these elements leads to economies of scale, which provide specialized economic advantages. Marshall, in 1925, first explained the concept of local economies of scale in geographical agglomerations. He introduced the notion of an 'industrial district' or localized industry, referring to an industry concentrated in specific localities (Marshall, 1920). Later scholars elaborated on the concept, highlighting the close connections and division of labor among firms within an industrial district. They also emphasized that small and medium-sized firms within a district can compete with larger vertically integrated firms (Fiorenza Belussi & Katia Caldari, 2009). From an industrial economic perspective, industrial clusters are not only about the geographical clustering of enterprises but also the existence of various networks within them, facilitating the flow of different elements. As industrial clusters develop, their internal structure becomes more complex, and they become embedded in local social networks (Gordon & McCann, 2000).

"An industrial cluster is a socioeconomic entity characterized by a social community of people and a population of economic agents localized in close proximity in a specific geographic region. Within an industrial cluster, a significant part of both the social community and the economic agents work together in economically linked activities, sharing and nurturing a common stock of product, technology and organizational knowledge in order to generate superior products and services in the marketplace." (Piero Morosini, 2002)

Composition:
An industrial cluster comprises not only a network of closely interconnected firms but also a diverse set of economic agents, forming a close-knit social community. This community includes not just firms but also universities, research centers, industry associations, and technological institutes, collectively referred to as the 'associational economy' (Schmitz, 2000). Practical experience has shown that the strength and sustainability of industrial clusters are significantly influenced by the presence of these close-knit social communities (Pyke, Becattini, & Sengenberger, 1990). Furthermore, the involvement of associational or meso-level agents has been proven effective in fostering cooperation for mutual benefit (Hudson, 1998).

4.1.2 Industrial Ecology

The issue of waste disposal resulting from industrial development is often viewed negatively by some individuals. However, in the eyes of scholars, it can actually serve as a catalyst for transforming the traditional industrial activity model into a more integrated one known as 'an industrial ecosystem' (Frosch, R.A. Gallopoulos, N.E. 1989). This new model aligns with the principles of Industrial Ecology (IE), which involves a fundamental shift from a linear model (extraction to production to consumption to disposal) to a closed-loop model that closely resembles the cyclical flows of natural ecosystems (Ernest A. Lowe, Laurence K. Evans, 1995).

Kalundborg, Denmark, serves as a compelling example for illustrating the concept of industrial ecology and showcasing the design of an 'industrial ecosystem'. The innovative exchange of energy and materials in Kalundborg has inspired the intentional creation of similar industrial ecosystems, highlighting the design of inter-company relationships at a regional level and the potential for new supporting social institutions (Ernest A. Lowe, Laurence K. Evans, 1995). Subsequently, the concept of regional industrial ecosystems and their assessment frameworks were proposed within the framework of industrial ecology theory (Weslynne S. Ashton, 2009). More recently, the integration of industrial ecology theory with the circular economy has been explored, particularly in the context of resource-intensive manufacturing firms and the overall ecosystem in which they operate (Vinit Paridaa,b, Thommie Burströmc, Ivanka Visnjicd, Joakim Wincent, 2019). The circular economy paradigm aims to minimize waste through reduction, reuse, and recycling, while minimizing environmental impact (Ellen MacArthur Foundation, 2016; Pearce & Turner, 1990). While some scholars have raised questions about the ability of industrial ecology theory to comprehensively explain complex ecosystems, especially in dynamic and evolving environments with intricate relationships, its practical application over the years has demonstrated its usefulness, particularly when combined with industrial cluster theory and corporate ecosystems to study the achievement of virtuous cycles within specific regions.

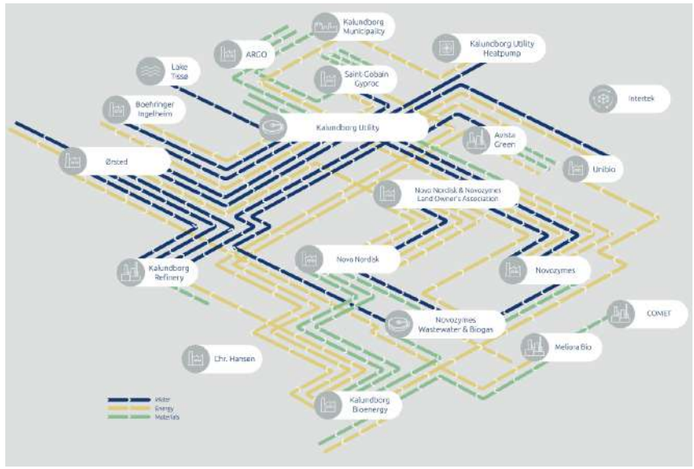


Figure 58: Industrial symbiosis in Kalundborg
Source: www.symbiosis.dk/en/

4.1.3 Endogenous Development

Since this research takes the situation of Ethiopia as the main background, as a developing country that urgently needs to get rid of poverty, endogenous development is very crucial to it. Although it has accepted assistance from the UN, EU, China, or elsewhere, this way is not sustainable in the long term. For developing countries, instead of accepting "blood transfusion", it is better to improve their own "blood-generating" ability, so as to gain a firm foothold in the competition of the global market.

Endogenous development is closely associated with the process of endogenous industrialization, which emphasizes the economic dynamics of cities and regions. It relies on expanding industrial activity and utilizing existing development potential within the local area. A key aspect of endogenous development theory is the recognition that local productive systems and firm networks play a crucial role in driving growth and structural change in regional economies.

In this research, the Eastern Industry Zone will serve as the basis for examining the transition from the current development model to an ideal model guided by endogenous development principles. The study will explore the incremental steps necessary for achieving this transformation, considering the intertwined nature of inside-out and bottom-up development trends within the context of endogenous development theory.

According to Vázquez-Barquero, A., in recent decades, a significant change has taken place in development policy. Gradually losing ground are the so-called "top-down" policies which, managed by central administrations, aimed to redistribute economic activity spatially and reduce regional differences in per capita income levels. Simultaneously gaining ground is the "bottom-up" approach, in which policy targeting the economic development of specific regions and cities is promoted and administered by local and regional governments. This also demonstrates the emphasis on the functions of local government. It will also be discussed combined with relevant policies and procedures in this research.

Furthermore, endogenous development is a territorial approach that harnesses local development potential to improve living standards. It encompasses three dimensions:

① Economic dimension: This dimension involves the establishment of a specific production system that enables local entrepreneurs to efficiently utilize productive factors, introduce technological advancements and innovation, and achieve competitive productivity levels in both domestic and international markets.

② Institutional dimension: In this dimension, economic and social actors are integrated into a network of institutions that form complex relationships. These institutions incorporate social and cultural values into the development process, fostering a cohesive framework for sustainable growth.

③ Political dimension: The political dimension is realized through local initiatives with multiple objectives. These initiatives serve as instruments for driving endogenous development, empowering communities to actively shape their own economic and social progress. (Antonio Vázquez-Barquero, Juan C Rodríguez-Cohard, 2016)

In conclusion, endogenous development is a gradual process that necessitates the evolution of institutions and the adjustment of local development policies. However, each step forward reduces dependence on external assistance, contributing to greater self-reliance and sustainable development.

4.2 Spatial Perspectives

4.2.1 City-industry Integration

Since industrial spatial planning plays an important role in China's planning system, and it is a key issue in the new urbanization in China, Chinese scholars have paid extra attention to the integration of industries and cities. This is also because the advantages of city-industry integration are gradually being explored based on countless practical experiences in China's industrialization development path. Especially when the industrial space develops towards a more advanced stage, the integration of industry and city is a necessary step for it. This research takes the cooperation between China and Ethiopia as the context and the industrial park invested by China as a case study, which should be studied in the context of relevant Chinese theories of city-industry integration.

The separation of industrial and city functions can lead to inefficient urbanization and hinder sustainable development (Kong & Yang, 2013). To address this issue, the concept of urbanization city-industry integration has emerged as a new development mode during the rapid urbanization process (Cong, Duan et al., 2017; Su & Jia, 2017). This approach emphasizes the importance of meeting people's needs and covers various aspects of academic research, such as land use and cover, labor transition from agriculture to industry, industrial structural transformation, and provision of basic social services and infrastructure.

The city-industry integration model significantly contributes to the green growth of regional economies. Firstly, it resolves the challenge of separating jobs and residences, attracting talent and fostering an environment conducive to innovation, thereby promoting regional economic growth (Panne, 2004; Engel & Del-Palacio, 2011). Additionally, city-industry integration not only supports public infrastructure development but also plays a crucial role in unlocking domestic demand potential and promoting consumption upgrades (Xiaoli Hao, Yuhong Li, Ume Lail, 2022). By exploring the application of the industry-city integration model in the Eastern Industry Zone (EIZ), the focus is on providing nearby housing and service facilities for employees, improving the surrounding infrastructure network to accommodate population clustering and growth, and meeting the diverse daily needs of different groups. This approach enables the Eastern Industry Zone to evolve into a mixed industrial city.

In addition, land management is also a key part of the process of industry-city integration. The different land use management measures are closely linked to the construction goals. And how to balance the security of production and the interaction between industrial space and the city is also an important issue that needs to be addressed. Functional zoning could be an effective tool, according to Yu, D., Jiang, Y., Kang, M., Tian, Y., & Duan, J. They proposed four categories of functional areas: (1) ecological protection areas; (2) restricted construction areas; (3) suitable construction areas; and (4) built-up areas. Different rules and design guidelines are proposed for each area so that they can guide future construction. (Yu, D., Jiang, Y., Kang, M., Tian, Y., & Duan, J, 2016) Then Tian, L., Liang, Y., and Zhang, B developed a method utilizing an index to measure the mixing degree (referred to as MDI) of residential and industrial land. Their work resulted in the grant of a patent by the State Intellectual Property Office of the People's Republic of China in 2016 (Patent number: 201310659117.6). This provides an effective way to measure spatial variation in land use mix at large spatial scales. (*Figure 55*)

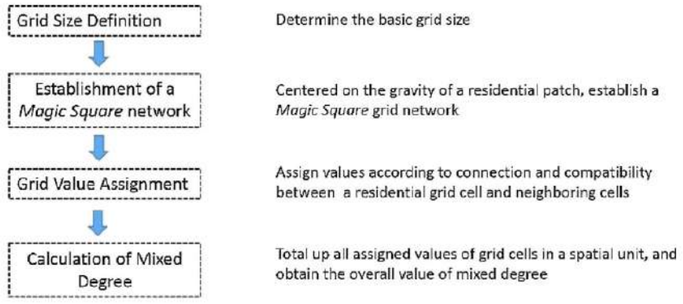


Figure 59: Steps of establishing MDI of R & I land
Source: Tian, L., Liang, Y., and Zhang, B, 2017

However, this quantitative approach also has its limitations, such as its application requires detailed land use information, especially the classification of industrial land. And even though some industrial sites are not adjacent to residential areas, the air pollution and water pollution they generate can have a negative impact on residential areas. Also, therefore, this method is difficult to use for this project due to the lack of data.

4.2.2 Planning Guidelines for Industrial Park Development

An industrial park can be defined as a designated land area that is developed and subdivided according to a comprehensive plan. It may include pre-built factories or be vacant, and can have shared facilities or lack them, catering to a group of industrialists (UNIDO, 1997, p.10). The term "comprehensive plan" refers to the holistic approach in industrial park planning, encompassing spatial design, functional synergy, and considerations for the entire life cycle of the park. This involves planning, land acquisition, design and development, operation and management, regulation, investment marketing and facilitation, risk management, and performance evaluation (UNIDO, 2019). Different types of industrial parks exist, as outlined in *Table 10*, but all of them have detailed master plans that establish standards and specificat=ions for the built environment, including buildings.

In many developing countries, industrial parks are recognized as crucial tools for achieving inclusive and sustainable industrialization. Consequently, the planning guidelines for industrial parks align closely with the Sustainable Development Goals (SDGs), particularly Goals 6, 8, 9, 11, 12, and 13 (UNIDO, 2019). These goals also reflect the aspirations of Ethiopian Industrial Park development, which seeks to create a competitive, inclusive, and sustainable industrial landscape.

Table 10: Common types of Industrial Parks
Source: Zeng (2010), ADB (2016), ASSOCHAM (2016); Locus Economica (2019); and UNIDO

Type	Definitions	Examples
Eco-Industrial Parks (EIPs)	Also called, sustainable, low-carbon, green, or circular zones, EIPs are industrial parks designed to improve the social, economic and environmental performance of their resident firms, including through the promotion of industrial symbiosis and green technologies delivering resource efficiency and resulting in competitive advantage, promoting climate-resilient industries and green value chains, as well as inclusive and sustainable business practices and socially responsible relations with surrounding communities.	Myeonggy, Noksan, Sungseo, and Kusan in the Republic of Korea; Masdar Green City in the UAE; Tianjin Eco-City in China.
Special Economic Zones (SEZs)	Delineated areas of a country, subject to unique economic regulations that differ from other areas in the same country and also generally provide for extra-territorial treatment with respect to customs tariffs.	Shenzhen and Xiamen in China; Panama Pacifico in Panama.
Border Economic Zones	Economic zones located along an international border to facilitate cross-border trade and investment.	Thai-Malaysian Special Border Economic Zone; Mexican Maquilladoras; Corozal in Belize.
Export Processing Zones (EPZs)	Duty-free zones focused on manufacturing for export, generally providing export subsidies in the form of tax holidays and having no or minimum export quotas.	Athi River EPZ in Kenya; Kaohsiung EPZ in Taiwan; United Republic of Tanzania EPZs; Bangladesh EPZs.
Free Trade Zones (FTZs) / Free Zones(FZs)	Delineated areas with suspended import taxes and where regulatory compliance obligations are reduced, in order to attract new business and foreign investments.	Shannon in Ireland; Katowice in Poland; Jebel Ali in Dubai; Tanger Med in Morocco.
Bonded Areas / Bonded Zones	Areas where dutiable goods may be stored, manipulated, or undergo light processing (such as assembly) without payment of duty, subject to customs bonds.	Waigaoqiao Bonded Logistics Zone in China; Dammam Port Bonded Zone in Saudi Arabia.
High-Tech Parks (HTPs)	Special areas designated to facilitate and promote the creation and growth of innovation-based companies through incubation and other policy interventions.	Mie Hi-Tech Park in Japan; Gangwon Technopark in the Republic of Korea; Discovery Park in the UK.
Agro-Industrial Parks (AIPs)	Specially-designated areas designed to attract and promote industries in downstream agricultural processing.	Integrated agro-industrial parks in Ethiopia; Indian Food Parks.

Figure 60: Sustainable Development Goals 6, 8, 9, 11, 12, 13
Source: Sustainable Development Goals Knowledge Platform. Transforming our world: the 2030 Agenda for Sustainable Development.

- **Goal 6:** Ensure availability and sustainable management of water and sanitation for all;
- **Goal 8:** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- **Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- **Goal 11:** Make cities and human settlements inclusive, safe, resilient and sustainable;
- **Goal 12:** Ensure sustainable consumption and production patterns; and
- **Goal 13:** Take urgent action to combat climate change and its impacts.

4.2.3 Informal Settlements

The term informal settlement primarily describes a built environment which is a slum, either under illegal or legal tenure (Srinivas, 1994: p. 1). In Africa, it is estimated that 166 million people or 73% of sub-Saharan Africa's urban population are currently residing in the informal settlements. (B.W. Wekesa, G.S. Steyn, F.A.O. (Fred) Otieno, 2011) And in Ethiopia, it is also a very common settlement typology that provides shelter for most of the urban poor. In this project, in recent years, with the construction of Eastern Industry Zone and the expansion of industrial scale, more and more informal settlements have been gathered around the EIZ. This special fabric of high building density and intricate streets and alleys has spread rapidly around the EIZ. This form of housing provides cheap housing for many migrants, but it also breeds many unsafe factors, such as increased crime rates, encroachment on farmland, and high density leading to fire hazards.

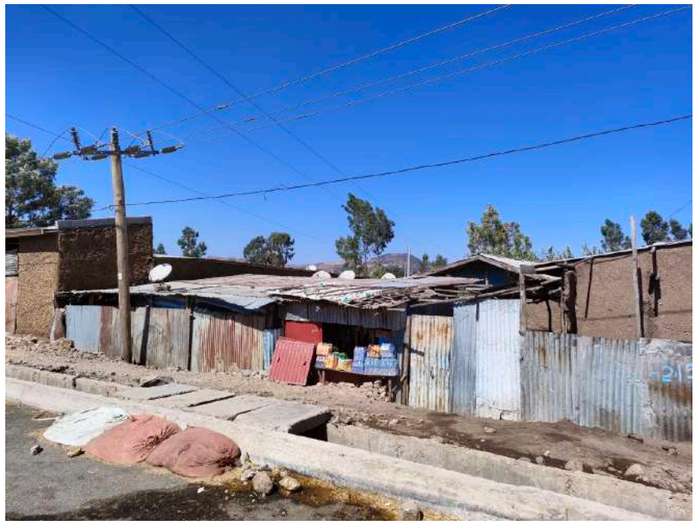


Figure 61: Informal settlements in Dukem, Ethiopia
Source: Photoed by Nan Ma, 2023

According to research in the literature, informal settlements exhibit two main characteristics. First, they are typically situated in areas with poor environmental conditions and lack secure land tenure. Additionally, these settlements suffer from inadequate housing units and a lack of basic infrastructure (Srinivas, 1994; UN Habitat, 2003). Often, the dwelling units in these settlements are makeshift and fail to meet building and land use regulations (B.W. Wekesa, G.S. Steyn, F.A.O. Otieno, 2011). From a socio-economic perspective, the majority of residents in informal settlements are impoverished and heavily reliant on the informal economy for their livelihoods, engaging in activities such as street vending, small-scale trading, and home-based crafts (Burton, 2002). Their income is irregular and uncertain, and unemployment rates tend to be high.

Given these conditions, there is a pressing need for employment opportunities in urban centers of developing countries to improve livelihoods and combat poverty (Richards, R., O'leary, B., & Mutsonziwa, K., 2006). During fieldwork, local residents frequently highlighted the importance of the Eastern Industry Zone's development in generating stable employment opportunities.

Numerous intervention approaches have been proposed to enhance the quality of life in informal settlements. These approaches include the upgrading of existing informal settlements (Balbo, 2001), providing housing subsidies (Huchzermeyer, 2003), clearing informal settlements and relocating residents to public housing (Ogunshkin & Olayiwola, 1992), and reducing the cost of housing units (UN-Habitat, 2005). "Classic solutions" involve reducing building standards, utilizing low-cost traditional indigenous technologies and materials, adopting self-help housing delivery models, and addressing market imperfections (B.W. Wekesa, G.S. Steyn, F.A.O. Otieno, 2011).

In this project, the planning of the industrial park's development and interventions in its surrounding areas should be conducted simultaneously and in line with the research objectives, which aim to explore detailed spatial patterns that can stimulate endogenous dynamics.

4.3 Procedural Perspectives

4.3.1 Local Partnerships

Between 1999 and 2003, the OECD conducted an in-depth study of area-based partnerships in which it examined the experience of 14 countries and they found that the main impact of partnerships was to improve local governance. And here are 3 factors contributing to the outcome:

"① First, in all the countries surveyed, partnerships stimulate the uptake of public programs in a way that is consistent with locally-shared priorities.
② Second, partnerships combine public programs with local initiatives, and in so doing, support the development of these initiatives.
③ Third, there are many instances in which partnerships have influenced the targeting of public programs better to meet local needs." (OECD, 2003)

From a local governance perspective, local partnerships could be used as a valuable instrument to promote vitalization programs. In Ghana's capital city, Alake, the government has proposed a multi-level partnership through the Cities Alliance Land, Services, and Citizenship Project. This partnership operates at the national, city, and community levels in Accra. It aims to improve living conditions and empower residents to participate in the city's development, particularly in the slums of Accra. (Marie-Alexandra Kurth, 2016) Residents collaborate closely with local and national governments to voice their needs and contribute to policy decisions. For instance, they provide mapping and statistical assistance, allowing government departments, experts, and other stakeholders to utilize the collected data for developing priority interventions. This potential for resident involvement in policy-making is significant.

Local partnerships serve as efficient networks that bring together diverse stakeholders. They facilitate the exchange of valuable resources in various directions, supporting the implementation of vitalization programs. By organizing different actors and leveraging their expertise, these partnerships can effectively address local challenges and drive positive change.

4.3.2 Co-governance

The term "co-governance" has gained recent attention in the literature, and its precise definition is still evolving (Johnson & Osborne, 2003). This project primarily focuses on co-governance between local authorities and local communities. It enables mutual shaping and representation, offering a more inclusive and participatory approach to governance. However, given the specific study site, it is important to include private entrepreneurs, park operators, and other relevant stakeholders in the system.

Governance can be understood as a dual capacity: the ability to shape collectivities such as interests, groups, and organizations, and to represent them in various arenas (Le Gale`s, 1998). Kooiman (2005) has identified three modes of governance: hierarchical governance, self-governance, and co-governance. Hierarchical governance represents a "top-down" approach, which is currently adopted by the government in Ethiopia. While this mode allows for quick decision-making, it may compromise some aspects of democracy. Self-governance, on the other hand, involves a "bottom-up" approach where collectivity shapes and represents itself. Co-governance occurs when different collectivities work cooperatively with one another, engaging in mutual shaping and mutual representation (Peter Somerville & Nathan Haines, 2008). Co-governance can operate across multiple scales, and when different collectivities operate on the same scale, the process becomes relatively more straightforward.

Besides, combined with the concept of "co-governance", John Ackerman proposed the concept of "co-governance for accountability". The very important point that the active participation of civil society and the strengthening of the state apparatus are not mutually exclusive or even contradictory was mentioned. (Ackerman, J., 2004) In fact, it is essential to recognize that strengthening both the state and civil society can contribute to a virtuous circle of governance. This requires a well-designed system that fosters collaboration and synergy between the two.

By actively involving civil society in decision-making processes, the state can benefit from diverse perspectives, local knowledge, and innovative solutions. Civil society organizations can provide valuable input, hold the government accountable, and act as a bridge between citizens and the state. At the same time, a strong and effective state apparatus is necessary to provide the necessary institutional framework, resources, and enforcement mechanisms for sustainable governance. It can create an enabling environment for civil society to thrive, ensuring that their contributions are recognized and valued. Therefore, it is crucial to foster a symbiotic relationship between the state and civil society, where both entities support and reinforce each other's roles and functions. This can lead to a more inclusive, participatory, and effective governance system that addresses the needs and aspirations of the society as a whole.

Another two cases are from Helsinki. Through a comparative qualitative analysis, it has been observed that citizen self-organization expands the scope of urban planning practice. This approach enables the mobilization of diverse groups around urban space-related issues. (Horelli, L., Saad-Sulonen, J., Wallin, S., & Botero, A., 2015) The outcomes of such participatory processes combine urban space with co-governance and highlight the necessity of grassroots efforts to influence decision-making through effective channels.

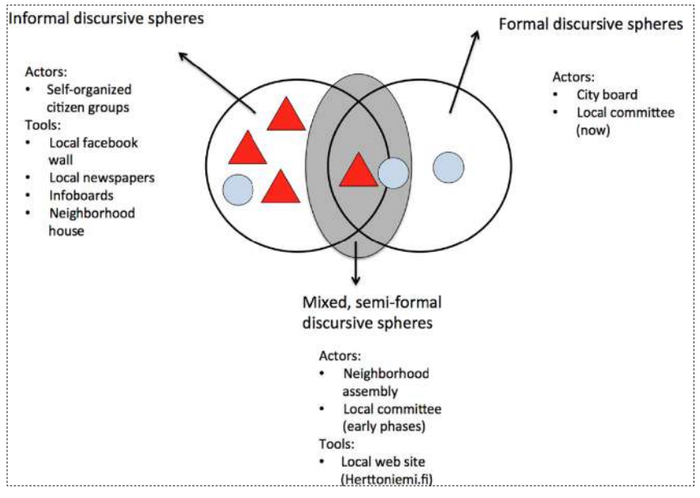


Figure 62: Local co-governance in Herttoniemi as an integrated deliberative system
Source: Horelli, L., Saad-Sulonen, J., Wallin, S., & Botero, A., 2015

4.3.3 Institutional Capacity Building

Capacity refers to the capability of individuals, groups, communities, organizations, or governments to effectively and efficiently perform tasks required of them. It involves achieving desired objectives and utilizing resources effectively, while sustaining performance gains with reduced external support. It encompasses the inherent potential of individuals or organizations to reach their maximum potential. (Antwi and Analoui, 2008; Zafarullah and Rahman, 2008; Jay D. Jurie, 2000). And institutional capacity building refers to the process of enhancing an institution's ability to effectively fulfill its responsibilities by optimizing the utilization of its resources (Tadele, 2009).
In this project, institutional capacity building is a very important topic to be explored, as Ethiopia should be able to develop continuous, rational and flexible policy guidelines, industrial development plans, etc., in order to maintain an equal and cooperative relationship between Ethiopia and foreign investors around the construction of foreign-invested industrial parks, in order to firmly focus on the achievement of its goals.

In this regard, there is much literature that proposes strategies for building institutional capacity. For example, provide relevant training programs, workshops, and seminars and offer opportunities for professional development. (Kwiatkowski, Tikhonov, Peace and Bourassa, 2009) Develop and implement clear policies and procedures that align with best practices and support effective decision-making. At the same time, regularly review and update policies to ensure they remain relevant and responsive to changing circumstances. (R.Krishnaveni & R.Sujatha, 2013) And Wouter Spekkink proposed building institutional capacity to enable different companies to solve the problem of industrial symbiosis through cooperation. (Spekkink, W. , 2013) It can be seen that capacity building can be both a goal and a method.

Institutional capacity building has also been emphasized in the field of urban planning and sustainable development. In Merritt Polk's study of the Gothenburg, Sweden case, he emphasizes the important role of institutions in addressing complex sustainable development planning and environmental management issues, and proposes to improve institutional capacity by promoting relational linkages between organizational units and levels of governance and by increasing substantive knowledge. (Merritt Polk, 2011)

Figure 63: Billboard of Eastern Industry Zone in Dukem
Source: www.sohu.com/a/273815330_795961

05 SCENARIO BUILDING & VISION

5.1 The Evolution of Regulatory Spaces such as IPs

The evolution of regulatory spaces, such as industrial parks, has followed a historical trajectory that reflects changing economic, social, and environmental considerations. *Figure 60* reflects the evolution of this type of space worldwide until the year 2000. The concept of designated industrial areas can be traced back to the 19th century during the industrial revolution. Initially, these zones were established to separate industrial activities from residential areas due to concerns over pollution, health hazards, and safety. These early industrial zones focused primarily on zoning regulations and physical separation. Then in the mid-20th century, the development of industrial estates gained momentum. These estates provided a more planned approach to industrial development. They incorporated infrastructure provisions, such as transportation links, utilities, and shared services, to support industrial activities. Industrial estates aimed to attract investments, promote economic growth, and foster industrial specialization. And industrial parks emerged as a more comprehensive and integrated concept in the latter half of the 20th century. They expanded beyond the physical infrastructure to include a broader range of services and amenities.

This kind of regulatory space often featured dedicated management entities responsible for providing business support services, facilitating collaboration, and promoting innovation. They aimed to create a favorable business environment, attract foreign investment, and stimulate economic clusters. After 1990, more emerging concepts were introduced, such as eco-industrial parks, innovation parks, science parks, business parks, etc. After 2000, the use of digital technology and connectivity to improve productivity, efficiency and sustainability has gradually become a popular concern in the construction of industrial parks. The concept of industrial ecosystem has been continuously refined, and the functions of industrial parks have evolved toward diversification and complexity.

In Ethiopia, on the other hand, the construction of industrial parks started late, in 2007. Based on the experience of industrial park construction from East Asian countries and South Asian countries, the Ethiopian government's proposed industrial park development goals include consideration of services and facilities, and aim to build comprehensive industrial parks.

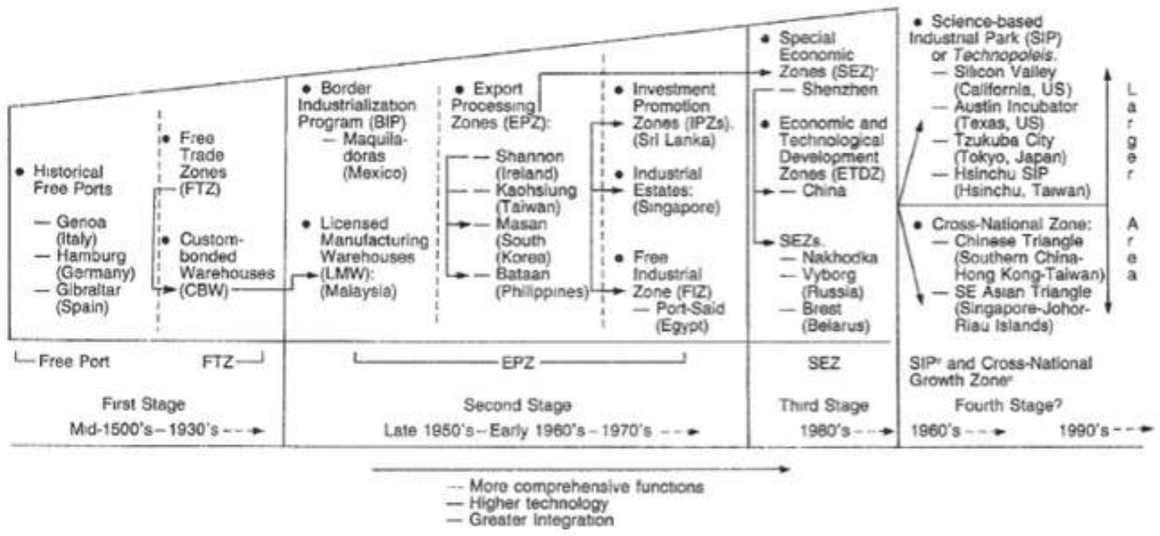


Figure 64: The Evolution Of Free Economic Zones And The Recent Development Of Cross-National Growth Zones
Source: X Chen, 2014

Since this project focuses on Ethiopia and China's Overseas Economic and Commercial Cooperation Zones built around Chinese investments in Ethiopia (the Eastern Industry Zone is a typical example), Chen's related research is used as a reference to explore the intentions of both sides at the government and international relations levels. (*Figure 61*)

These industrial parks (OECCZs) are aimed at attracting Chinese investment, promoting economic cooperation, and facilitating trade between China and Ethiopia. The Ethiopian government's objective in participating in it o leverage Chinese investment and expertise to develop its manufacturing and export sectors, improve infrastructure, and boost foreign exchange earnings. If technology transfer and knowledge exchange can really be implemented through the Chinese companies brought in, it will enhance Ethiopia's own industrial strength.

On the other hand, China's goals are to secure access to resources, diversify its investment portfolio, and expand its economic influence in Africa. And the extent of this is currently a matter of opinion and one of the more controversial international topics. In addition to gaining a foothold in the African market and benefiting from Ethiopia's domestic labor force, Chinese companies are looking to take advantage of Ethiopia's preferential trade agreements, such as the African Growth and Opportunity Act (AGOA), to export goods to the U.S. and other markets.

On a macro level, this initiative is a win-win for both sides. Of course, if each specific industrial park is observed, a variety of practical dilemmas and obstacles will be uncovered.

Type of zone by time period	1980s	1990s	2000s	2010s
1. Special Economic Zones (SEZs)	• Shenzhen • Zhuhai • Shantou • Xiamen • Hainan (province)	Industrial upgrading began	Uneven success in upgrading	Uneven success in upgrading • Kashgar • Horgos
2. Economic & Technological Development Zones (ETDZs)	14 coastal cities including: • Shanghai • Ningbo • Nantong • Others	Began industrial upgrading	Transition and diversification to high-tech manufacturing and service	Fully institutionalized and stable
3. High- and New-Technology Zones (HNTZs); Border SEZs		Special zones spread to coastal, central and western border regions • Ruili • Mohan (Yunnan)	Growing and spreading nationally	Uneven success
4. New Free Trade Zones (FTZs) and Overseas Economic and Commercial Cooperation Zones (OECCZs)		Growing gap between coastal and inland/border regions	"Go West" and "Go Global" policies began • China-built SEZs in Africa	Belt & Road Initiative (BRI) launched • Shanghai FTZ • Forest City, Johor, Malaysia • China–Laos (Mohan-Boten) Economic Cooperation Zone (ECZ)

Figure 65: Types of China's SEZs by Time Periods
Source: X Chen, 2014

5.2 Comparative Analysis & Reference Studies

5.2.1 Selection of Comparative Cases

Based on the background of the Ethiopian government learning industrial park development model from East and South Asian countries and Ethiopia as an African country, this project selects six cases, Huajian Light Industrial Town, Hawassa Industrial Park, Bole Lemi Industrial Park, Ogun-Guangdong Free Trade Zone, Long Jiang Industrial Park, for comparative analysis with the Eastern Industry Zone.

Huajian Light Industrial Town is an industrial park with shoe-making as the core industry invested by Chinese private enterprises in Addis Abeba, the capital of Ethiopia. Hawassa Industrial Park is a pilot project developed by Ethiopian government on its own while attracting foreign investment to build industrial park projects, with the goal of building an eco-industrial park in the country. Bole Lemi Industrial Park is an industrial park project invested in by South Korean private developers and it focuses also on the light industry. Ogun-Guangdong Free Trade Zone is an industrial park project invested in by private Chinese companies in Nigeria, which is similar in positioning to the EIZ - a comprehensive industrial park. And they are Chinese overseas industrial parks built in the same period. Long Jiang Industrial Park is also a Chinese overseas industrial park developed by China in cooperation with Vietnam, which is characterized by its in-depth cooperation with research institutions of local universities.

Applying a comparative analysis method in this case can provide a broader perspective for the subsequent vision, strategy and design proposal. A more comprehensive assessment of similarities, differences, and patterns across various dimensions could be conducted to assess the value and limitations of Eastern Industry Zone. Successful or unsuccessful strategies, approaches or policies from the case studies can be identified to compare with those of Eastern Industry Zone to support the proposal of more practical strategic action plans. But each case has its own unique socio-cultural, economic, and political context. This can affect the implementation of certain strategies. This can involve different periods of industrial park construction, different national systems and cultures on both sides of the partnership, changes in policies, changes in the international environment, etc.

Bole Lemi Industrial Park
(South Korea-Ethiopia)

Hawassa Industrial Park
(Ethiopia)

Huajian Light Industrial Town
(China-Ethiopia)

Eastern Industry Zone
(China-Ethiopia)

Ogun-Guangdong Free Trade Zone
(China-Nigeria)

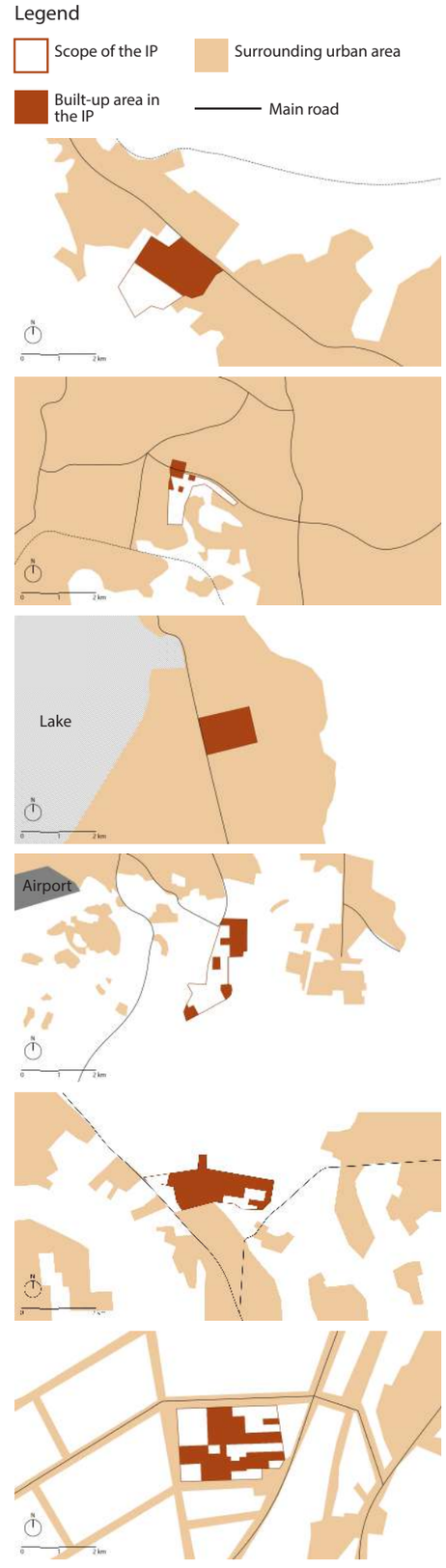
Long Jiang Industrial Park
(China-Vietnam)

Figure 66: Location of cases
Source: Author, 2023
Note: The photos are from the websites of each industrial park.

5.2.2 Comparative Analysis

Case	Location	Dominant Part	Start Year	Main Industries	Current Status	Size	Creation of Employment
Eastern Industry Zone It is the only overseas economic & trade cooperative zone in Ethiopia at the national level, and the first industrial park built in Ethiopia.	Ethiopia, Dukem	Chinese private developers	2007	cement, footwear, automobile assembly, steel rolling, textile and garment	Phase in operation	500 ha	20,000
Huajian Light Industrial Town It incorporates elements such as factories, warehouses, residential areas, commercial spaces, and recreational facilities to promote mixed development.	Ethiopia, Addis Ababa	Chinese private developers	2015	shoes and garment	partly in operation	138 ha	25,000
Hawassa Industrial Park It has its own renewable electricity source and employs Zero Liquid Discharge (ZLD) that enables to recycle of 90 percent of sewerage disposal water. It serves as a prototype for the industrial parks being built in other parts of Ethiopia.	Ethiopia, Hawassa	Ethiopian government	2016	textile and garment	partly in operation	400 ha	25,000
Bole Lemi Industrial Park It is strategically located near Bole International Airport, which provides convenient access to air transportation and global markets.	Ethiopia, Addis Ababa	South Korean private developers (but it is public)	2014	manufacturing, agro-processing, textiles, and garments	fully in operation	353 ha	13,000
Ogun-Guangdong Free Trade Zone It is a collaboration between the Ogun State government and the Guangdong Provincial Government of China.	Nigeria, Lagos	Chinese state-owned companies	2007	manufacturing, warehousing, and logistics	fully in operation	250 ha	6,000
Long Jiang Industrial Park In cooperation with local universities, it has also established the "Long Jiang Industrial Park Bursary".	Vietnam, Tien Giang Province	Chinese private developers	2007	manufacturing, pharmaceutical, rubber and wood industry	fully in operation	540 ha	17,907

Table 11: Case study
Source: Author, 2023



5.2.3 Conclusion

Here is a detailed comparative analysis of seven industrial parks from three aspects:

① **Socio-economic Aspect:**

Huajian Light Industrial Town is known for its shoe manufacturing industry and has played a significant role in job creation and economic growth in the region. It has attracted both local and foreign investment, contributing to the development of the local economy. Hawassa Industrial Park has moved toward the direction of an eco-industrial park, but it is difficult to form a symbiotic system for the industries clustered in the current situation. But it has created a significant number of employment opportunities and has been a driving force behind Ethiopia's industrialization efforts. Bole Lemi Industrial Park focuses on various manufacturing sectors and aims to stimulate economic growth, create job opportunities, and promote technology transfer in Ethiopia. Ogun-Guangdong Free Trade Zone has attracted Chinese investment and has been instrumental in creating employment opportunities and driving economic development in the region. It has helped enhance trade relations between China and Nigeria. Long Jiang Industrial Park has contributed to economic growth, employment generation, and technological advancement in the region.

② **Spatial Aspect:**

Huajian Light Industrial Town is a well-planned industrial town with designated manufacturing areas, residential zones for workers, and supporting infrastructure. The layout is organized to optimize productivity and efficiency. Hawassa Industrial Park is located near Hawassa Lake, providing a pleasant environment for workers. And the spatial design ensures a smooth flow of goods and efficient operations. Bole Lemi Industrial Park is strategically located near the Bole International Airport, facilitating easy access to transportation and logistics. Ogun-Guangdong Free Trade Zone is a designated trade zone with separate areas for industries, logistics, and commercial activities. Spatial planning ensures the efficient functioning of different sectors and provides a conducive environment for businesses. Long Jiang Industrial Park is located in the countryside but the spatial design promotes collaboration and connectivity for businesses and residents.

③ **Governance Aspect:**

Huajian Light Industrial Town operates under Chinese management and follows Chinese regulations and standards. Governance and decision-making processes are aligned with Chinese practices. Hawassa Industrial Park is managed by the Ethiopian Industrial Parks Development Corporation (IPDC) and operates within the legal framework and regulations of Ethiopia. Bole Lemi Industrial Park is overseen by the Ethiopian Investment Commission (EIC) and operates under Ethiopian governance and regulations. Ogun-Guangdong Free Trade Zone is governed jointly by the Ogun State Government in Nigeria and Guangdong Province in China. Governance structures and policies are established through collaboration between the two entities. Long Jiang Industrial Park operates under Chinese governance and adheres to Chinese regulations and policies. Decision-making processes and administrative structures align with Chinese practices.

In contrast, the industrial parks basically meet local requirements for their job creation, but less consideration is given to industrial upgrading; the spatial layout mainly serves production and logistics, with a lack of consideration for living space; in addition, the China-led industrial parks do have more power in terms of management and operation.

Policy Instruments

Investment Incentives: These cases offer various incentives to attract investment, such as tax breaks, subsidies, and preferential policies, to encourage businesses to establish operations within the industrial zones.

Infrastructure Development: The development of necessary infrastructure, including transportation links, utilities, and shared services, is a key policy tool in these cases. Adequate infrastructure supports industrial activities, enhances connectivity, and facilitates efficient operations.

Specialized Services and Support: Industrial parks provide dedicated management entities responsible for providing business support services, facilitating collaboration, and promoting innovation. These services may include business incubation, access to financing, technical assistance, and training programs.

Regulatory Framework: These cases have established regulatory frameworks that govern the operations within the industrial parks, ensuring compliance with environmental, labor, and safety standards. (There is a regulatory framework, but the actual implementation depends on the situation.)

Public-Private Partnerships: Collaboration between the government, local authorities, private sector entities, and other stakeholders is emphasized in these cases. Public-private partnerships are formed to jointly develop and manage industrial parks, leveraging the strengths and resources of each stakeholder. (But the reality is that most focus only on public-private relationships and give less consideration to the needs of other groups.)

Market Access and Promotion: Market access and promotion are crucial aspects addressed in these cases. Measures such as organizing trade fairs, showcasing local products, and connecting producers with potential buyers are undertaken to facilitate market opportunities and boost economic growth. (But most of the cases are export-oriented, and even if the relevant products can enter the markets of the host countries, their shares are relatively small.)

5.2.4 Other Reference Studies

Industrial Park Development Practices in South Korea

Industrial park development in South Korea has played a crucial role in the country's economic growth and industrial transformation. The government has implemented various policy instruments, adopted effective spatial patterns and layout strategies, managed land use efficiently, and fostered partnerships and cooperation.

Governance Tools

Korea has established a support system for developers and resident companies. The support system for industrial park developers aims to provide partial financial assistance for development costs and streamline land acquisition processes. The government implements relevant laws and systems to facilitate the smooth acquisition of land for industrial park development. Additionally, the support system for resident enterprises within the parks offers tax benefits during land acquisition and facilitates low-interest loan arrangements for land purchases. These measures aim to encourage investment and reduce financial burdens for both developers and resident enterprises, fostering a favorable environment for industrial park development and growth. (*Figure 63*) The reason for providing a support system is that the Korean government realizes that the development of industrial parks has had a significant ripple effect on the regional economy, something that Ethiopia can learn from.

Spatial Pattern and Layout

The spatial pattern and layout of industrial parks in South Korea are carefully planned to optimize efficiency and accessibility. The parks are strategically located near transportation networks, such as ports, highways, and airports, facilitating the movement of goods and resources. The clustering of related industries within designated zones allows for the sharing of infrastructure, services, and knowledge, promoting collaboration and resource efficiency. And the program for competitiveness improvement of industrial clusters was proposed to create synergism. Organic partnerships with universities, research organizations and business support organizations that are located adjacent to industrial parks were built for technology transfers. From *Figure 64*, in 2010, the pan regional cluster program was launched to make use of the outside innovation resources and extend their operation field.

Figure 68: Program for Competitiveness Improvement of Industrial Clusters in 2010
Source: Hyeyoung Cho, 2012

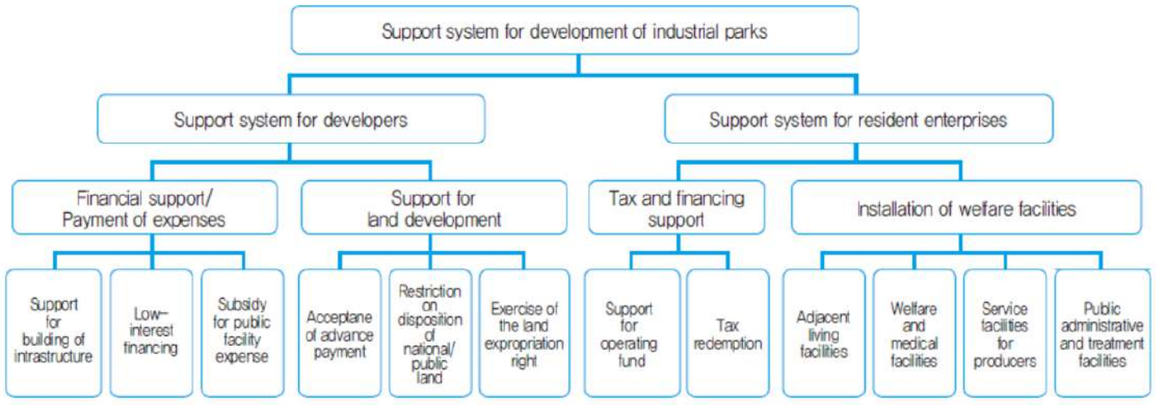


Figure 67: Support systems for development of industrial parks in South Korea
Source: Hyeyoung Cho, 2012

Suzhou Industrial Park (SIP) in China

Suzhou Industrial Park (SIP) in China is a successful example of an industrial park development that has contributed significantly to regional economic growth and development.

Efficient Land Use Management

The park has adopted a comprehensive land use planning system that ensures the optimal allocation and utilization of land resources. Careful consideration is given to environmental protection, with designated areas for green spaces, ecological preservation, and sustainable development. SIP has also incorporated mixed-use zones, integrating residential, commercial, and recreational facilities to create a livable and sustainable environment. From *Figure 65*, it can be seen that the planning and design of Suzhou Industrial Park is not limited to the interior of the industrial park, but integrated with the surrounding urban environment and concerned about the compatibility of the site.

Partnership and Cooperation

The model of partnership and cooperation in Suzhou Industrial Park (SIP) in China is characterized by a collaborative approach involving various stakeholders. First, strong public-private partnerships (PPPs) are fostered, bringing together the government and private sectors. Then SIP actively engages with government agencies at various levels to ensure coordinated planning and implementation. And industry associations and chambers of commerce, both domestically and internationally, play a vital role in promoting networking, information exchange, and business development. They organize events, conferences, and trade fairs to facilitate cooperation and collaboration among companies. In addition, it has attracted foreign companies and investors through initiatives such as joint ventures, technology transfers, and investment incentives. Such an integrated and dynamic network of relationships allows for support for all types of collaborative projects around the Suzhou Industrial Park.

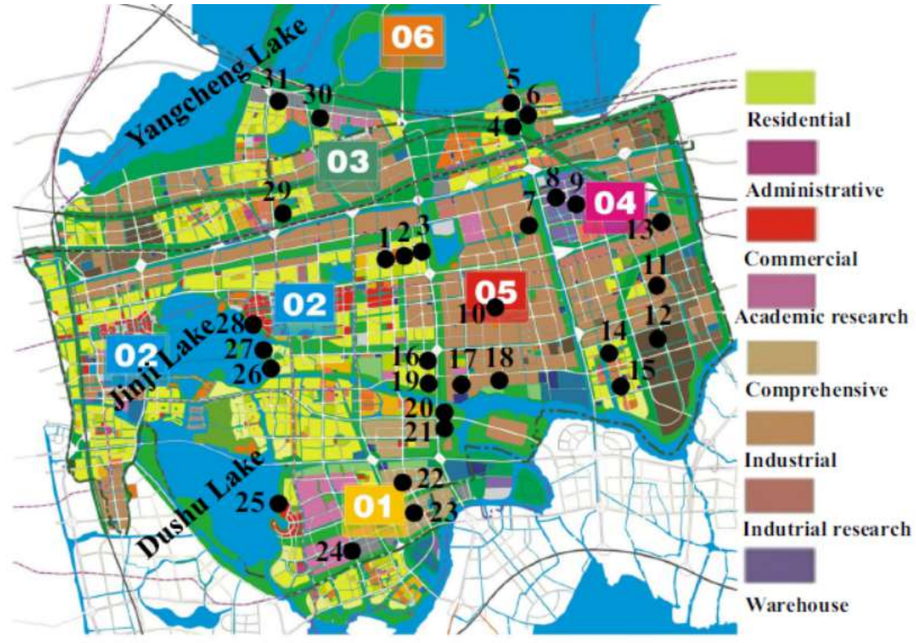


Figure 69: Land use in SIP
Source: Xu, J., Zhuang, Q., Fu, Y. et al., 2019

Figure 70: Photos of SIP
Source: www.szxc.gov.cn/

5.3 Stories of Local People

The author commissioned one Chinese friend in Ethiopia to complete this questionnaire on April 30, 2023, in Dukem and Debre Zeyit, as well as in the Eastern Industry Zone. A total of 30 questionnaires were distributed and 30 were collected on the spot, of which 10 were distributed to local workers working in the EIZ, 10 to residents of Dukem and 10 to residents of Debre Zeyit. Due to the small number of questionnaires distributed, the distribution of participants was not completely even. There may also be a degree of chance in the results. However, the results of this questionnaire are valuable for the study of this project, as they present the most realistic thoughts and needs of the local people.

In general, among the ten workers, most of them are satisfied with their current workspace and their relationship with their co-workers, and they are also satisfied with the safety of the work they are doing. In addition, more than half of them are also satisfied with the current commuting conditions. However, regarding access to training and vocational programs, most of them think that there are very few education and training opportunities available now. Women make up four out of ten of these workers, a much higher percentage than in the random survey of residents. Combined with the data on the Eastern Industry Zone, the construction of this industrial park has indeed promoted female employment in the region. Among these ten participants, most of them had been working for one year or less, except for two who had been working for more than three years. From this, it can be guessed that the mobility of local workers in the EIZ is high.

Of the 20 residents, only three-twentieths of the participants were female. And while the majority of participants in Dukem were native-born, the majority of residents in Debre Zeyit were from other parts of Ethiopia. One interesting finding: residents in Dukem interacted significantly more with Chinese people than residents in Debre Zeyit. This is most likely due to the proximity of the Eastern Industry Zone to Dukem. Most of the residents from both towns are interested in working at EIZ and have a strong desire to be involved in the decision-making process. Most of them believe that the construction of the industrial park has made the area a better place to live. But they are also more concerned about the environmental impact of these production activities on the area. In addition, the survey found that the local people rely heavily on "bajaj" tricycles to get around.

Regarding the two open-ended questions "What do you think the construction of an industrial park should bring to the city, besides new jobs?" and "Can you imagine what other activities, apart from production activities, will take place in and around the industrial park in the future?", most of the responses received were "No idea". This may be due to poor communication during the survey (due to language differences), or because the local people simply see EIZ as an exotic product and do not think it has deeper connections to the local area. However, there are still some valuable suggestions that were collected. One of the most mentioned was the desire to have more jobs for local people. And they would like to have more schools with good teaching quality and hospitals with good medical conditions. In addition, three people mentioned that they would like to see more products from the Eastern Industry Zone enter the local market as well and be sold at a lower price. Recreational facilities were also mentioned several times by the young participants. It can be seen that people's needs are to improve their quality of life around infrastructure, public services, education, etc.

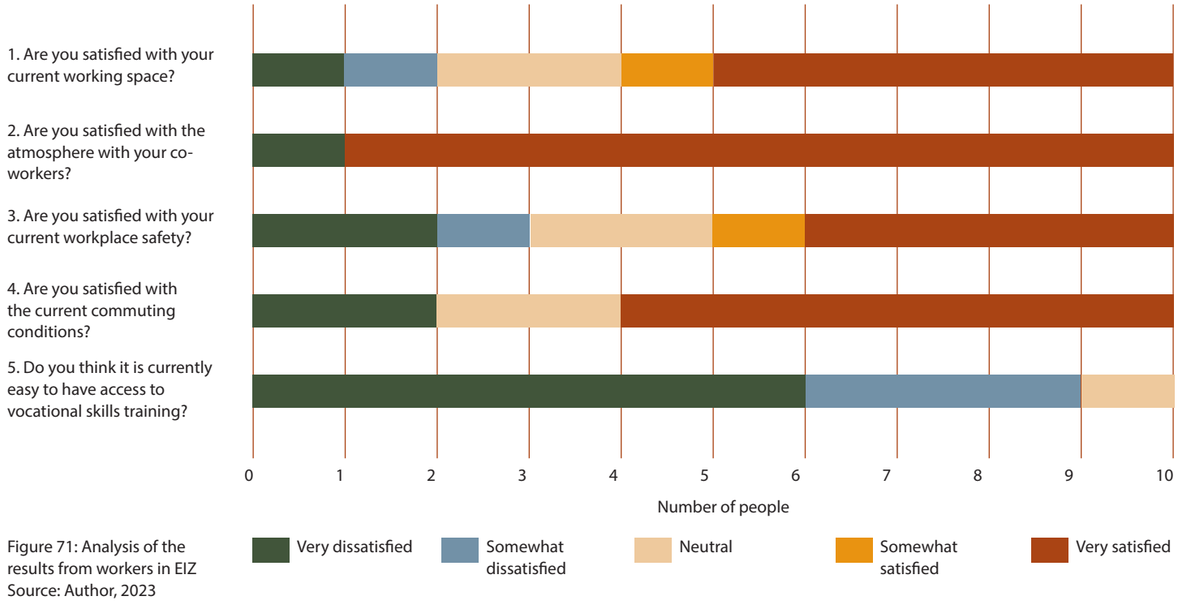


Figure 71: Analysis of the results from workers in EIZ
Source: Author, 2023

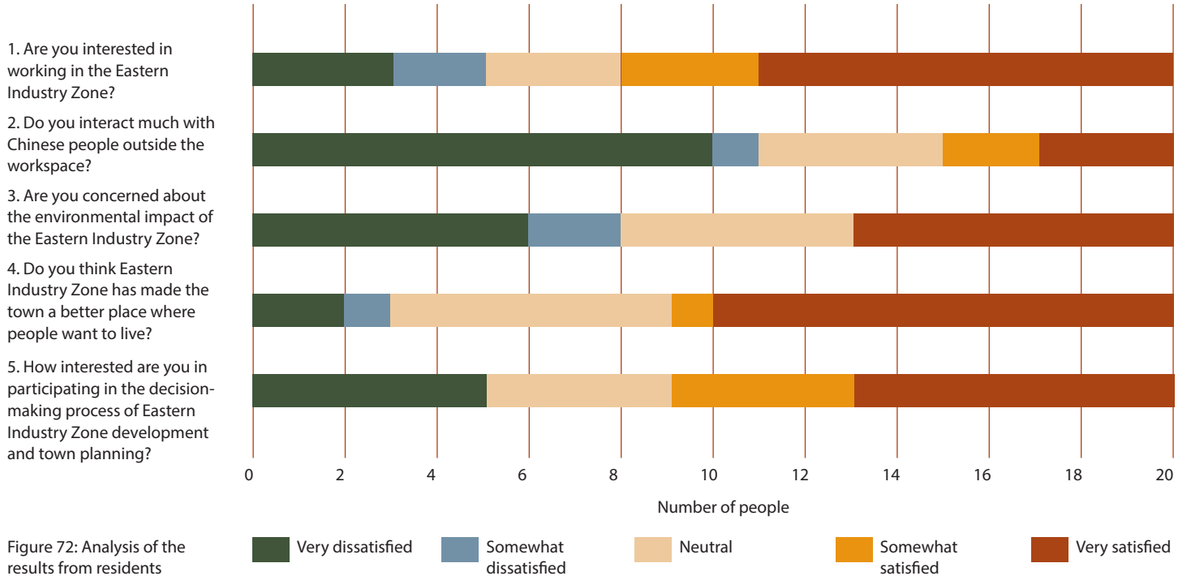


Figure 72: Analysis of the results from residents
Source: Author, 2023

Figure 73: Analysis of the basic information
Source: Author, 2023

5.4 Local Capacity Analysis

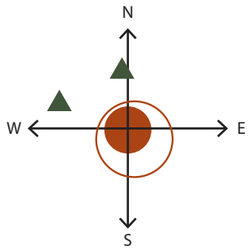
5.4.1 Explorations at the Meso Scale

The topography has a major limitation on the distribution of the population and the extent of its activities. First the terrain can limit the extension of critical infrastructure, such as railroads and roads. This, in turn, can constrain the expansion of towns and other informal settlements. But in the region the topography at the same time brings rich tourist resources such as mountains and lakes in the city of Debre Zeyit. As a result tourism facilities and industries have also clustered and developed here. The area between the two towns is relatively flat, and this is where the Oriental Industrial Park is located.

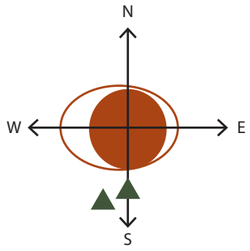
And it can be seen from *Figure 73* that Debre Zeyit is much larger and more densely populated than Dukem. When considering the layout of phase two of EIZ and other local industrial clusters in the future, it is necessary to consider the negative impacts that production and logistics activities may bring to densely populated areas, such as air and noise pollution.

According to *Figure 72*, there are mountains to the north and west of Dukem and to the south of Debre Zeyit, and this topography will limit the expansion of the two towns in the future. The terrain around the Eastern Industry Zone is relatively flat and open and may gather some small local industries.

Urban Expansion Direction in Dukem



Urban Expansion Direction in Debre Zeyit



Legend

Mountains

Current Urban Area

Future Urban Area

Figure 75: Diagram of the direction of urban expansion
Source: Author, 2023

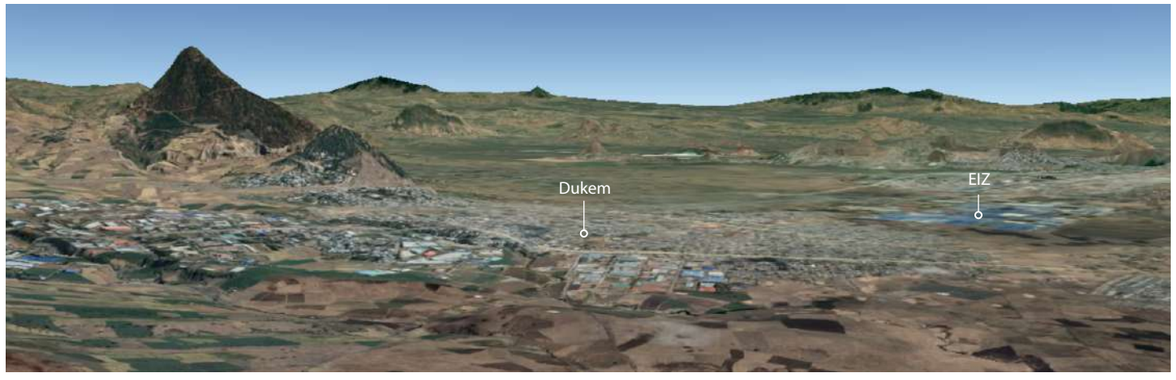


Figure 74: The mountain on the north side of Dukem
Source: Author, 2023

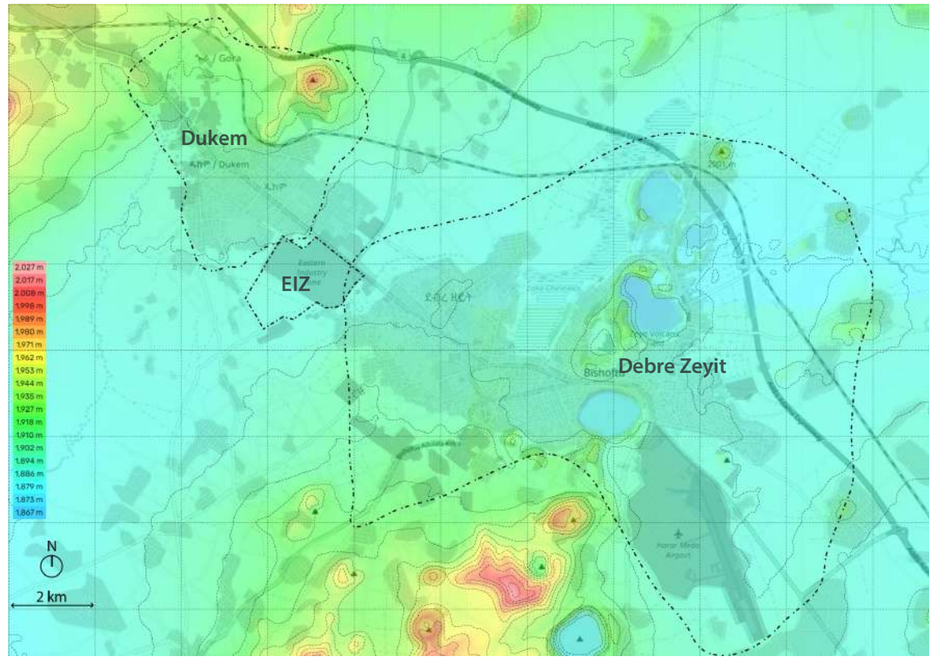


Figure 76: Elevation in Dukem-Debre Zeyit area
Source: Author, 2023

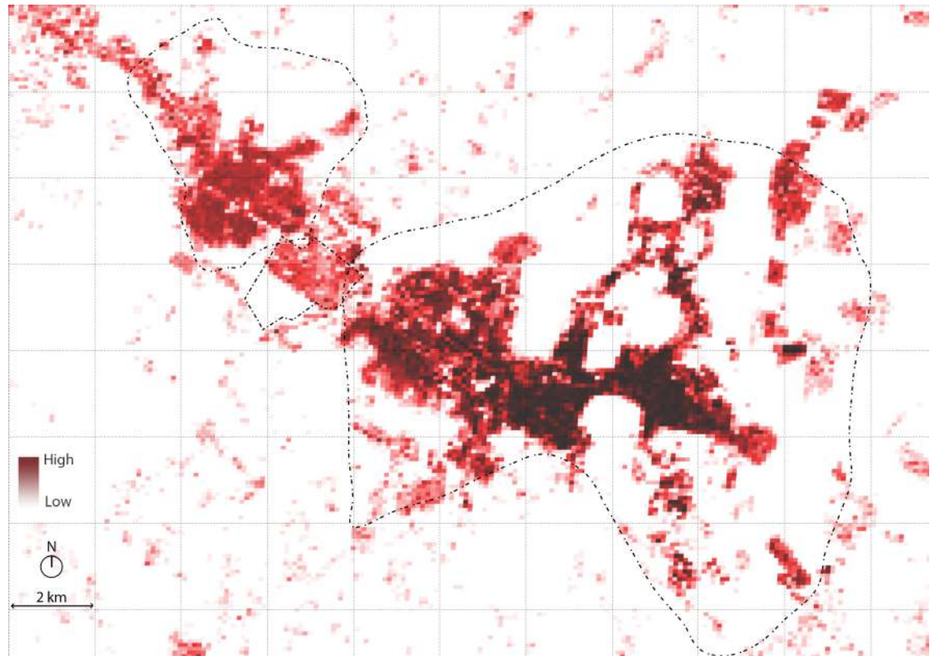


Figure 77: Population Density in Dukem-Debre Zeyit area in 2021
Source: Global Human Settlement Layer, 2023

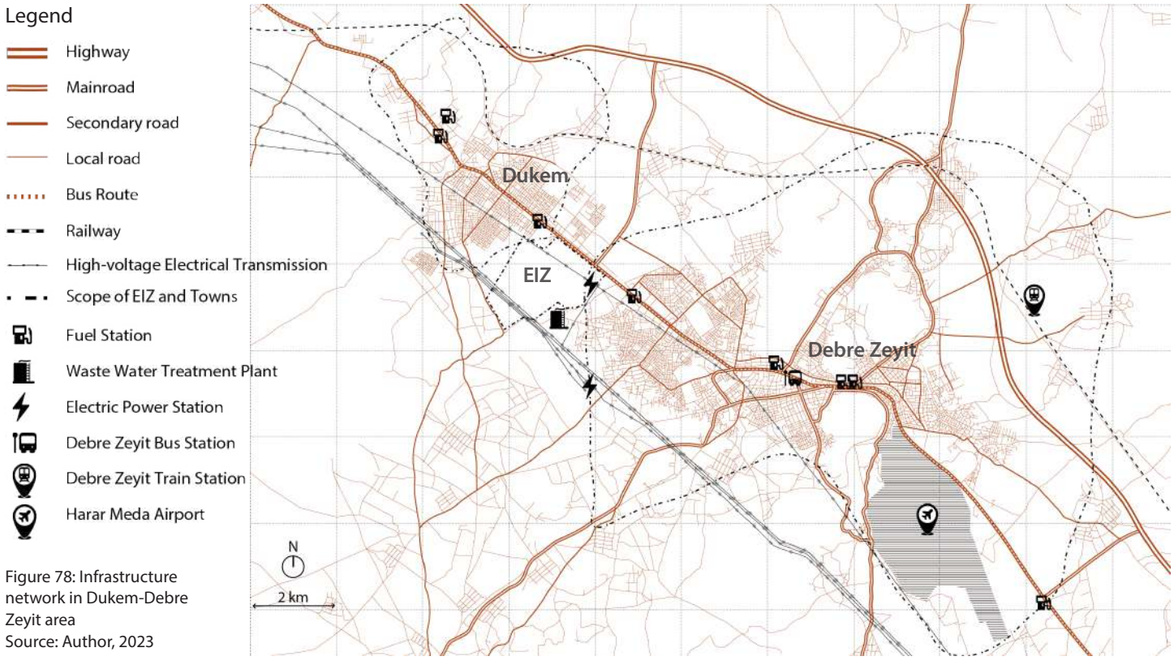
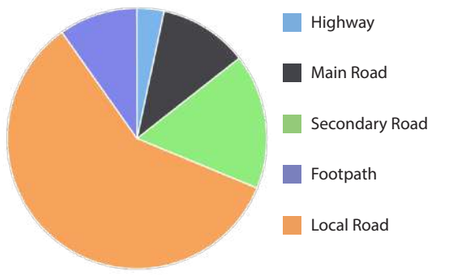


Figure 78: Infrastructure network in Dukem-Debre Zeyit area
Source: Author, 2023

Proportion of different types of roads



Proportion of different types of road surfaces

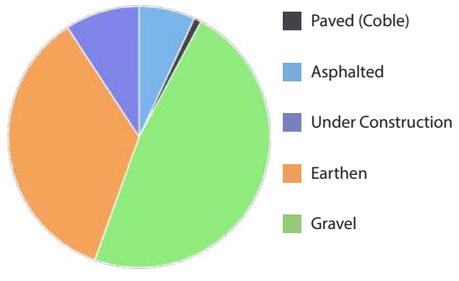


Figure 79: Proportion of different types of roads and road surfaces
Source: data from Girum Sisay Alemu, 2020

Dukem and Debre Zeyit are connected by the Bishoftu-Dukem Road, which is a major arterial road in the region and passes in front of the EIZ. The road infrastructure in these areas consists of a network of paved and unpaved roads connecting various industrial zones, residential areas, and commercial centers. Road connectivity needs to be increased and the quality of roads needs to be improved. (*Figure 75*)

The Addis Ababa-Djibouti Railway, which connects the capital city Addis Ababa to the port of Djibouti, passes to the north of the area. However, the current train station is located on the eastern side of the city of Debre Zeyit and does not serve the entire region well for rail transportation. The current Harar Meda Airport is for military use only.

The electricity supply in Dukem and Debre Zeyit is supported by high-voltage transmission lines. These lines transmit electricity from the national power grid to the industrial areas and other parts of the region. The Ethiopian Electric Power Corporation (EEPCo) is responsible for the management and distribution of electricity in the country.

In addition, the "bajaj", a three-wheeled vehicle used for short trips or personalized transportation, is a local specialty.

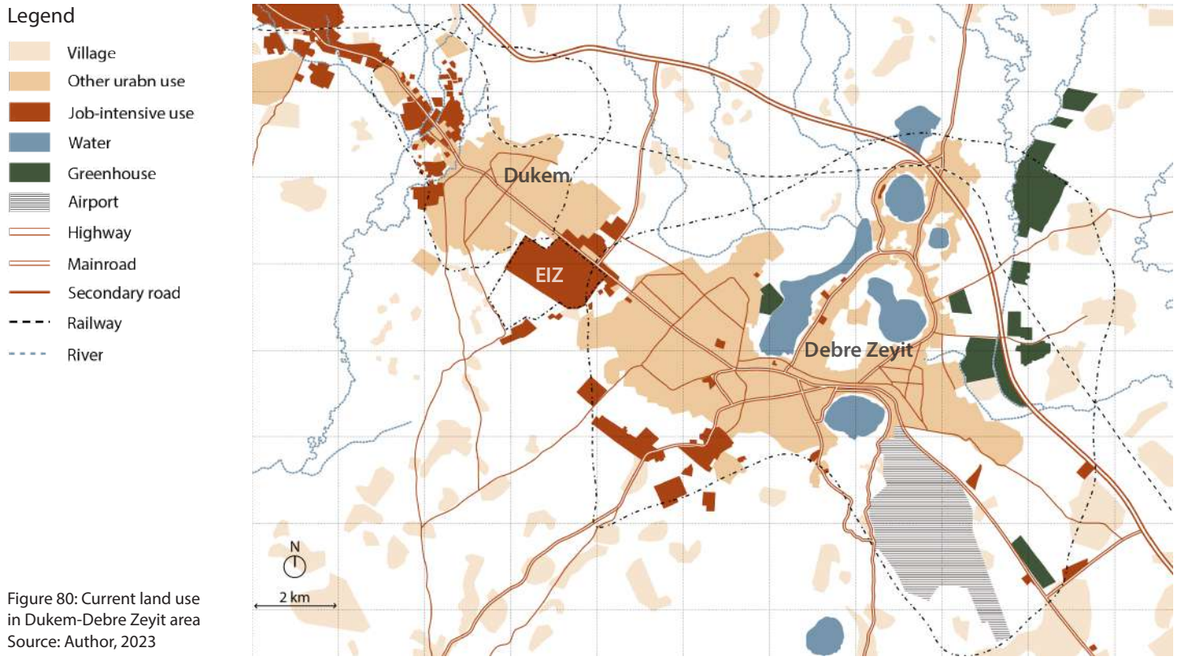


Figure 80: Current land use in Dukem-Debre Zeyit area
Source: Author, 2023

The current land use in Dukem-Debre Zeyit area presents the characteristics of fragmentation and collage. The villages and informal settlements around the towns have no access to any public services or infrastructure. This urban sprawl has led to inefficient land use and low quality of life for people.

As for industrial land, local industry clusters are largely concentrated on the west side of Dukem. There are also some on the south side of Debre Zeyit, but they are more scattered. The transitional space between Eastern Industry Zone and local communities presents a particularly clear boundary. As towns continue to expand and industrial parks continue to be built, this particular type of space will receive special attention.

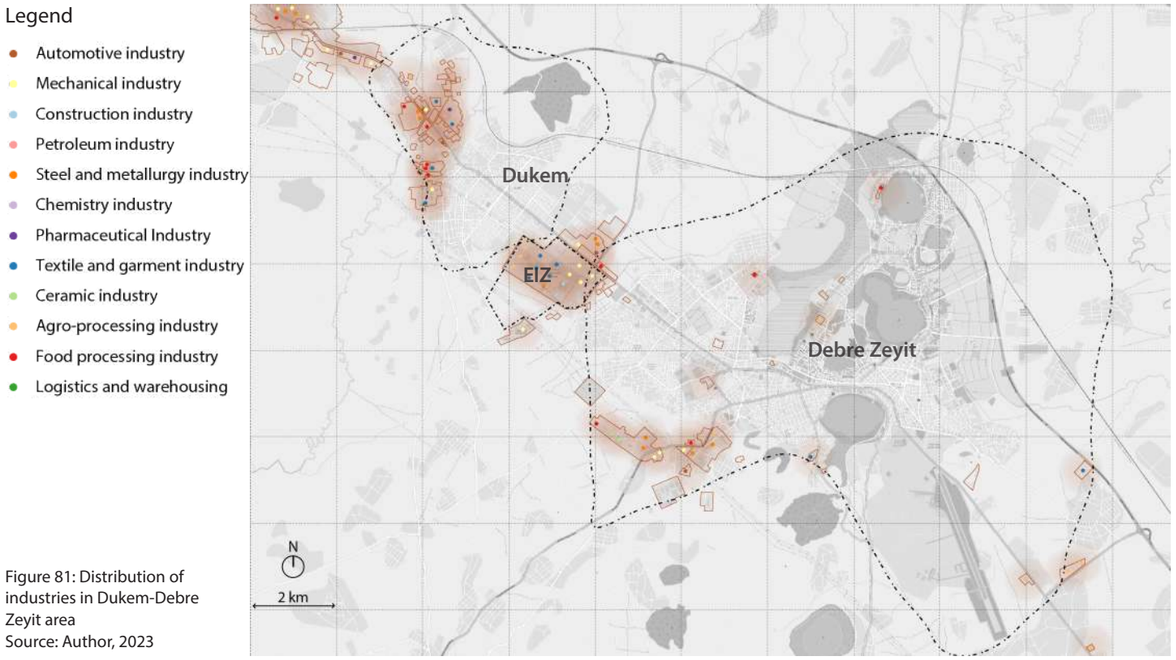


Figure 81: Distribution of industries in Dukem-Debre Zeyit area
Source: Author, 2023

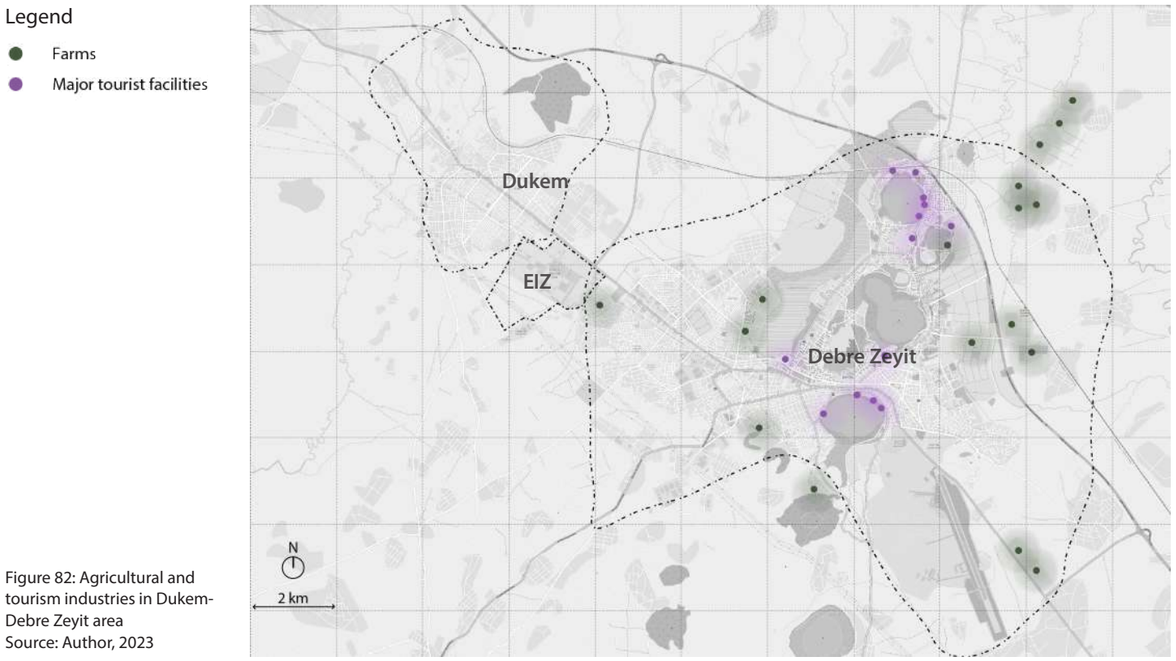


Figure 82: Agricultural and tourism industries in Dukem-Debre Zeyit area
Source: Author, 2023

It can be seen that Dukem is characterized by manufacturing and Debre Zeyit is characterized by tourism services and agriculture. And the textile and apparel industries account for the largest share of these sectors and generate the most employment. Other manufacturing sectors are smaller and less connected to each other, with a more haphazard layout.

The tourist facilities are mainly laid out around the lakes. The space around these is of high quality, and future planning may be considered in conjunction with the development of public transportation.

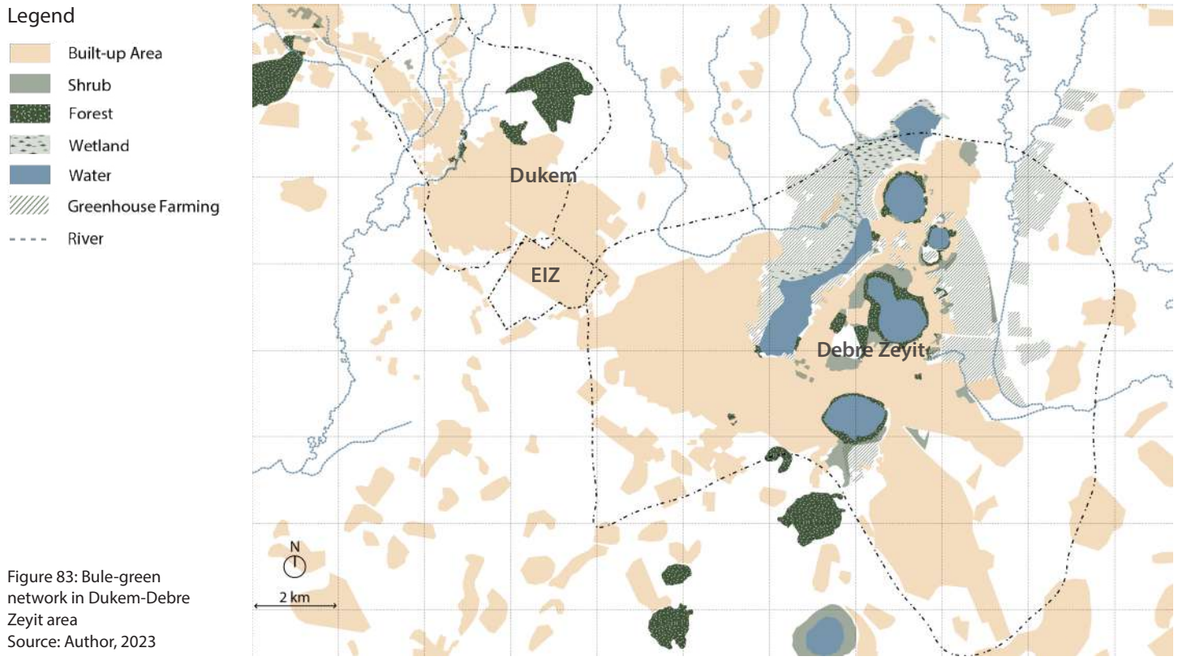


Figure 83: Bule-green network in Dukem-Debre Zeyit area
Source: Author, 2023

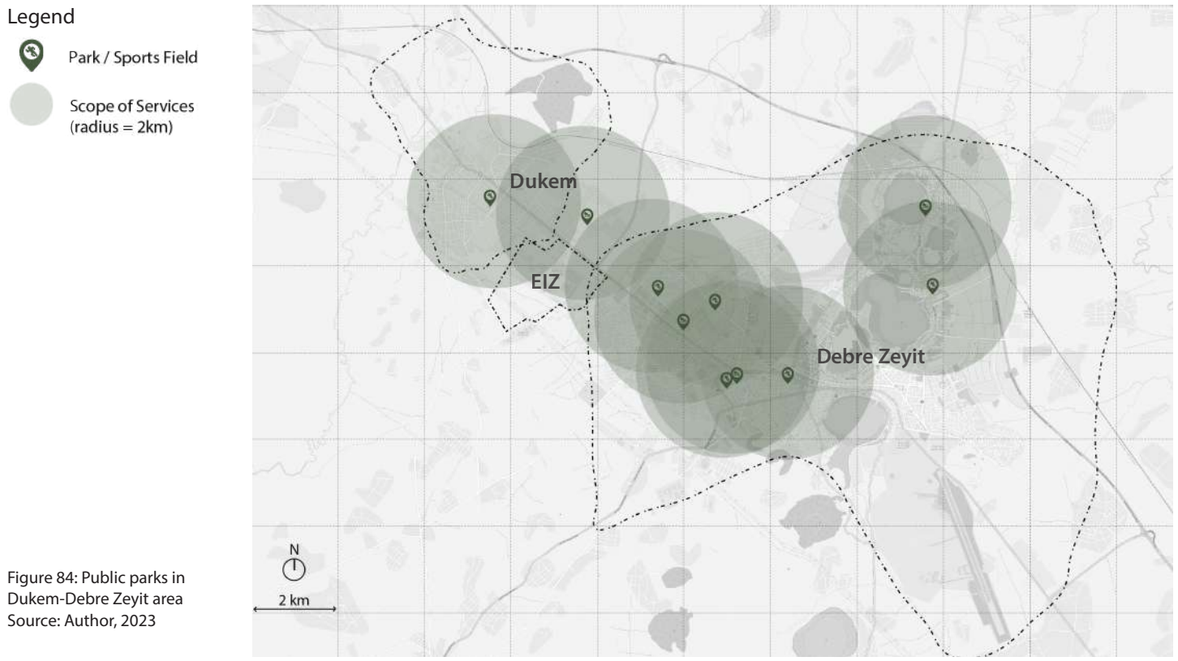


Figure 84: Public parks in Dukem-Debre Zeyit area
Source: Author, 2023

It can be seen that the quality of Dukem's environmental landscape is clearly inferior to that of Debre Zeyit, with almost no green space. In contrast, Debre Zeyit is richer in landscape resources and has a better ecological environment. The protection of important wetlands and water bodies needs to be considered in future planning.

Parks and sports fields are relatively adequate in both towns. The improvement of their quality can be considered in the future.

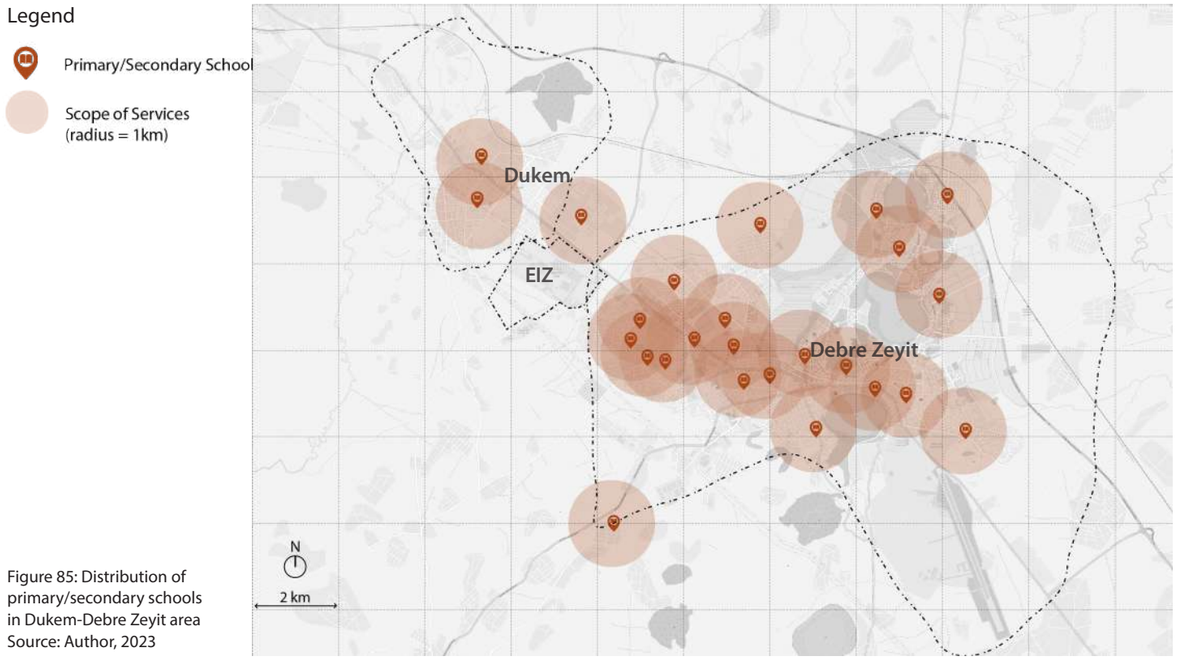


Figure 85: Distribution of primary/secondary schools in Dukem-Debre Zeyit area
Source: Author, 2023

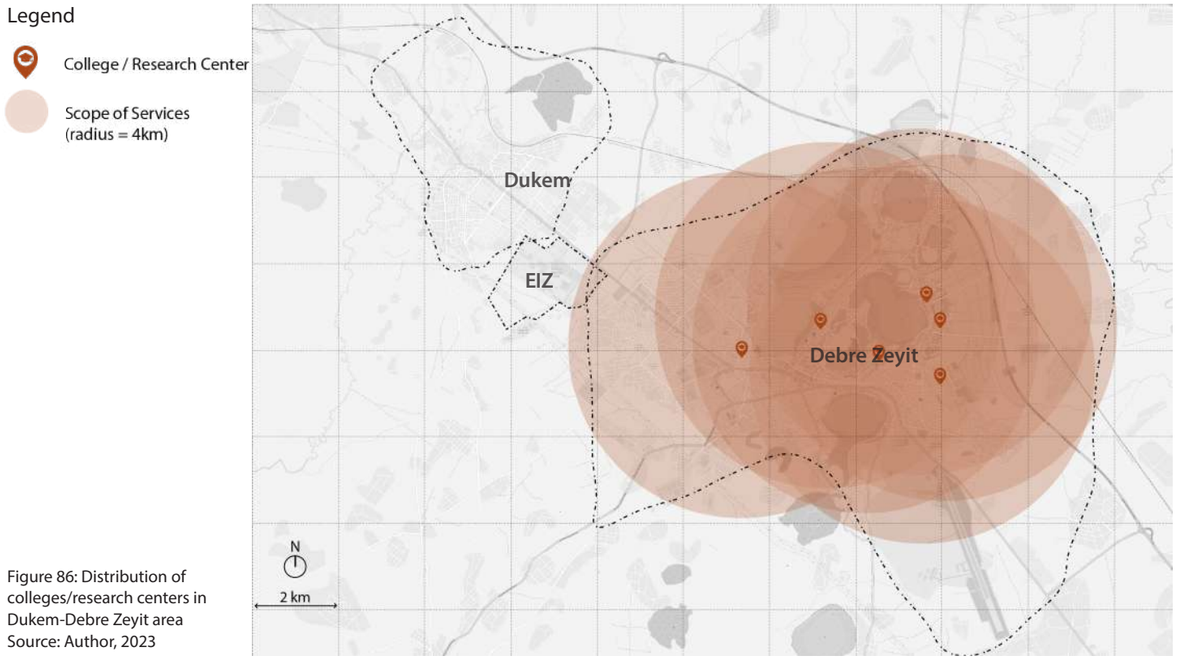


Figure 86: Distribution of colleges/research centers in Dukem-Debre Zeyit area
Source: Author, 2023

Although the number of basic education is high, according to local official reports and field research, the quality of teaching needs to be improved. The colleges are mostly community colleges set up by the Ethiopian government, but not in Dukem. Research institutions are concentrated in the east of Debre Zeyit, which is far from the EIZ and not convenient for knowledge exchange.

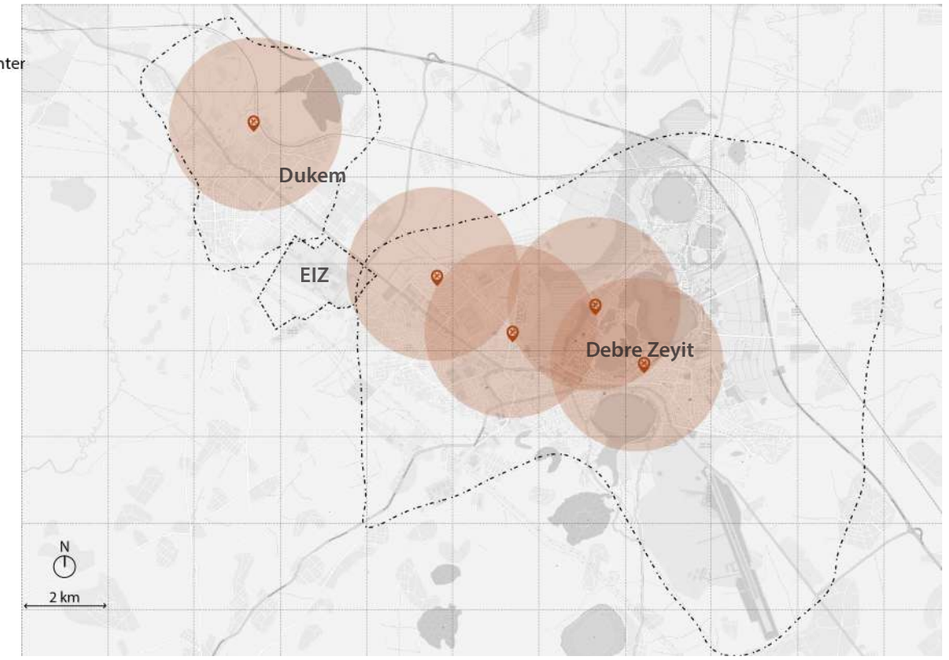


Figure 87: Distribution of vocational training centers in Dukem-Debre Zeyit area
Source: Author, 2023

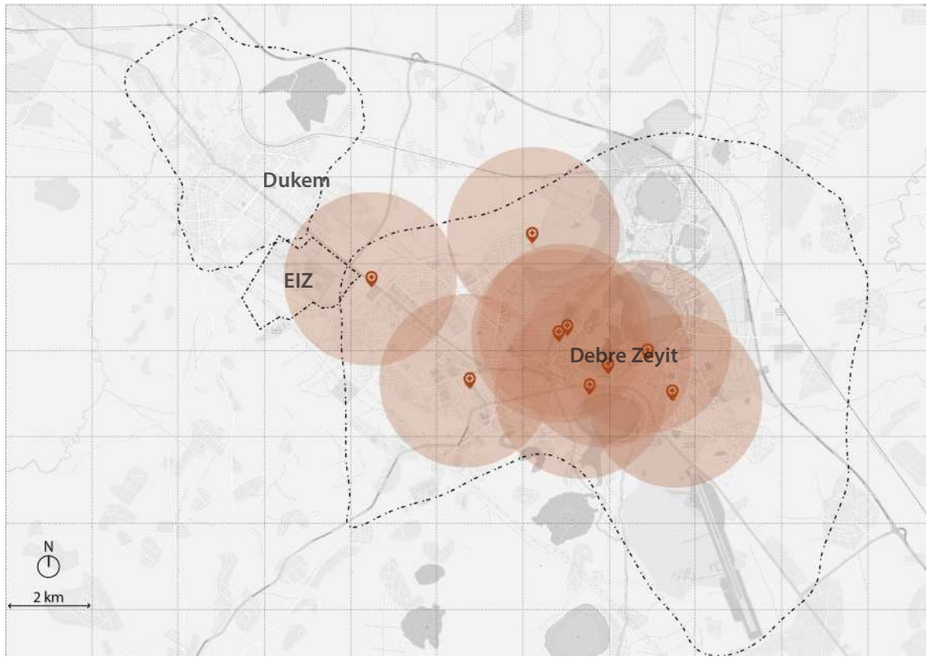


Figure 88: Distribution of health service centers in Dukem-Debre Zeyit area
Source: Author, 2023

Dukem has a distinct lack of public service facilities, especially medical facilities. This seriously reduces the quality of life of the citizens. And while there are currently a few skills training centers, according to the survey, they have not been able to train local workers to help them acquire the appropriate skills according to the needs of local industrial development.

Legend

10 types of urban blocks mainly for residential use

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

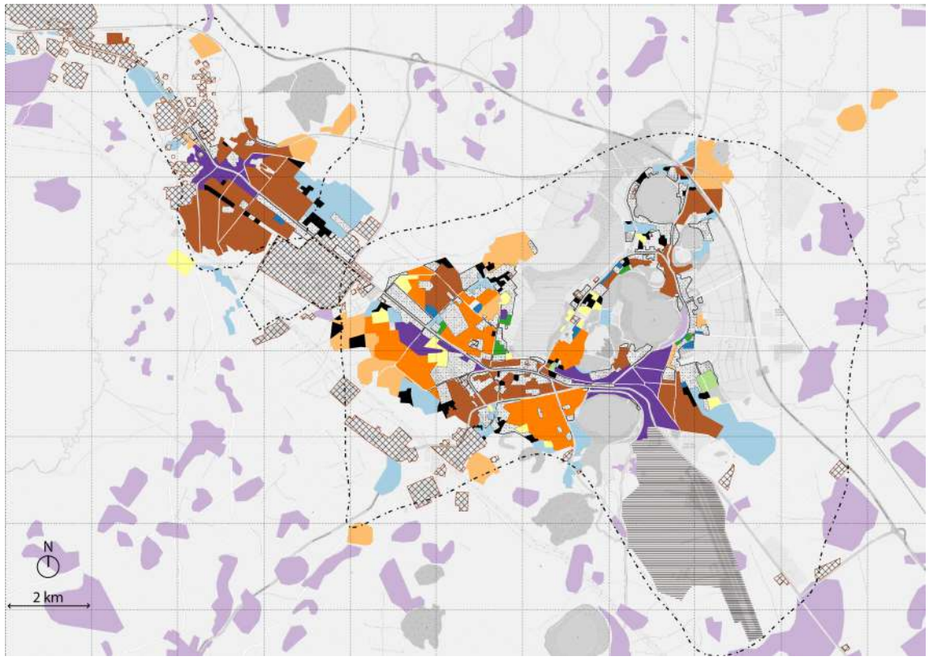


Figure 89: Distribution of residential blocks in Dukem-Debre Zeyit area
Source: Author, 2023

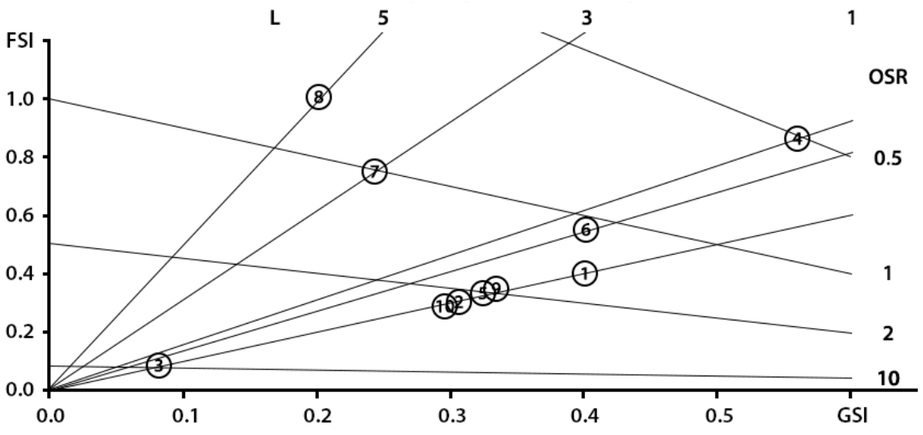


Figure 90: Spacematrix diagram about the density
Source: Author, 2023
Note: Base figure is from Berghauser Pont and Haupt.

Categories 3, 5 and 10 are very typical of the spatial manifestations of urban sprawl in African countries. Category 3 mainly represents rural spaces close to the city.

Categories 7, 8 are similar to affordable housing in the Ethiopian Integrated Housing Development Programme (IHDP). However, due to the weakness of the urban infrastructure, this type of housing is dependent on a network of facilities in higher condition, so there is less of this type of housing in Dukem-Debre Zeyit area.

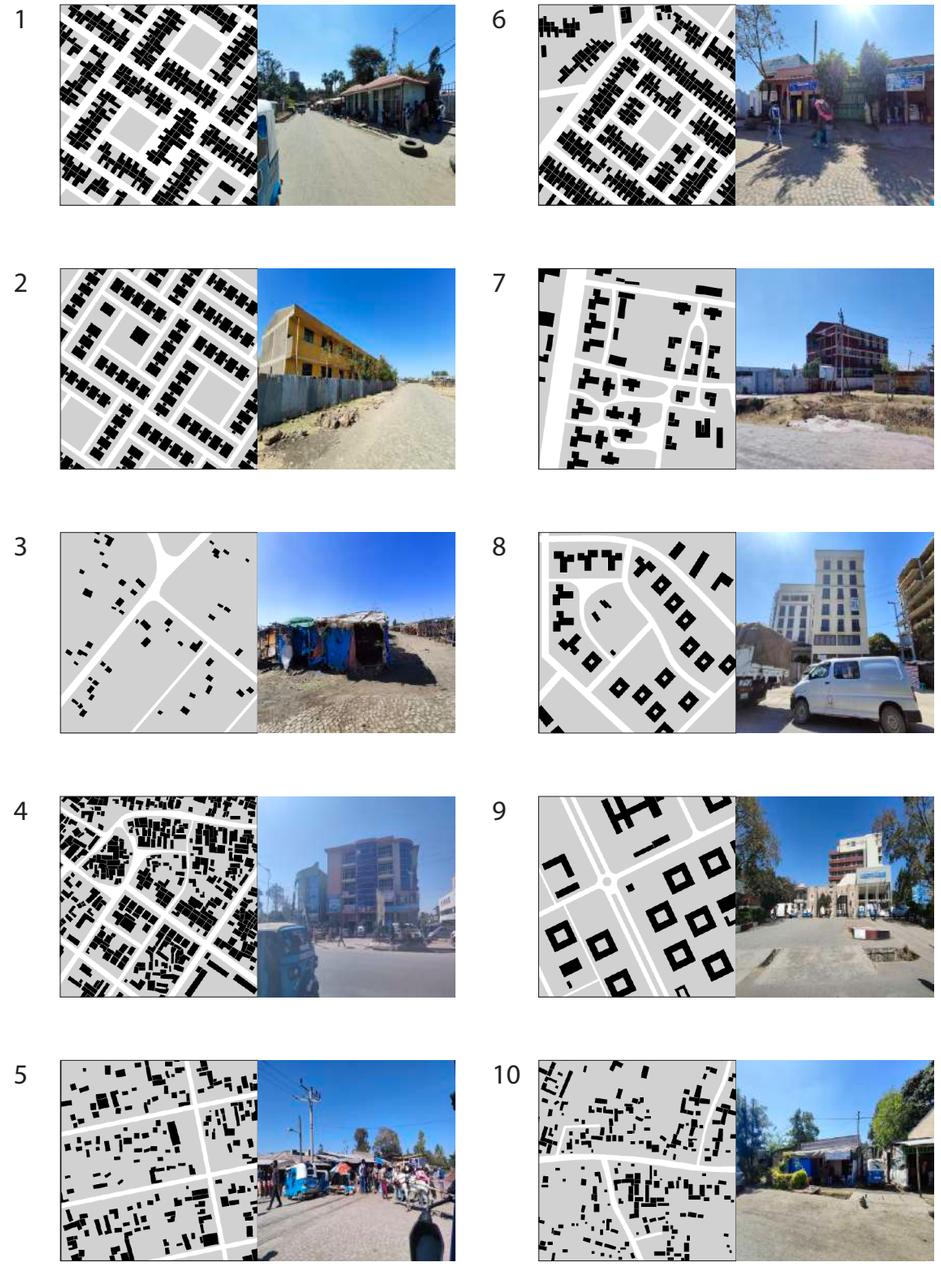


Figure 91: Ten types of residential blocks
Source: Mapped by Author, photoed by Nan Ma, 2023

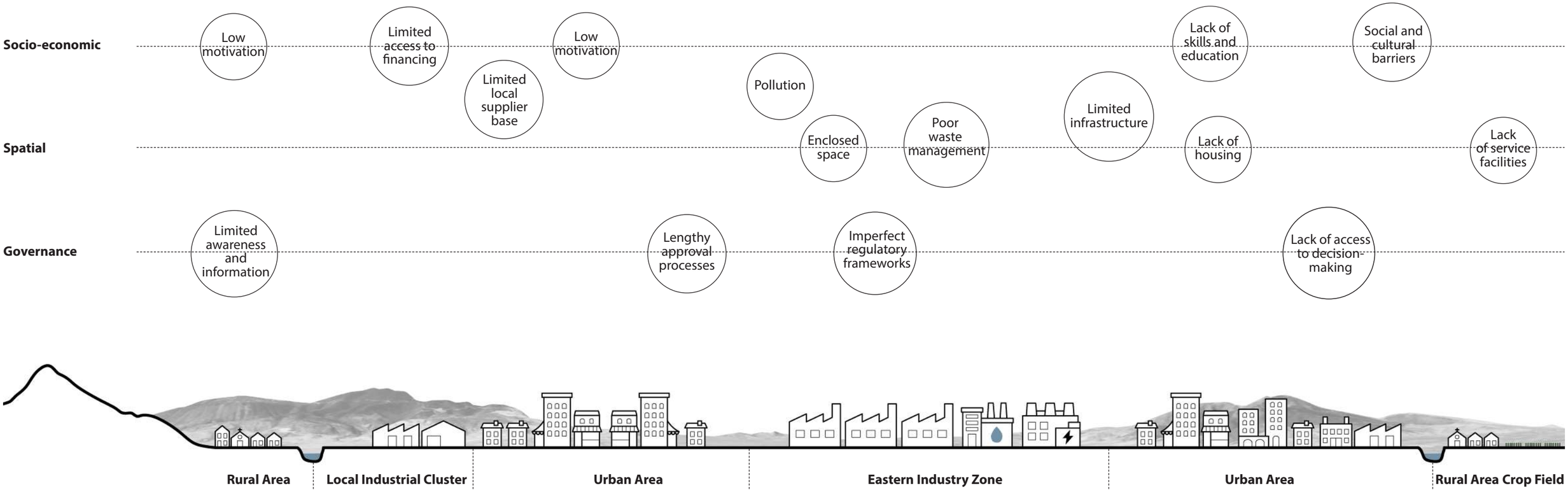


Figure 92: Current barriers in Dukem-Debre Zeyit area for city-industry integration
Source: Author, 2023

To address these barriers requires comprehensive and inclusive approaches. The first step is to fundamentally change the view of the industrial park as a separate space for foreign investment, although it was introduced with the purpose of attracting foreign direct investment by the Ethiopian government. But the fact that it is built on this land inevitably makes it inextricably linked to the city in which it is located. Therefore its value and potential need to be reinterpreted. Harnessing its potential and creating a better investment, business, production and living environment can lead to a win-win situation for both Ethiopia and investors from foreign countries.

5.4.2 The Value of EIZ as A Positive Medium

Through the analysis of the current situation, it is clear that Eastern Industry Zone has significant value for local endogenous development in Dukem-Debre Zeyit area, encompassing socioeconomic, spatial, and governance aspects.

Firstly, the establishment of the EIZ creates employment opportunities for the local population, contributing to poverty reduction and improved livelihoods. The zone attracts investments, leading to increased economic activities, business growth, and income generation. The presence of industries fosters skills development and knowledge transfer, enhancing the human capital of the local workforce. It can also participate in local supply chain development and benefit local people by assuming its social responsibility. So as an industrial park, it is the most embedded in the local network at the socio-economic level.

Secondly, the development of the Eastern Industry Zone can promote regional economic development by attracting businesses and industries to a designated area. This spatial concentration allows for efficient infrastructure planning, targeted service provision, and reduced environmental impacts. It promotes the balanced growth of the region and provides opportunities for the development of supporting industries and services. And it also plays an important role in the sharing of facilities, the mixing of sites, and the attraction of educational programs.

In terms of governance, the establishment of the industry zone requires effective governance mechanisms and institutions. It encourages collaboration between the government, local authorities, and various stakeholders, fostering participatory decision-making and coordinated efforts. Although the Industrial Park project is only a small part of the comprehensive local development, it can focus around it on the improvement of local institutional capacity, and building trust between different actors. As this project was originally proposed, it is not to solve all the local dilemmas with one industrial park, but to explore the possibility of it becoming a breakthrough.

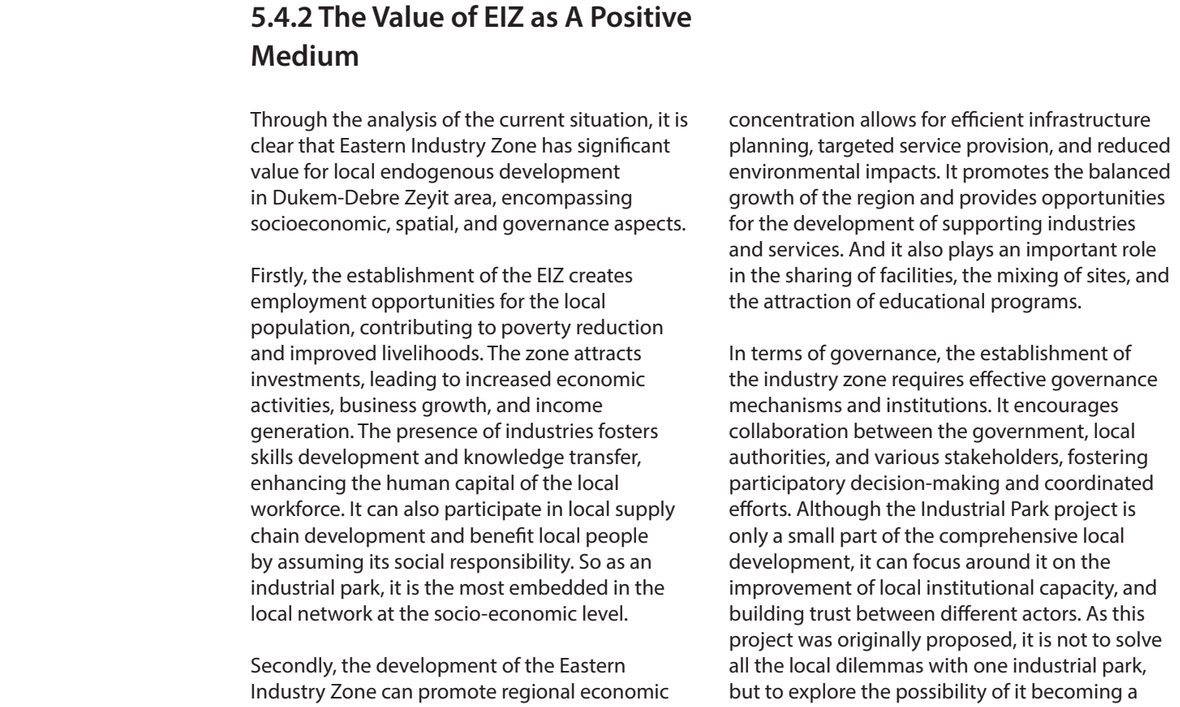


Figure 93: Diagram of the value of EIZ in Dukem-Debre Zeyit area
Source: Author, 2023

5.4.3 Assessment of Local Capacities

S-RQ3:
What are the socioeconomic, spatial and governance capacities in EIZ Area to promote regional endogenous development?

To promote regional endogenous development in Dukem-Debre Zeyit area, it is important to consider several factors:

Socioeconomic Capacities:
- Human capital
- Economic activities
- Creation of tax revenue

Spatial Capacities:
- Land availability
- Infrastructure
- Environmental sustainability

Governance Capacities:
- Collaboration & partnerships
- Local governance capacity

The current momentum can be continued in terms of job creation and tax revenue generation. The center of industrial park development is recommended to shift to the building of soft power.

In the future, with the implementation of key strategies such as the establishment of knowledge-sharing and innovation networks around industrial parks, the development and implementation of environmental standards, the enhancement of infrastructure connectivity, and the optimization of partnerships, the overall local capacity will surely be greatly improved.

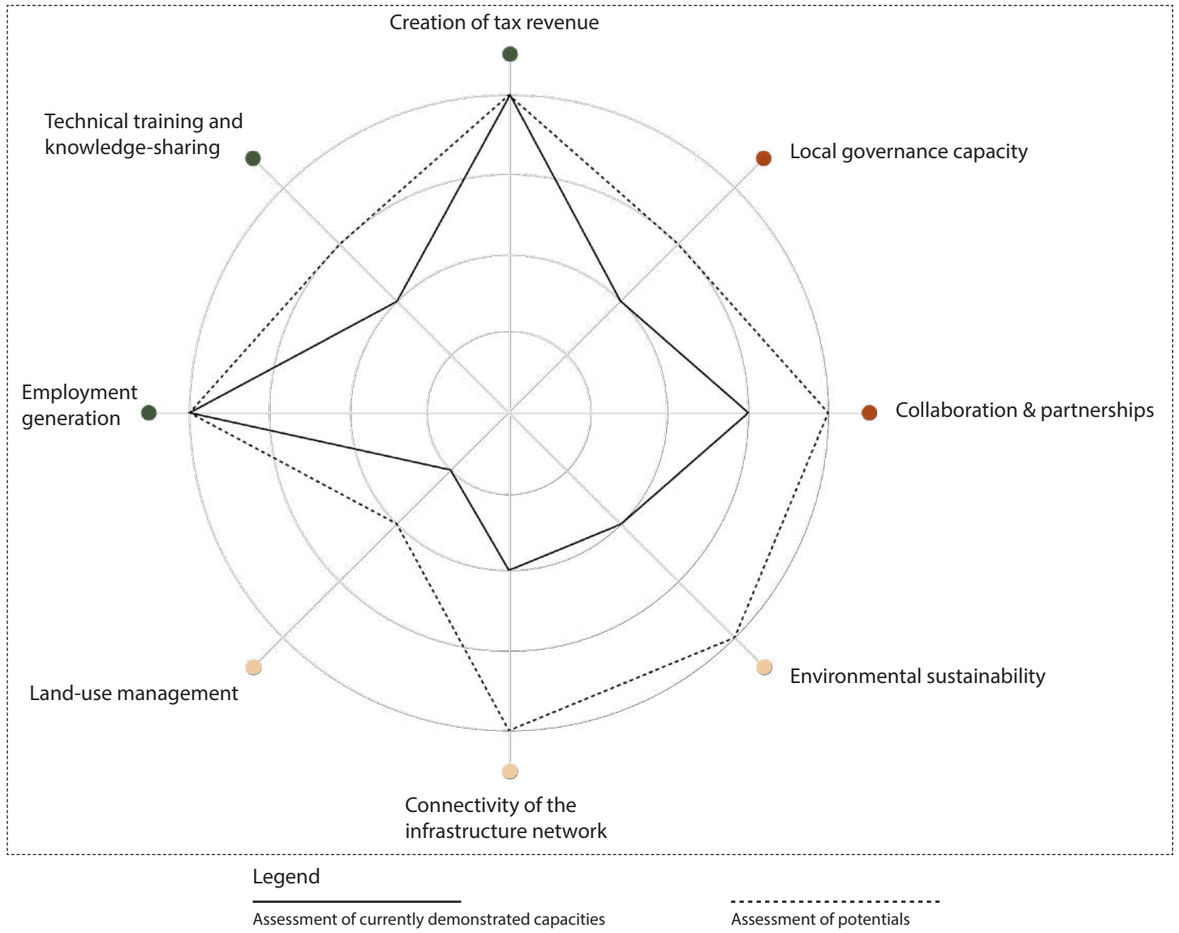
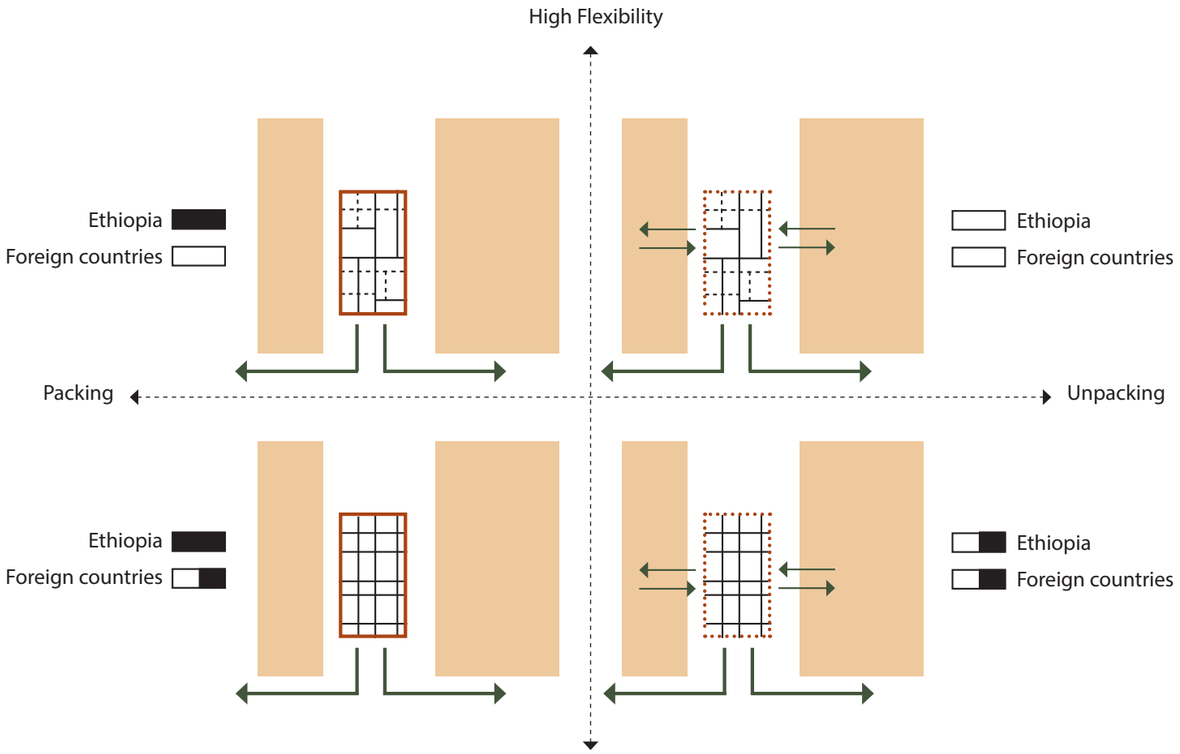


Figure 94: Diagram of assessment of local capacities in Dukem-Debre Zeyit area
Source: Author, 2023

5.5 Scenario Building



Legend

Advantageous

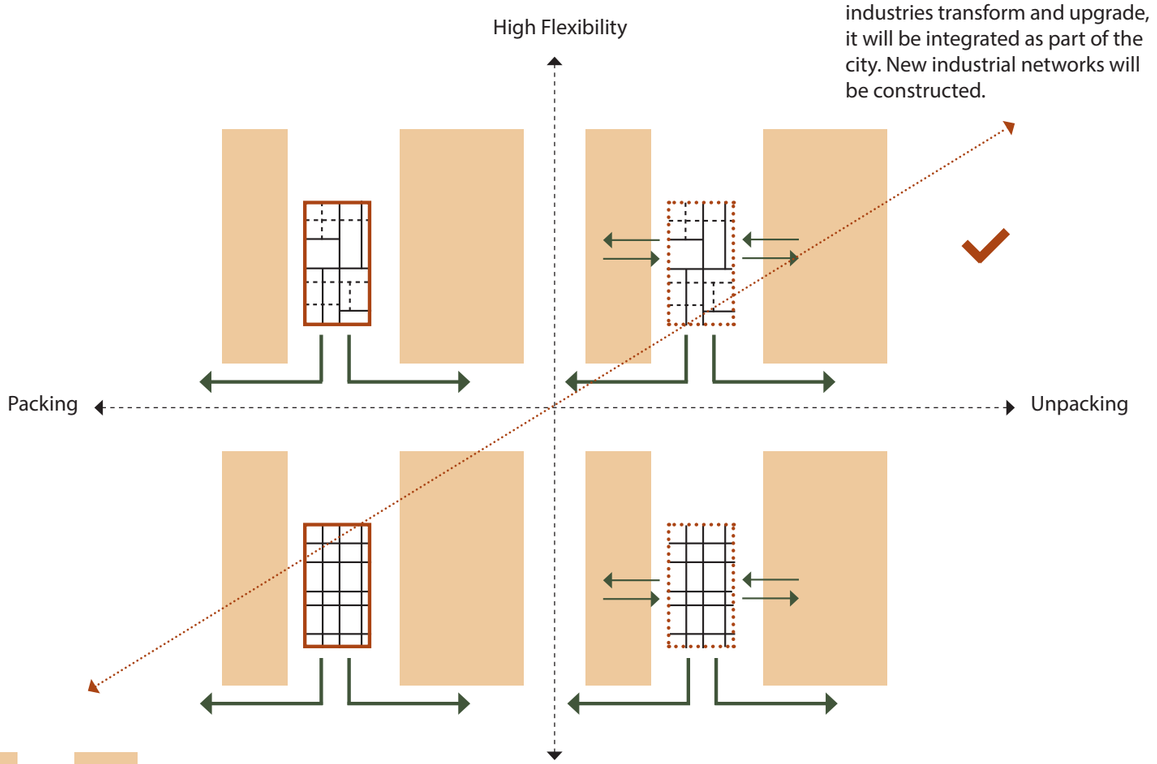
Disadvantageous

(Being advantageous or disadvantageous in future global competition)

Figure 95: Pros and cons of different scenarios for both sides
Source: Author, 2023

In *Figure 91*, the horizontal axis represents the interaction of the industrial park with the local towns in various aspects, and the vertical axis represents the degree of flexibility in the spatial layout of the industrial park. The interaction is reflected in the exchange of raw materials, products, knowledge, and technology with the local towns, while the degree of flexibility refers to the flexibility of its internal plots and buildings, etc., in response to industrial transformation and upgrading in the future.

Then four scenarios are compared, addressing the implications of different development models for Ethiopia and China in response to future global competition. The lack of interaction can lead to the Eastern Industry Zone serving only the needs of the foreign country-China, while the lack of flexibility can lead to high costs of renovation or demolition and reconstruction in the face of industrial transformation and upgrading.



As the town expands and industries transform and upgrade, it will be integrated as part of the city. New industrial networks will be constructed.

As the international situation changes and industries shift, it will be abandoned.

Figure 96: Final choice
Source: Author, 2023

The scenario in the lower left corner is a continuation of the status quo scenario. If there is no intervention and the current model is maintained between the EIZ and the towns, in the future, when Ethiopia loses its present advantages of attracting FDI, such as cheap labor, investors will move to new areas and the EIZ will be abandoned. After all, the departure of investors is not a big loss for investors if they are not deeply embedded in local networks. But for the local area, it will bring a lot of trouble, such as the loss of tens of thousands of jobs, waste of space resources, etc.

The scenario in the upper right corner is the final choice and the optimal solution. The Eastern Industry Zone is no longer an enclave but is embedded in the local industrial chain and social network. As the towns expand, it is spatially integrated into the towns through a flexible layout, and their living and service areas are gradually integrated into the local system in terms of economy and governance. Both investors and locals can benefit from this.

5.6 Vision

In 2025, based on the coordination between the government and private developers, and the participation of citizen representatives in the decision-making process, the second phase of the Eastern Industry Zone will complete the planning of the infrastructure system, articulate the urban development plan and start the construction. This presents a significant opportunity to promote local industrialization. The new round of investment attraction and employment promotion will improve the standard of living, reduce poverty and promote economic diversification in the region. The expansion of transportation networks, improved access to utilities, and the development of supporting services such as housing, healthcare, and education are all planned with the planning of the industrial park as a whole. Effective regulatory frameworks are applied to daily management, with transparent processes and efficient administration. Clear policies for land allocation, environmental sustainability, labor rights, and business regulations are established to promote a new inclusive and participatory governance approach.

Looking ahead to 2030 and 2050, the continued success of the Eastern Industry Zone can further amplify its positive impact. Upon completion of the Phase II infrastructure system, a comprehensive assessment will be conducted and public meetings will be held to publicize and collect local recommendations. In 2030, Phase II of Eastern Industry Zone will be 50% or more built, with over 5,000 jobs created by the companies already in operation. More than 30% of the companies in the first phase have transformed and upgraded their industries, and new technologies and knowledge are used in practice. The knowledge and innovation network of companies and educational and research institutions is already relatively well established. The zone can serve as a catalyst for regional economic and innovation integration, attracting more industries and fostering a vibrant business ecosystem.

By 2050, integrated with the Eastern Industry Zone, Dukem-Debre Zeyit area is the major industrial hub in Ethiopia, contributing significantly to Ethiopia's economic development. The whole region's sustained growth can stimulate innovation, research, and development, leading to the emergence of high-value industries and global competitiveness. The local communities benefit from improved infrastructure, quality education, and enhanced social services, resulting in a prosperous and inclusive society. In conjunction with national policies, clean energy is being promoted in the region, and people have developed an awareness of following the principles of a circular economy.

Overall, the Eastern Industry Zone will be leveraged as a driving force for local vitalization, leading to long-term economic growth, improved living conditions, and enhanced regional competitiveness.

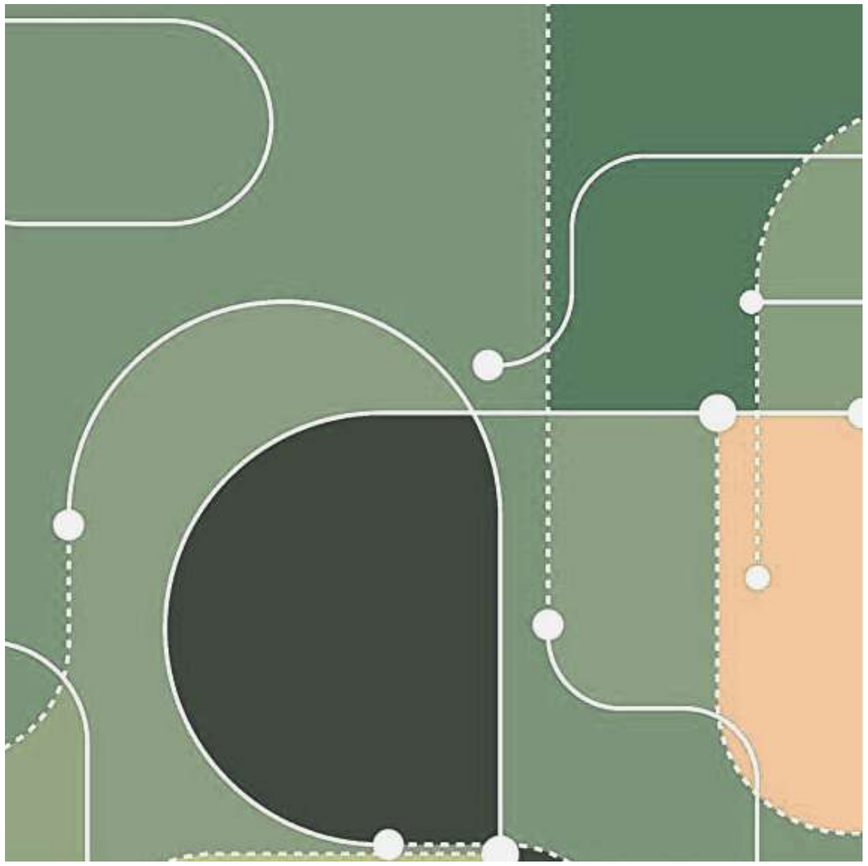


Figure 97: Cover of *Rural development strategy review of Ethiopia: reaping the benefits of urbanisation*
Source: OECD, 2020

06 STRATEGY

6.1 Strategy Theme & Framework

S-RQ4:
How can industrial parks act as a positive medium to participate in the process of regional vitalization?

6.1.1 Multifaceted Role of Eastern Industry Zone

In general, "an industrial park" is regarded as a functional space with a strong economic purpose developed and built by the government or private developers to pursue the benefits of a cluster economy. It can be seen as a tool to rapidly promote economic development. However, based on the previous analysis and research, and assessing the real situation in Dukem-Debre Zeyit region in Ethiopia, the Eastern Industry Zone has indeed had an impact beyond its role as a general industrial park, especially in the local urbanization and social integration process. So this chapter mainly discusses the role of Eastern Industry Zone and how related strategies can stimulate its role in local region vitalization. And first of all, its multifaceted role will be unpacked as follows:

① It is a general role as a foreign-invested industrial park. It serves as a hub for investment promotion, attracting foreign companies from various industries such as textiles, and manufacturing. It offers investors various incentives, including tax breaks, duty-free imports of machinery and raw materials, and simplified procedures for obtaining permits and licenses.

② It is a special role demonstrated in the socio-spatial processes of the Dukem-Debre Zeyit region. It has created thousands of jobs and attracted Ethiopians, locally or from other regions, to seek opportunities here, which has transformed the spatial dynamics of the Dukem-Debre Zeyit region, leading to the emergence of new urban centers and commercial zones.

③ It is a desired role based on the objectives and visions mentioned before. It will play a more critical role in facilitating the development of regional infrastructure systems, and its attractiveness for advanced technology and expertise will be enhanced. Also through a different planning approach from previous industrial parks, new strategies and guiding principles will lead to the embedding of the Eastern Industry Zone in local social structures and networks, and the formation of new social relationships and community groups will lead to a more inclusive and vibrant region.

Based on the multifaceted role of the Eastern Industry Zone, the strategy theme is proposed - "a positive medium".

6.1.2 "A Positive Medium"

Firstly, EIZ will be a positive medium for sustainable cooperation between Ethiopia and China and other potential countries to invest in. This will be reflected in industrial cooperation, education and technology cooperation, cooperation in space planning and implementation process, disclosure and discussion of key information, etc.

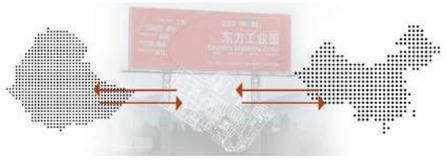


Figure 98: EIZ as A Positive Medium for the Sustainable Cooperation
Source: Author, 2023

Secondly, EIZ will be a positive medium for the integration of industry and city in Dukem-Debre Zeyit region. With further industrial upgrading and technology transfer in the future, the land use of industrial parks will transition towards a more mixed and diverse direction, and the boundary between industrial space and urban space will gradually disappear.

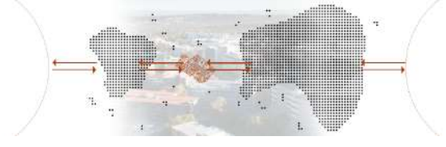
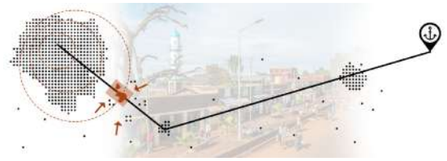


Figure 99: EIZ as A Positive Medium for the Integration of Industry and City
Source: Author, 2023

Thirdly, EIZ will be a positive medium, a major hub on the important corridor from Addis Ababa to the port of Djibouti, connecting not only the key nodes - Addis Ababa and Adama - but also between the megacity and the vast rural areas around the capital.

Figure 100: EIZ as A Positive Medium on the Important Corridor from Addis Ababa to the Port of Djibouti
Source: Author, 2023



Through the previous analysis, it can be concluded that Dukem-Debre Zeyit area has gradually developed into a new type of intermediary city (intermediary area) since the construction of the industrial park began in 2007. And based on the population size, function and economic status exhibited by the region, it can be considered as a type of "intermediary city" driven by economic factors to develop rapidly and act as a bridge between metropolitan and rural areas.

"Intermediary cities are agglomerations which – for geographic, historical and economic reasons – act as bridges between- metropolitan and rural areas. In parallel, they are strategic nodes within urban networks at national or international level. Their population, depending on the country or region, can range from 50 000 to 1 million inhabitants, usually accounting for the largest share of the urban population." (OECD/PSI, 2020)

Therefore, this project proposes to regard the Eastern Industry Zone as a positive medium, which can also be understood that the industrial park itself and its attraction to various elements in the local area for more than ten years, have shown the potential of the region as an intermediary area. So the five main development strategies in this chapter will not be limited to the EIZ itself, but will explore the interventions placed in the industrial park and their influence to achieve the research aim by constantly changing scales and perspectives.

6.1.3 The Strategic Framework

In this project, four strategies would be proposed: Infrastructure Development, Transition to A Circular Economy, Stimulating the Local Endogenous Growth, and Fostering Collaboration and Partnerships. Their implementation will mainly involve 3 scales: L-Addis Ababa metropolitan area, M-Dukem-Debre Zeyit area, and S-EIZ/urban communities. Besides, in order o foster collaboration and partnerships, transnational/national networks will also be involved. All of these strategies have their own emphasis on achieving the three goals: Socioeconomic Integration, Spatial Justice, and Governance Optimization.

It should be noted that in this project, all interventions will be proposed around the Eastern Industry Zone and its impact on the region. The purpose is to make full use of the existing influence of the Eastern Industry Zone and its underutilized potential. And the ultimate goal is to vitalize the Dukem-Debre Zeyit region. It is also for this reason that the strategy chapter in this research is not intended to propose a comprehensive strategy for the integrated development of the area. After all, there are limits to the role that an industrial park can play, and we cannot expect that the construction of an industrial park will solve all existing problems in the region. From a practical point of view, the choice to start thinking about the development of such emerging small-town areas in Ethiopia from an Eastern Industry Zone is the most reasonable pathway that can be chosen after balancing actual capacity and vision.

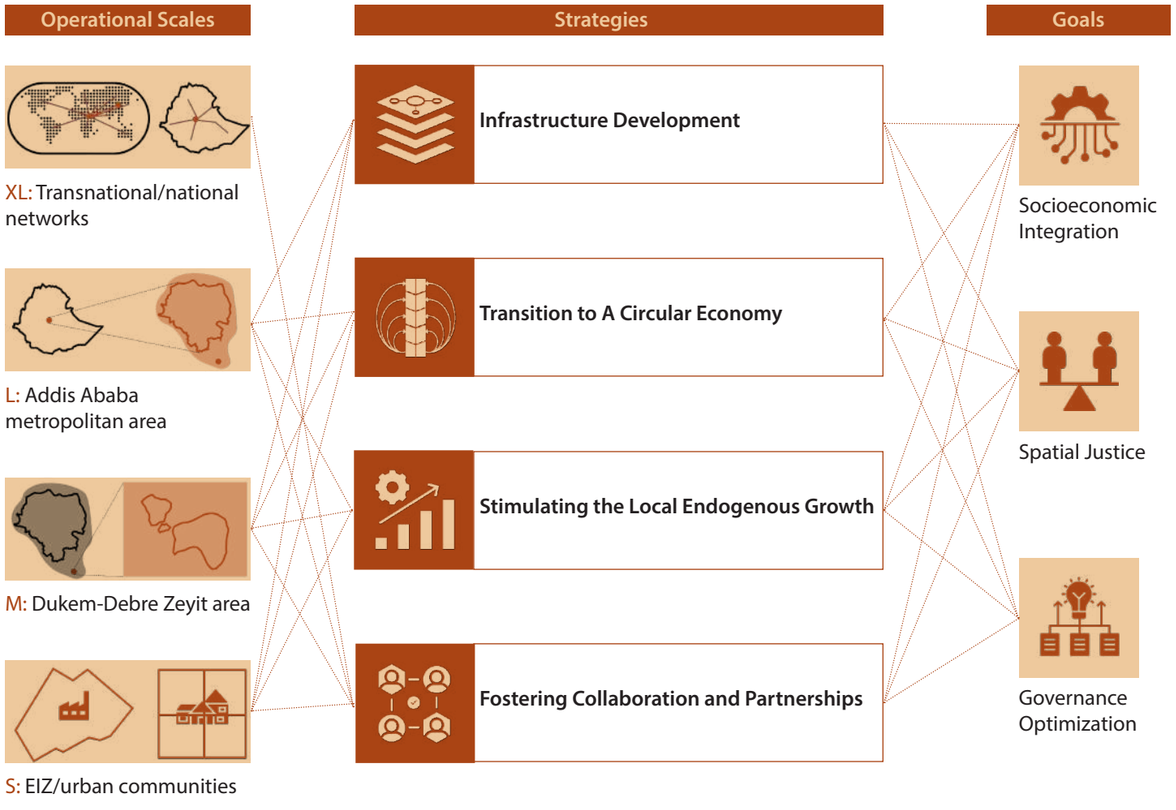
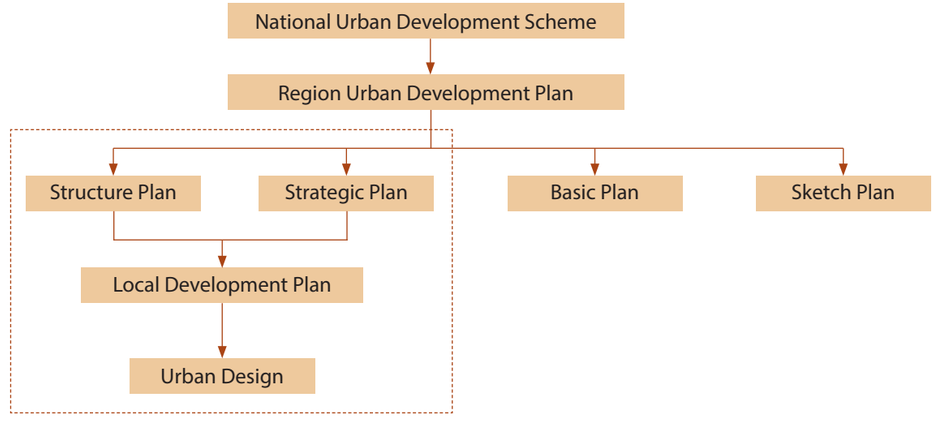


Figure 101: The Strategic Framework
Source: Author, 2023

6.2 Strategy Intervention Scales

The analysis of the current urban planning system in Ethiopia (*Figure 99*) shows that there is no separate planning for industrial parks. In terms of spatial scale, the research scale of this project can be linked to the hierarchy of "structure plan/ strategic plan - local development plan - urban design". Since the Dukem-Debre Zeyit region is still in a period of rapid development and frequent interaction between urban and rural areas and industry, it is not an optimal solution to formulate a very detailed urban design plan. Faced with a situation that is so dynamic and difficult to predict from experience or past patterns, a very detailed solution would only be difficult to implement or require multiple iterations in a short period of time. Therefore, in this project, cross-scale design principles and strategies are proposed, and then design guidelines are proposed for different industrial communities. And some of the above design outcomes are specific to the Dukem-Debre Zeyit region, and others can be applied to the planning of other similar IP projects. In this way, the significance and value of this project are reflected - to provide new development strategies that combine spatial, social, and economic dimensions for these transnational cooperative industrial parks and localities in the host countries.

Figure 102: Hierarchy of the current urban planning system in Ethiopia
Source: Author, 2023



According to *Figure 100*, the principles summarized by the theoretical study and the previous analysis chapters, will lead the strategic actions and design test in general. And the mesoscale will serve as the primary research scale from which the strategy part will unfold. Then, depending on the characteristics of each strategy, the scale will be switched for discussion.

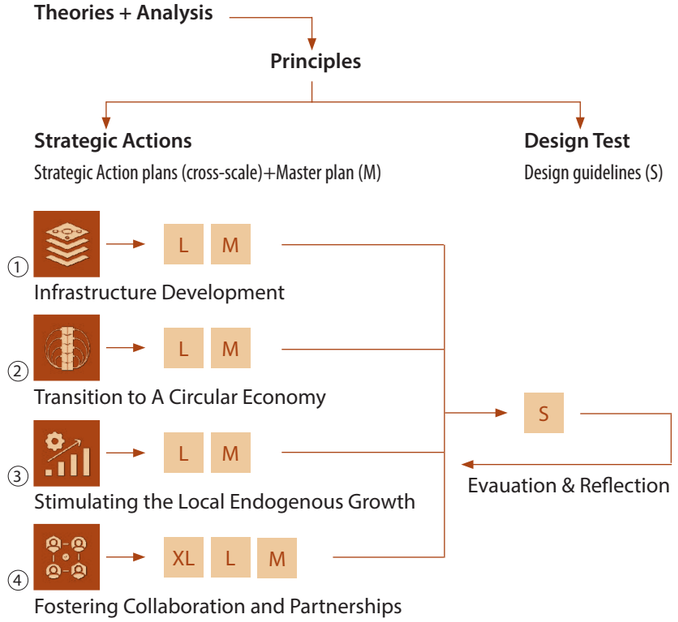
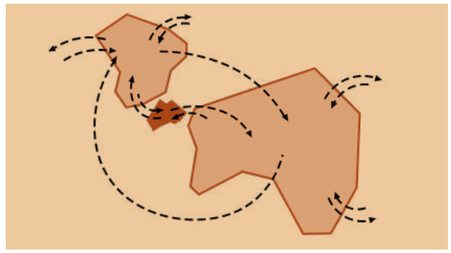


Figure 103: Cross-scales in the Process
Source: Author, 2023

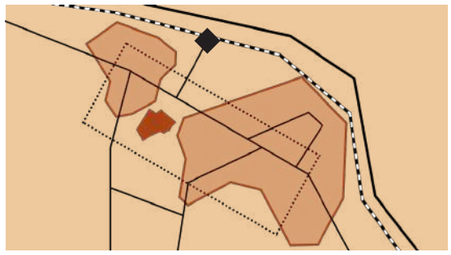
6.3 Principles



Flow of elements

Integrated Planning:

The planning in the Dukem-Debre Zeyit region at the meso scale should be based on an integrated approach that takes into consideration the needs and requirements of the Eastern Industry Zone. In terms of town expansion, industrial development and upgrading, land use, infrastructure improvement, and public service coverage, establishing good transition spaces between the EIZ and the urban areas should be seriously taken into account to achieve a more positive city-industry integration.



Railway
Highway
Primary road
Bus
Railway station

Connectivity and Accessibility:

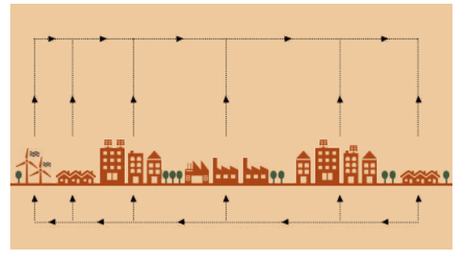
A seamless connection between the Eastern Industry Zone and the surrounding urban areas should be created, providing an efficient and effective transportation network, including roads, railways, and public transportation. So the industrial park has good accessibility for workers, goods, and services. This will promote economic growth and development in the whole area.

Residantial area
Mixed commercial and residential area
Commercial area
Industrial area
Mountain

Mixed-use Development:

The Planning of land use should include mixed-use development that integrates residential, commercial, public service, industrial, and other open spaces. A more livable and dynamic region will be created through interactions among different urban functions.

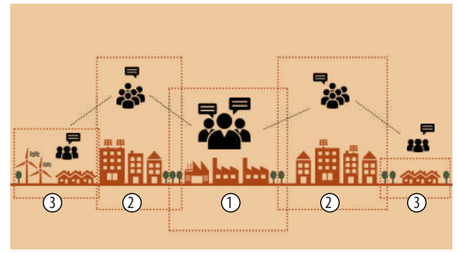
Figure 104: Principles applied in strategy and design test
Source: Author, 2023



Sustainable flows

Sustainable Development:

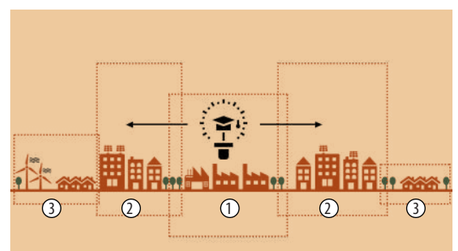
The development of Dukem-Debre Zeyit region should be guided by sustainable and green urban planning principles. The circular economy should be applied including using renewable energy sources, setting practical environmental standards for industrial parks, and establishing efficient waste management systems.



① Eastern Industry Zone
② Town area
③ Rural area

Community Engagement:

The planning and decision-making should engage with local communities and stakeholders to ensure that their needs and concerns are incorporated into the process. This includes creating opportunities for public participation, engaging with local businesses and organizations, and promoting community ownership of the development.



① Eastern Industry Zone
② Town area
③ Rural area

Innovation:

Innovation and creativity should be encouraged in the development of the Eastern Industry Zone and surrounding areas. This includes promoting research and development, encouraging the adoption of new technologies and practices, and supporting entrepreneurship and innovation in the local economy.

6.4 Cross-scale Strategic Action Plans

Strategy 1: Infrastructure Development

One of the most important aspects of infrastructure development is improving transportation systems. This includes improving road networks, and expanding public transportation. The extension of the light rail line from Addis Ababa is expected, which will be more conducive to regional integration. And also a more efficient logistics network and better logistics infrastructure are also needed around a network of industrial parks on a larger scale. Another important infrastructure strategy is to restructure the energy system in the Eastern Industry Zone. This would involve investing in renewable energy sources like solar and wind power to reduce dependence on fossil fuels, improving the efficiency of energy usage, and upgrading the power grid to ensure a stable supply of electricity for living and production in the area.

Goals:

Socioeconomic goals:
The primary goal of infrastructure development is to support economic growth in the region, which includes creating jobs for the locals and attracting new industries to the region. The optimization of the road network structure and the promotion of public transportation will promote the sustainable development of society and the environment.

Spatial goals:
To improve connectivity within the region and with the capital, so access to markets, healthcare facilities, and other essential services will be enhanced.

Governance goals:
To promote the establishment of clear procedures and guidelines for infrastructure projects, as well as coordination and cooperation mechanisms that involve all stakeholders in decision-making.

Related SDGs:

Figure 105: Icons of SDGs
Source: sdgs.un.org/goals

1a

Improving transportation system

Actions:

① Integrate land-use and transportation infrastructure planning
② Upgrade road system
③ Encourage sustainable transportation like walking, cycling, and public transit
④ Coordinate road planning with economic development in logistics

1b

Restructuring energy system in EIZ

Actions:

① Explore renewable energy integration in EIZ

Comprehensive infrastructure development includes transportation, energy, water and sanitation, and communication networks, among others. However, in this project, due to the limitation of data acquisition, it is difficult to find real and accurate information about the infrastructure of water and communication systems, so this project will focus on the development of transportation and energy infrastructure to propose relevant strategies. The further improvement of these two aspects around the Eastern Industry Zone will reshape the spatial structure and energy use structure of the Dukem-Debre Zeyit area and guide the future development direction of the area.

According to the construction procedure of the EIZ, the local government carried out the construction of a relatively complete infrastructure system within the planned land before the investment was made. But as the industrial park grows, it needs to ensure the infrastructure not only within it, but also needs to consider the connection and integration with the city-related infrastructure. In this process, the reconstruction and upgrading of infrastructure will involve multiple stakeholders inside and outside the industrial park, and this process of negotiation and cooperation will also improve the local institutions' capacity.

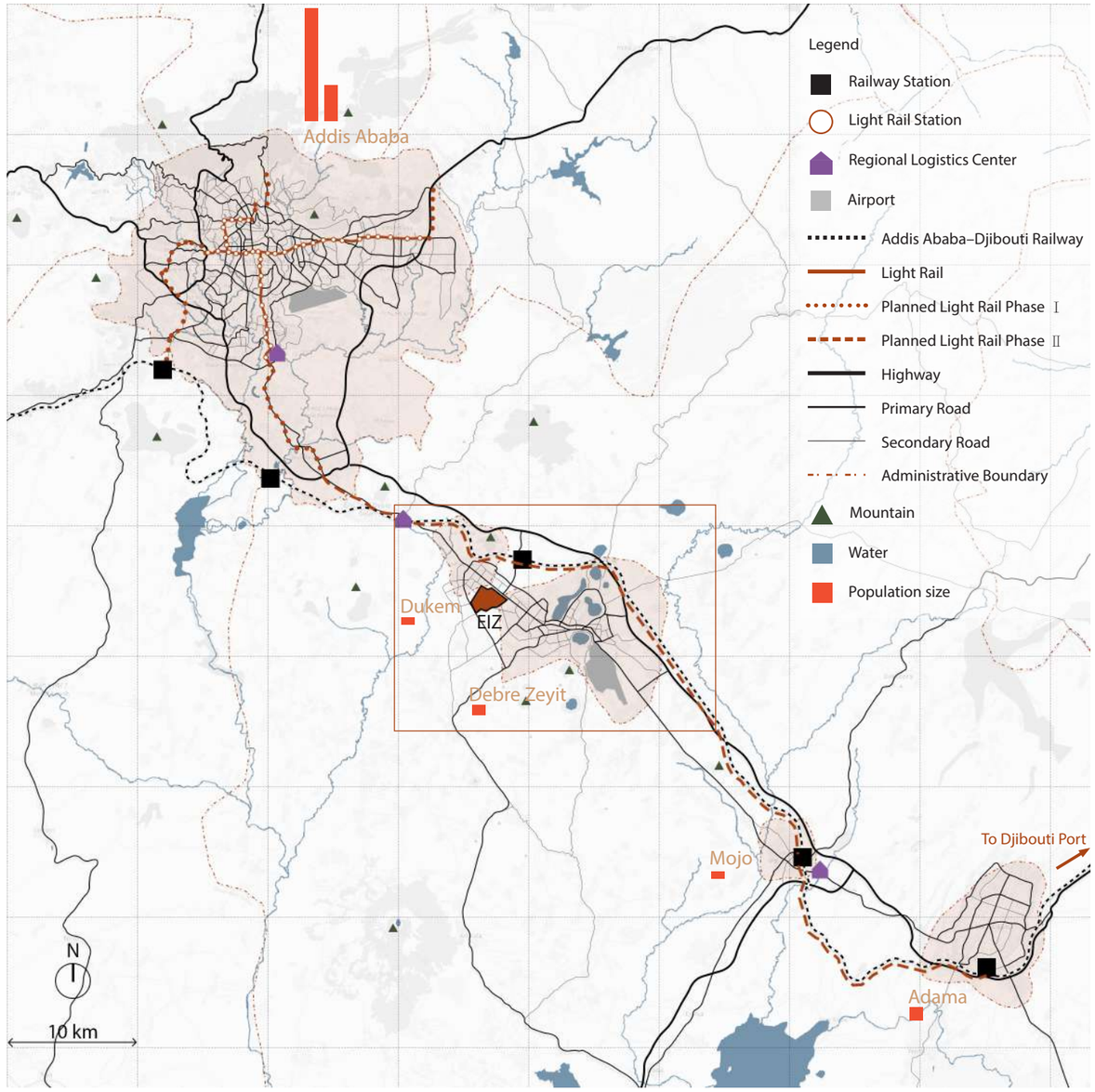
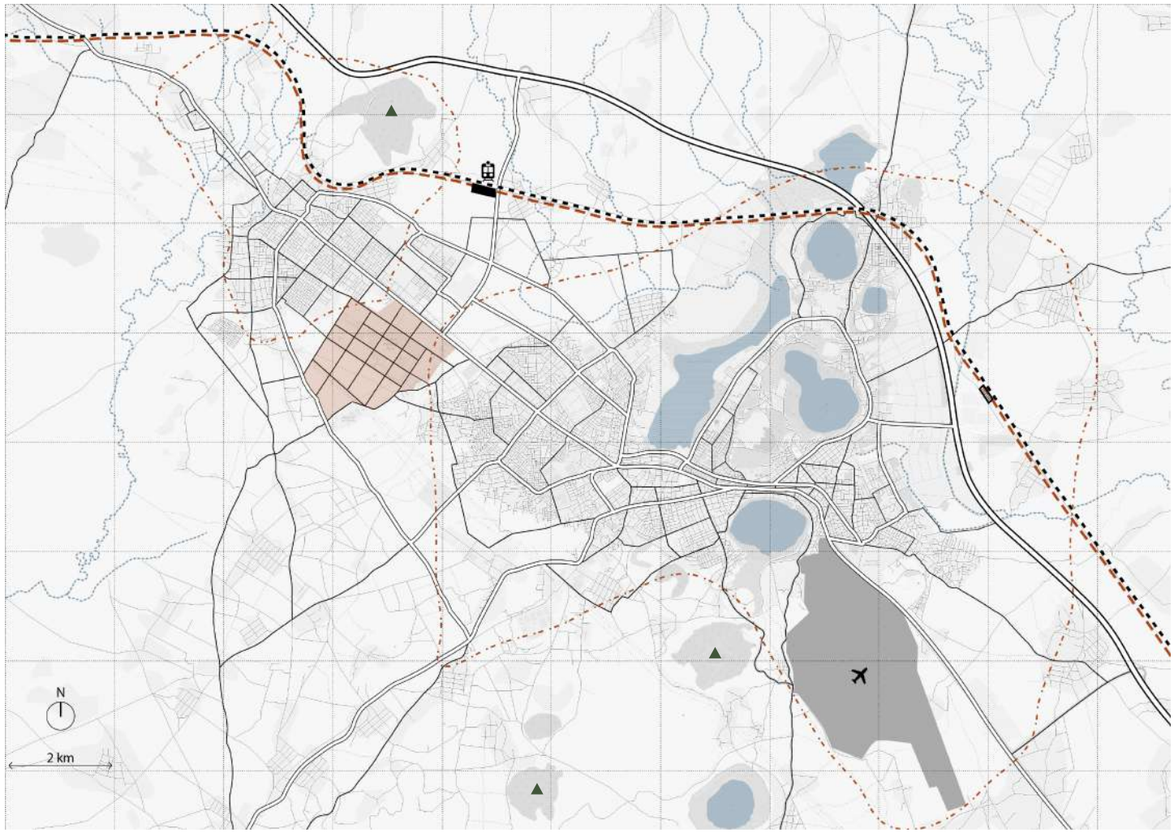


Figure 106: Map of key transportation projects and demographic distribution at the macro scale
Source: Author, 2023

According to *Figure 103*, the two towns, Dukem and Debre Zeyit, closely linked (spatially and socio-economically) by the Eastern Industry Zone, is an important node along the corridor from Addis Ababa to the port of Djibouti, with a railway station, airport (military only) and proximity to regional logistics centers. On a large and medium scale, it is advisable to replace the location of the railway station in the Dukem-Debre Zeyit region to the northeast of the EIZ, between the two towns.

According to the latest demographic data from the Ethiopian Central Statistical Agency, Addis Ababa currently has a total population of more than 4 million, and due to the mountainous terrain to its north, the future expansion of the city will take place in a southeastern direction with the railroad and road network. Due to the grossly uneven distribution of the population (Grenestedt, A., Kobylakiewicz, B., Crijns, F., Yilmaz, H., van Eijs, M., de Ridder, M., ... & Shia, Z. M., 2021), the construction of other transportation facilities in the city has naturally created a sequence. The construction of the capital's light rail system has been completed only in the central part of Addis Ababa. In the future it will be extended in a southeastern direction and will merge with the railway line and continue along it to Dukem-Debre Zeyit area.



Legend

- Planned New Railway Station
- Current Railway Station
- Harar Meda Airport (For the military)
- Scope of EIZ
- Highway
- Primary Road
- Secondary Road
- Local trail
- Railway
- Planned Light Rail
- Town Boundary
- Mountain
- Water

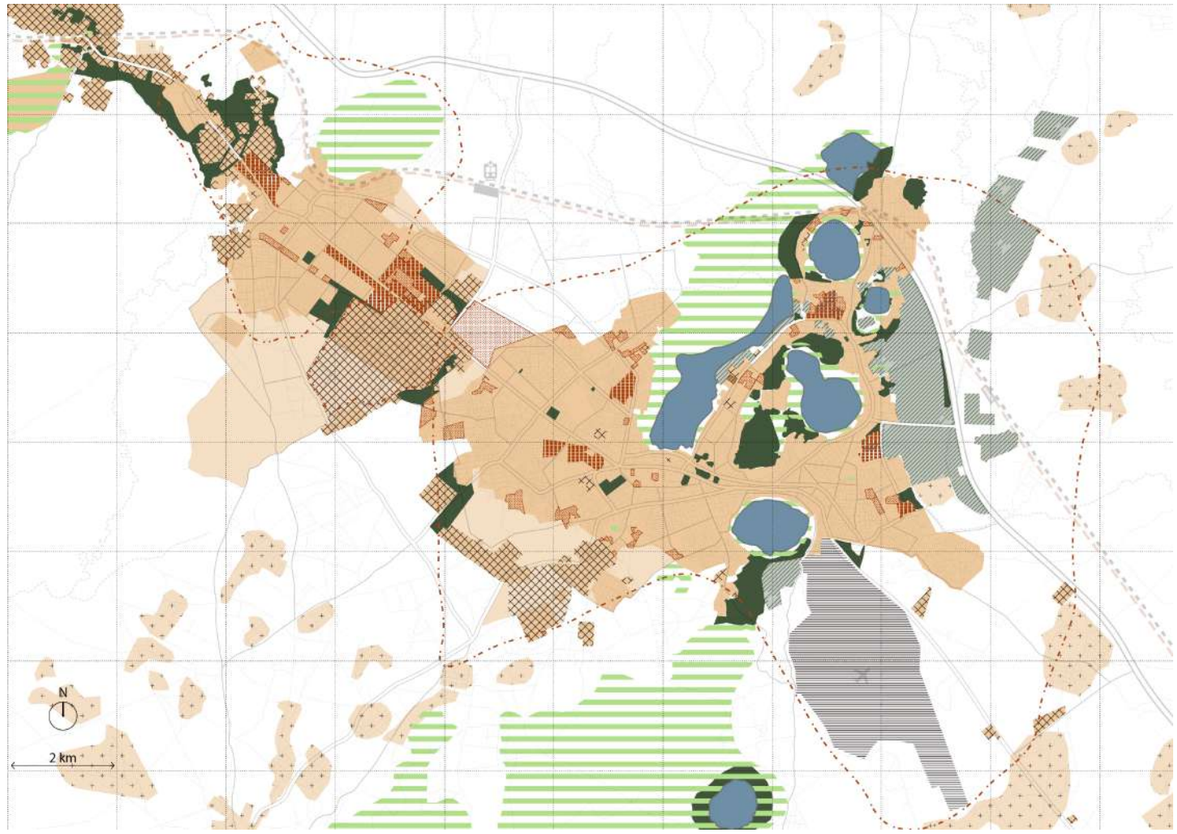
Figure 107: System Planning
Source: Author, 2023

1a

Improving transportation system :
In the Dukem-Debre Zeyit area there is a typical urban sprawl that is common in African countries. Due to high urban land prices, high cost of living, and land management policies that are not effectively and finely implemented, a rapid increase in the number of low-density hamlets can be seen in the population distribution heat maps, Google satellite maps, outside the town scope of the region, especially between 2015 and 2023. This sprawling growth leads to a certain number of people who have no access to public services, such as health care and education, and also results in a waste of land, which is not conducive to the sustainable development of the region. However, in the study of Mohammed Aljoufie, it is known that this situation can be improved. Integrated land use and transportation planning in the early stages could improve situations where land or transportation issues are managed in isolation. (Mohammed Aljoufie, 2013) So integrating land use and transportation infrastructure planning is essential for creating a sustainable, compact, and equitable region.

Besides, in this project, upgrading the road system and encouragement of public transportation are also important actions.

Since government budgets for transportation infrastructure are limited, investments need to be made in the most important infrastructure that has the greatest impact on the urban development structure. It is known from the local capacity analysis in the previous chapter that the road structure of the area (the presence of a large number of low-quality trails) is not conducive to the development of public transport. And as is known from the fieldwork, the quality of most of the roads also does not support logistic transport. Therefore, in the planning, the system of primary and secondary roads would be upgraded for connectivity and planned in combination with bus routes. Logistics routes are planned with a focus on connecting not only regional-level logistics and storage centers, but also considering the transportation needs of local small local producers. And the location of the train station, based on the distribution of stations on the Addis Ababa-Djibouti Port railway line and the forecast of local town development, is proposed to be moved from the eastern edge of Debre Zeyit to the northern part of EIZ, which will make it more convenient for the residents of both towns to travel and for EIZ and other local industrial clusters to use the railway for transportation of raw materials and products.



Legend

- Additional urban land
- Rural land
- Current urban land
- Green space
- Industrial space
- Densification area
- Areas to build on vacant land
- Greenhouse farming
- Airport
- Water
- Ecological protection area

Figure 108: Land Use Planning
Source: Author, 2023

Based on the forecast of the population growth trend in the Dukem-Debre Zeyit region and the calculation of the towns' population density, the controlling boundaries of the future urban expansion are determined in conjunction with the analysis of the current situation. (up to 2050) The current vacant land in the town will be used first, especially for the construction of new public services and some areas will be densified. At the same time, villages or informal settlements in the area, far from facilities and services, will be concentrated and relocated to better locations to ensure efficient land use and improved quality of life for the population. Ecological protection zones are defined to limit the negative impacts of industrial and urban expansion on important natural resources. New tourism clusters, innovation clusters, and business clusters will guide the agglomeration of different industries.

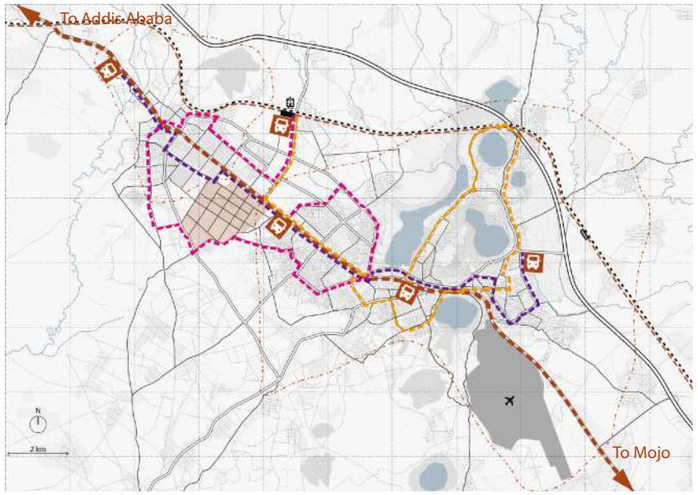


Figure 109: Map of bus routes
Source: Author, 2023

Legend
- Regional BRT Route
- Bus Route 1
- Bus Route 2
- Bus Route 3
- Bus Terminus

The regional bus express line to Addis Ababa responds to the capital's BRT construction plan, which can reduce the travel time from the capital center to the EIZ from 1 hour to 40 minutes. Then combined with the current urban land use type and density, future urban development direction and characteristic resources such as lakes, wetlands and other tourism resources, this project plans 3 bus routes and 4 important bus terminus.

The 4 bus terminus are located in the small industrial cluster west of Dukem (planned), the north gate of the EIZ (existing), downtown of Debre Zeyit (existing), and the education innovation cluster east of Debre Zeyit (planned).

And bus route 1 mainly covers the Dukem area. Bus route 2 mainly covers Debre Zeyit area, connecting the town center, tourist areas, and hotel clusters. Bus route 3 connects the small industrial cluster on the west side of Dukem, Dukem center and Debre Zeyit center, serving as a public transportation link between the two towns.

Figure 113: Current light rail in Addis Ababa
Source: www.crecg.com/english/2745/2808/41470/index.html

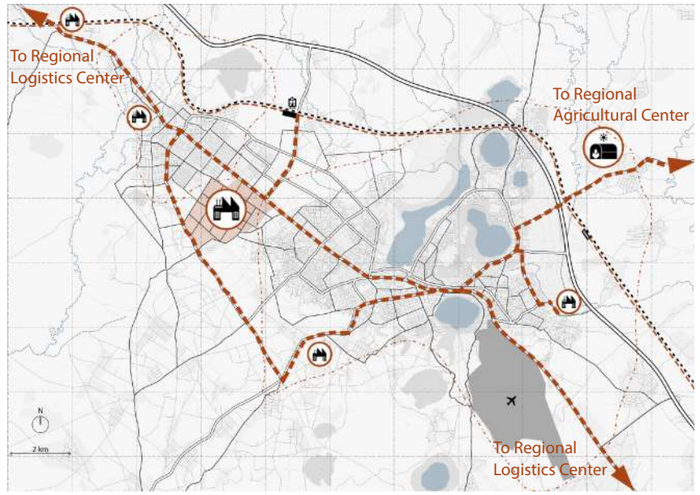


Figure 114: Map of logistics routes
Source: Author, 2023

Legend
- Logistics Route
- Clusters of Industry
- Greenhouse Area

It can be seen from *Figure 111* that there are major regional logistics and storage centers in the capital and Mojo, so the connection with these two centers should be strengthened in the mesoscale logistics planning. Furthermore, on the east side of the Dukem-Debre Zeyit area there are large-scale agricultural fields, so the connection to the regional agricultural center cannot be ignored. Then within the area, the logistics connection between the EIZ and the planned new railway station needs to be emphasized to enhance the capacity of using railways for product transportation. There are small industrial clusters in the west of Dukem, a local industrial park in the southwest of Debre Zeyit, and a proposed industrial park in the southeast of Debre Zeyit. Therefore, the logistics connection between them and the Eastern Industry Zone and transportation hub is also crucial. Only in this way can the local logistics network be basically constructed. Around this network, the local government can accurately invest funds for the construction, improvement and maintenance of related infrastructure such as roads and warehouses.

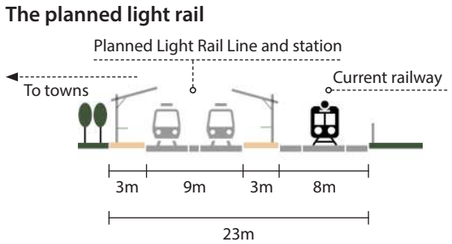


Figure 110: The section of the new rail station
Source: Author, 2023

Road Surface Material :

Asphalt

Paving Stone

Figure 111: Photos of road surface material in Ethiopia
Source: Photoed by Nan Ma, 2023

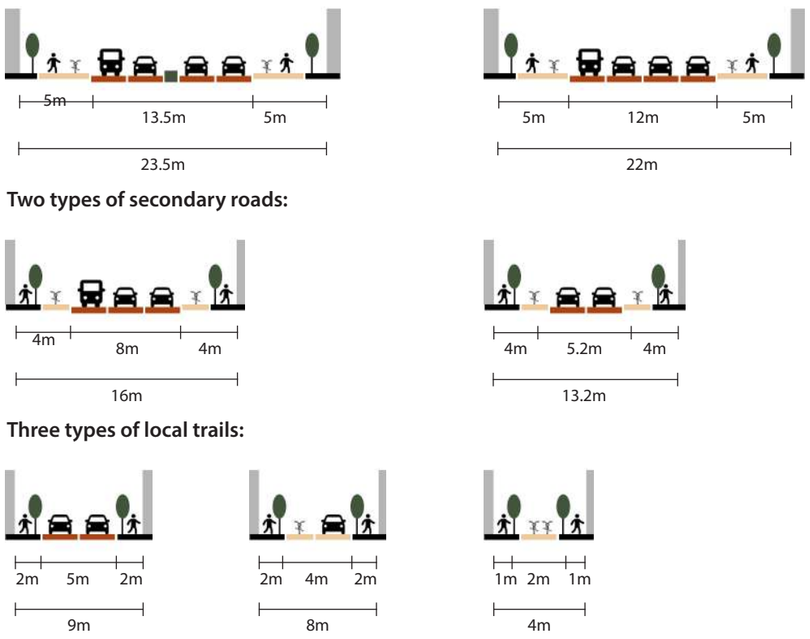


Figure 112: Sections of the roads
Source: Author, 2023

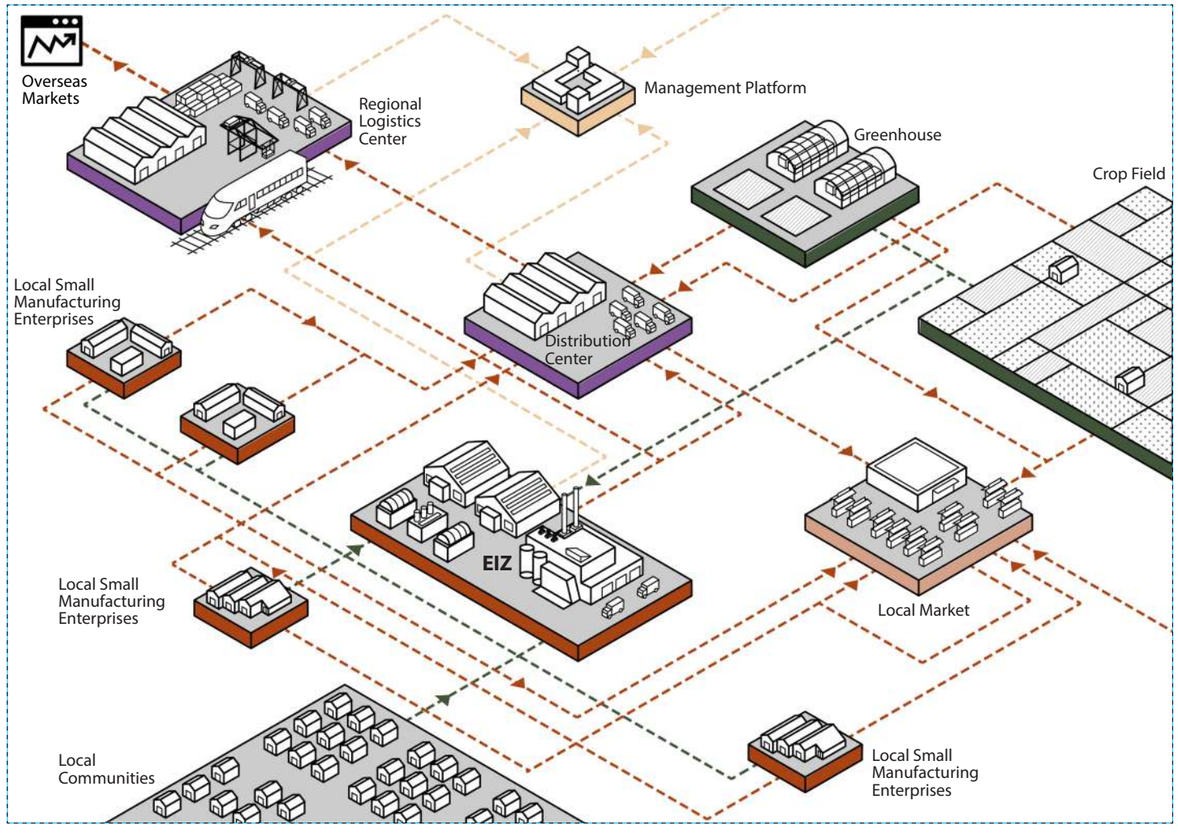


Figure 115: Diagrams of logistics flows
Source: Author, 2023

Legend
- Flow of Products
- Flow of Data
- Flow of Waste
- Manufacturing Space
- Ethiopian Domestic Market
- Logistics Space
- Agricultural and Greenhouse Industrial Space
- Industry Management Space

1b

Restructuring energy system in EIZ:
Ethiopia has experienced extremely rapid growth since 2000, but the limitations of the existing energy structure to economic development have gradually become apparent.

"Their domestic energy is mostly met by biomass, in the form of wood, animal dung and agricultural residues. Biomass accounts for 88% of the total energy consumed in the country. In urban areas 75,3 % of the residents use electricity for lighting, while in rural areas kerosene 80.1% and firewood 18,5% are predominant." (Gärtner, H. J., & Stamps, A. M. J. P., 2014)

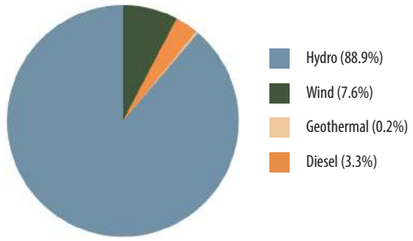


Figure 116: Pie Chart of the proportion of energy use in Ethiopia in 2018
Source: Author, 2023
(Data from Africa Energy Market Place (AEMP) Ethiopian Government Presentation)

At present, hydropower is the main source of electricity in Ethiopia, but due to the imperfect power infrastructure construction, unstable power supply has become one of the main reasons for the difficulty in attracting investment in industrial parks such as the Eastern Industry Zone. But in fact, due to climate, landform and other conditions, Ethiopia has abundant renewable energy resources, such as solar energy, wind energy, geothermal energy, etc., and their distributions are shown in *Figure 114*.

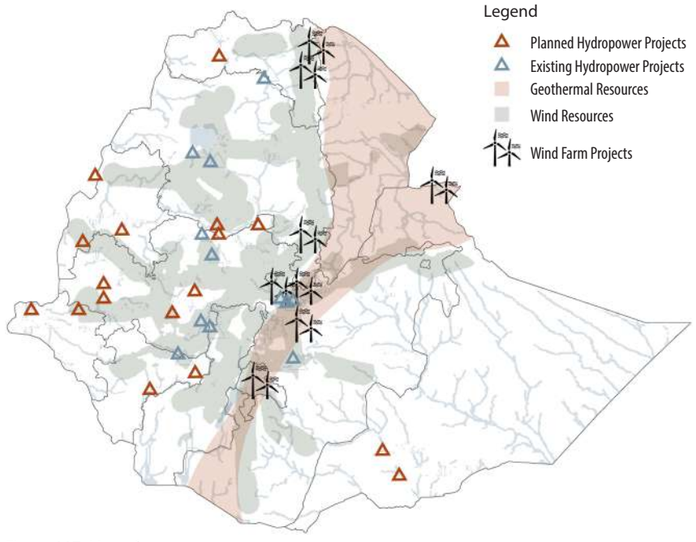


Figure 117: Map of distribution of main resources in Ethiopia
Source: Asress, M. B., Simonovic, A., Komarov, D., & Stupar, S., 2013

Because the strategies proposed in this project are essentially developed around the Eastern Industry Zone and its impact on the Dukem-Debre Zeyit region, and its potential to improve the whole energy system is limited. But as far as the industrial park space itself is concerned, in the process of planning, design and construction, there can still be some interventions to reconstruct the energy system inside the industrial park.

First of all, for the design and construction of factory buildings, it is recommended to adopt more sustainable forms, as shown in *Figure 117*, to improve the lighting and ventilation conditions inside the building, while reducing the energy consumption of the building itself. Second, the roof area of the factory buildings has the conditions to install solar panels to promote the use of clean energy. On this point, you can seek the cooperation of relevant companies. For example, the off-grid photovoltaic power station project undertaken by Chinese companies in the Somali region of Ethiopia will be officially completed and electrified in 2020 (*Figure 115*). The operator of the EIZ could consider cooperating with the company and reaching a consensus on architectural design and technical implementation. In addition, there is currently a 252,000 KV electrical substation in the EIZ. In the case of limited capacity, priority can be given to sharing power resources with local industrial clusters in towns.

Combined with Ethiopia's national energy plan, the construction of the national power system will be the most important energy project before 2050. After 2050, consider the transition to clean energy such as solar energy and wind energy. However, before 2050, during the development process, the region may consider reserving land for energy conversion and sharing in the second phase of the Oriental Industrial Park, and start small-scale pilot projects for utilizing solar energy and converting waste into energy. This will be discussed in detail in the next strategy, the section on the circular economy.

Figure 118: Photo of power station in Qorile village, Somali region of Ethiopia
Source: Courtesy of CET, 2020

Two types of current factory buildings:

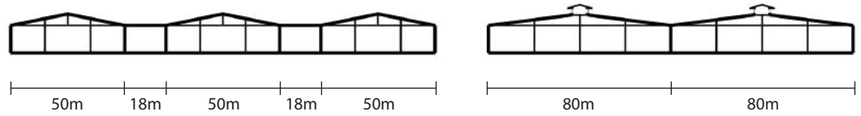


Figure 119: Sections of current factory buildings
Source: Author, 2023

Four types of sustainable improvements:

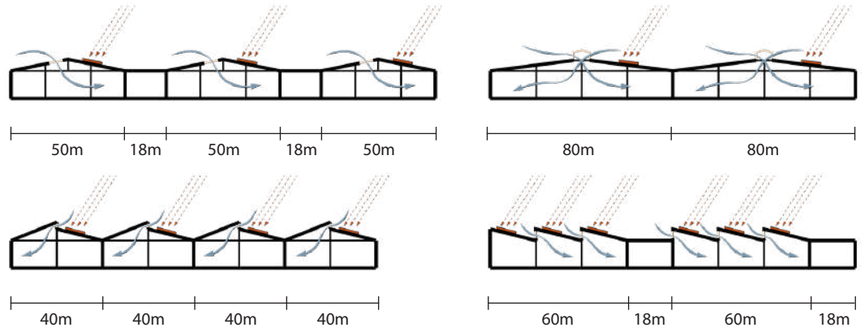


Figure 120: Sections of future factory buildings
Source: Author, 2023

The restructured power system in EIZ:

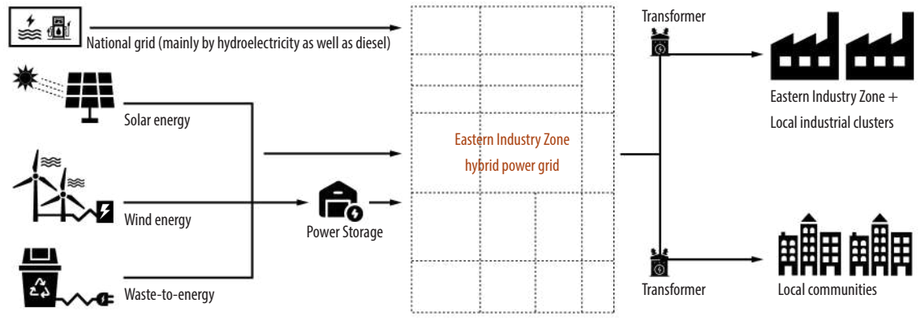


Figure 121: Diagram of the restructured power system in EIZ
Source: Author, 2023

Case Study - DEEP C Hai Phong Industrial Zone in Vietnam:

DEEP C is a cluster of industrial zones (IZs) developed and operated by Infra Asia Investment Hong Kong, majorly owned by Belgian company Ackermans & van Haaren in Haiphong and Quang Ninh in northern Vietnam.

A 2.3MW wind turbine was installed in DEEP C Haiphong II Industrial Zone, and this wind project is established on the back of the partnership between DEEP C and Unison, whereby DEEP C aims to supply its IZs with clean energy. Along with the wind energy project, two rooftop solar plants with a total peak capacity of 4.1MWp are under operation. One plant is installed on the rooftop owned by a tenant, representing a symbiotic activity for environmental benefits. This sharing of energy and rooftop space and other common facilities has gained momentum over the last few years.

"We are working towards the goal of supplying more than 50 percent of total power consumption from renewable energy by the end of the decade." (Bruno Jaspaert-general director of DEEP C Industrial Zones, 2023)

Figure 122: Photos of DEEP C Hai Phong Industrial Zone
Source: www.deepc.vn/en/

Stakeholder	Interest	Importance	Engagement Strategy
Ethiopian Industrial Parks Development Corporation (IPDC)	Development of EIZ and ability to attract investment	Promote infrastructure improvements to attract investment and promote industrial growth in EIZ	Stakeholder consultations and public forums; collaborative partnerships; establish communication channels
Ethiopian Investment Commission (EIC)	Investors' willingness to invest in Dukem-Debre Zeyit area	Promote and facilitate investments in infrastructure projects	Stakeholder consultations and public forums; proposal presentation and communication
Dukem and Debre Zeyit Municipality	Comprehensive development of the towns	Coordinating all parties to ensure the smooth implementation	Regular communication and updates; collaborative partnerships
Ethiopian Roads Authority (ERA)	Construction of road system in the region	Be responsible for the planning, construction, and maintenance of road infrastructure	Regular communication; proposal presentation and collaboration
Ethiopian Electric Power (EEP)	Improvement of electricity network in the region	Be responsible for providing reliable and affordable power supply to EIZ	Regular communication; proposal presentation and collaboration
Development Bank of Ethiopia (DBE)	Benefits from local infrastructure development	Support infrastructure development initiatives by offering loans and credit facilities	Incentives to involve; optimization of business model
International Financial Institutions (IFIs)	The positive effect of financial assistance in the region	Provide financial assistance, loans, and grants for infrastructure development	Optimization of business model
Local Commercial Banks	Investment returns from local infrastructure development	Provide loans and other financial services to developers and investors	Incentives to involve; optimization of business model
China Railway Group Limited (CREC)	Benefits from rail projects in Ethiopia	Be responsible for the construction of rail projects in Ethiopia	Incentives to involve; collaborative partnerships
Ethiopian Railways Corporation	Benefits from light rail transit projects in Addis Ababa	Be responsible for the construction of light rail transit projects in Addis Ababa	Incentives to involve; collaborative partnerships
Export-Import Bank of China	Investment returns in infrastructure projects in Ethiopia	Provide funding for light rail transit projects in Addis Ababa	Incentives to involve; optimization of business model
Private Investors and Developers of EIZ	Investment returns in the region	Provide funding for infrastructure projects in the region	Incentives to involve; Foster public-private partnerships
Companies in EIZ	Better infrastructure system in EIZ	Be influenced by the level of infrastructure improvement in and around EIZ	Incentives to involve; Foster public-private partnerships; provide support and facilitate processes
Local Communities	Better infrastructure system in the towns	Be influenced by the level of infrastructure improvement in the region	Provide information and education; implement community development initiatives
Local Worker Unions	Employment from projects implementation	Be an important player in the implementation of infrastructure projects	Seek input and feedback; share information; establish dialogue and communication channels

Table 12: Stakeholder management for Strategy 1
Source: Author, 2023

Legend

Public Sector Private Sector Civic Society

Policy Recommendation

Integrated Planning and Coordination — Establish an integrated planning framework that brings together relevant government agencies, local municipalities, and other stakeholders to coordinate infrastructure development efforts.

Prioritize Strategic Infrastructure — Due to the limited government budget, key projects that enhance connectivity, such as road networks, transportation systems, electricity and water systems should be prioritized.

Public-Private Partnerships (PPPs) — This policy has been implemented in Ethiopia. It should be optimized toward transparency and accountability in the future.

Financing and Resource Mobilization — Explore diverse and flexible financing options to mobilize resources. This can include domestic and international financing, public funds, and development assistance. Financial instruments and incentives could be developed to attract private investment in infrastructure projects.

Long-term Maintenance and Operation — Develop a sustainable plan for the long-term maintenance and operation of infrastructure. Establish mechanisms to ensure regular maintenance, upgrades, and the provision of necessary services.

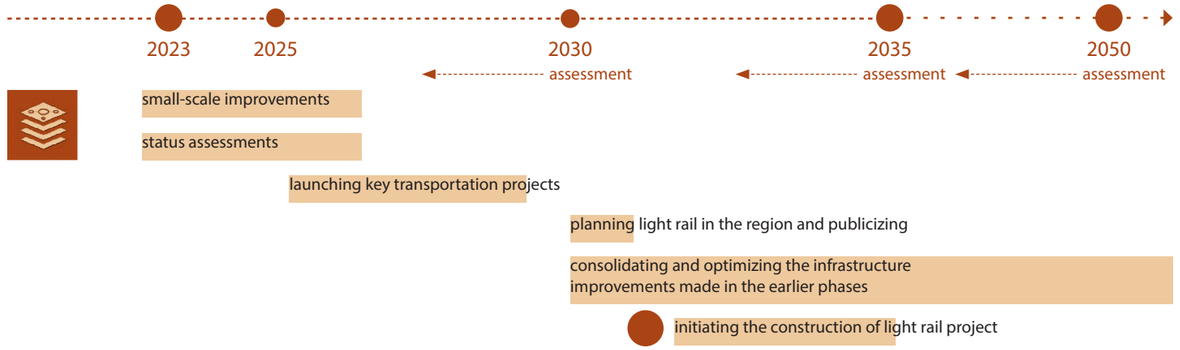


Figure 123: Diagram of phasing for Strategy 1
Source: Author, 2023

Strategy 2: Transition to A Circular Economy

Ethiopia has started implementing an ambitious Climate Resilient Green Economy (CRGE) strategy since 2011. (Haileselassie A. Medhn and Alemu Mekonnen, 2019)

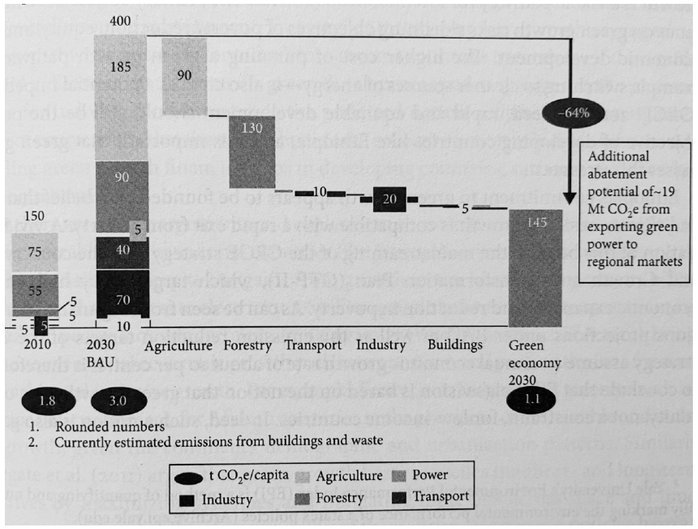


Figure 124: Targets of CRGE in Ethiopia
Source: FDRE Climate-Resilient Green Economy Strategy Document, 2011

Goals:

Socioeconomic goals:
To promote sustainable industries, create new job opportunities, and attract investments in circular business models; to promote recycling and reusing of materials, which can lead to cost savings, reduced dependence on imports, and increased competitiveness of local businesses.

Spatial goals:
To minimize environmental impacts of industries, optimize land use; develop sustainable infrastructures that support waste management, and renewable energy generation; reduce urban sprawl, and promote compact development.

Governance goals:
To promote the development and enforcement of supportive policies, regulations, and incentives, take advantage of the positive role of policy tools in promoting circular business models.

Related SDGs:

Figure 125: Icons of SDGs
Source: sdgs.un.org/goals

2a

Promote circularity of the lifecycle of EIZ

Actions:

① Design for circularity
② Promote circularity in the textile and the apparel industry in EIZ
③ Encourage the sharing of resources like equipment and space

2b

Implement a waste management system

Actions:

① Improve the network of waste collection points
② Establish a waste recycling and processing center in EIZ
③ Develop composting facilities

2c

Encourage agricultural eco-efficiency

Actions:

① Promote cooperation between agro-processing companies in EIZ and local farmers and entrepreneurs
② Facilitate knowledge and technology transfer on circularity in the agriculture and greenhouse industry

According to CRGE, in transportation and industry, sustainable strategies to reduce carbon emissions need to be applied. In this project, the interaction between activities within the industrial park and those outside the industrial park needs to be focused on as the research objective is to promote the role of the Eastern Industry Zone as an active medium in the local area. The concept of "circular economy", in terms of increasing flows of elements, enhancing opportunities for stakeholder collaboration, and encouraging innovation in production and recycling technologies, will be applied to promote local vitalization strategies.

And transitioning to a circular economy around the Eastern Industry Zone in Ethiopia can be achieved through a combination of spatial strategies that promote circularity of the lifecycle of EIZ, implement a waste management system and encourage eco-efficiency in agriculture and the greenhouse industry. The Eastern Industry Zone can become an important center of clean energy supply, waste recycling and treatment, new technology testing, etc. in the local circular economy network, and play its own active role in the town through this network.

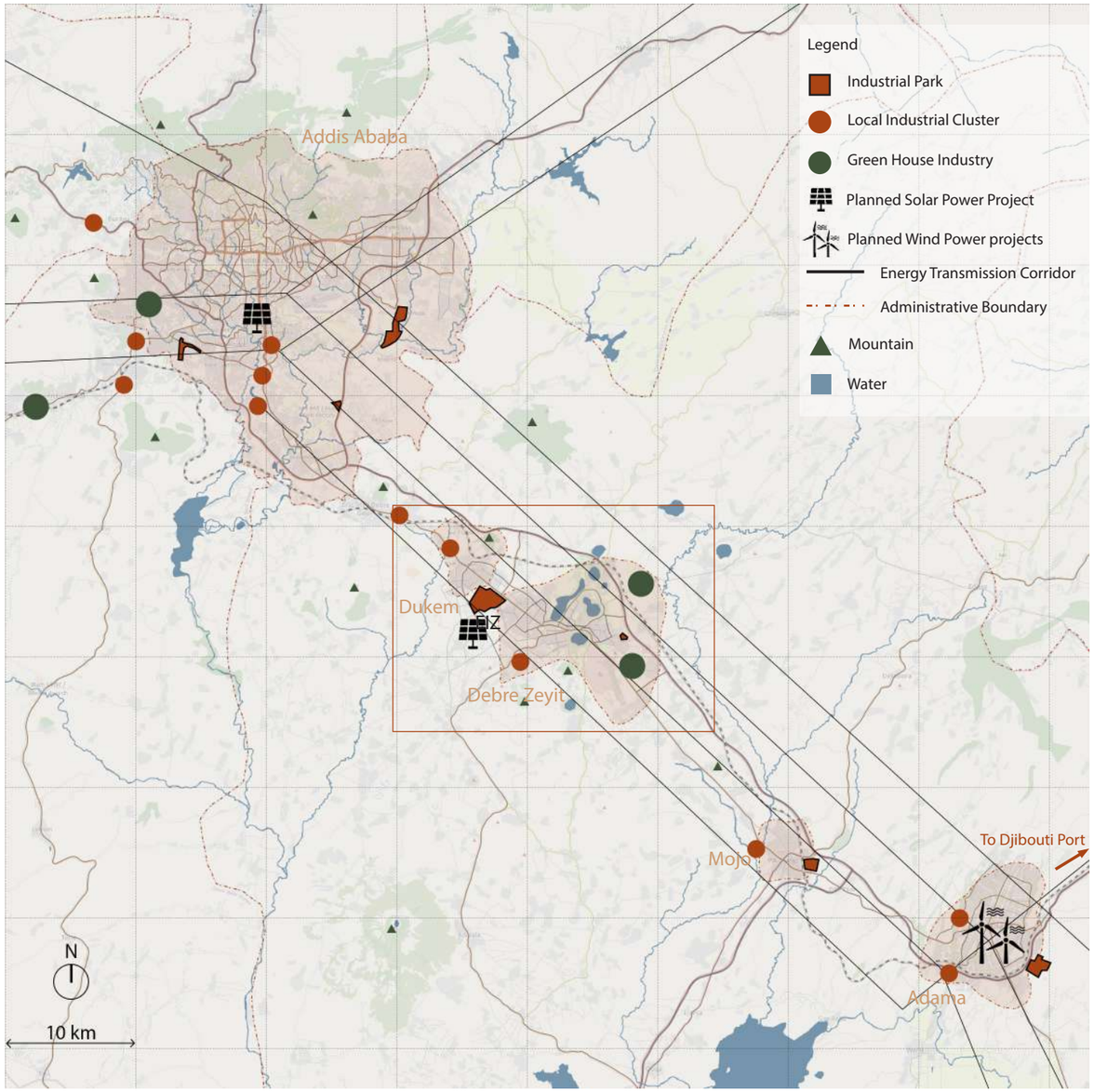


Figure 126: Map of the location of industrial projects and energy projects at the macro scale
Source: Author, 2023

According to *Figure 124*, the Addis Ababa-Dukem-Debre Zeyit-Mojo-Adama is an important regional energy transmission corridor. The four lines in the map mainly represent four types of electricity resources in Ethiopia, namely hydroelectric power, wind power, geothermal power and solar power. And in the future, solar projects are planned in Dukem (EIZ) and Addis Ababa, with a first phase to support the development of industrial parks and local industrial clusters, and a second phase to benefit other uses in the city. A large wind power project is planned in Adama, due to its location. In the transition to a circular economy, the transformation of the energy supply structure is also an important part, as mentioned in Strategy 1. (Chapter 6.4 Strategy 1 Action 1b)

At the regional scale, the transformation of greenhouse industry and agriculture is also one of the important strategies for the development of the circular economy. In this project, the recycling and treatment of related organic waste and biomass power generation will also be proposed in the action plan.

2a

Promote circularity of the lifecycle of EIZ: First of all, starting from the life cycle of the Eastern Industry Zone, in order to achieve a sustainable transition from a linear to a circular process, some enablers should be introduced at each step to drive top-down and bottom-up changes. Government institutions should enact laws and regulations to ensure the implementation of sustainable measures; the private sector should take on the social responsibility for environmental protection and explore new opportunities in sustainable business models; and civil society should make a shift in a mindset based on education and awareness-raising to promote a bottom-up change towards a circular economy. In this project, in response to the circularization of the life cycle of the EIZ, eight enablers are referenced: collaboration and early engagement, secondary materials market, circular economy design principles, green contracts and leases, tax and legislation, green finance, metrics and benchmarks and indicators, education. (UKGBC, 2023) These eight enablers are also considered to be the key to overcoming the barriers to the shift to a circular economy. (See the Appendix for detailed strategies for each enabler.)

The life cycle of the industrial park is designed to shift from the traditional linear model (*Figure 125*) to a circular model (*Figure 126*). In this regard, a phased implementation strategy is used in the construction phase to develop the park on a rolling basis and to alleviate the financial pressure of developing the remaining part of the park by operating that part of the park first. In addition after the maintenance period, a deconstruction rather than demolition approach is adopted to maximize the recovery of construction materials and equipment, which can be sold in the city's secondary market or reprocessed and updated for new construction.

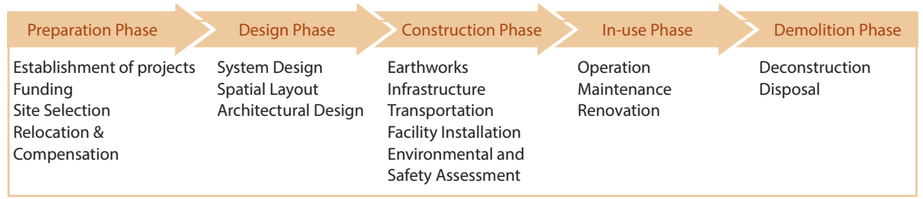


Figure 127: Linear life cycle of an industrial park
Source: Author, 2023

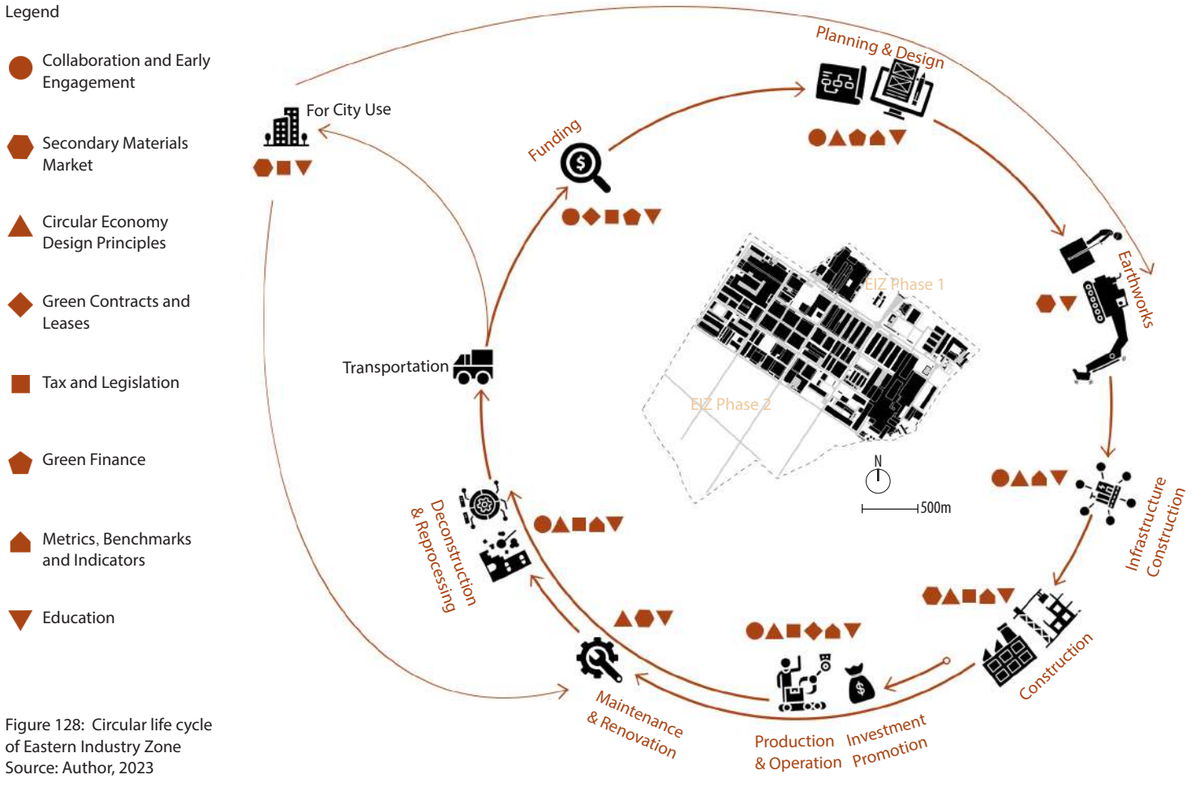


Figure 128: Circular life cycle of Eastern Industry Zone
Source: Author, 2023

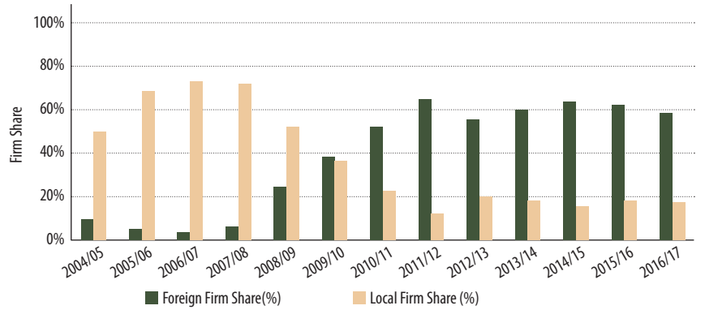


Figure 129: Apparel exports by local and foreign firms in Ethiopia, 2004/5-2016-17
Source: TIDI, 2017

Ownership	Total	Textile (spinning and weaving/knitting)	Integrated (textile and apparel)	Apparel
Ethiopia	**49**	**9**	**10**	**30**
Foreign	**50**	**14**	**4**	**32**
China	22	11	-	7
India	6	2	-	4
Turkey	4	1	2	1
Korea	4	-	-	4
Sri Lanka	4	-	-	4
European	3	-	-	3
Pakistan	2	-	2	-
UAE	2	-	-	2
US	1	-	-	1
Indonesia	1	-	-	1
Israel	1	-	-	1
Total	**99**	**23**	**14**	**62**

Table 13: Overview of firms in the textile and apparel sector in 2017
Source: Based on data from TIDI, 2017. The data were confirmed by fieldwork information by Cornelia Staritz and Lindsay Whitfield in 2019, the total number is an estimate.

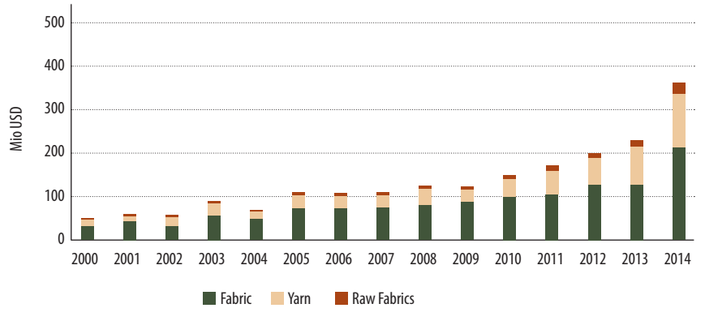


Figure 130: Textile Imports to Ethiopia 2000-2014
Source: UN COMTRADE, 2015

As the first phase of the Eastern Industry Zone is currently in good operation, the textile and apparel industry is chosen for this project to study the model of transition to a circular economy for specific industries. Ethiopia is positioned to become an important supplier country in the globalized apparel industry. Ethiopia has the potential to emerge as a significant supplier country in the global apparel industry, as evidenced by the proactive government policies in place. The country boasts a range of ownership structures, including locally owned export firms, and has laid the foundation for a comprehensive national supply chain encompassing cotton, textile, and apparel. This foundation provides a strong base for further development, with the potential to establish vertically integrated production capabilities within Ethiopia. (Cornelia Staritz and Lindsay Whitfield, 2019) Furthermore, the textile and apparel industry is also the sector that accounts for a large share and generates the most employment in the EIZ and other Ethiopian industrial parks. Although this sector has significant backward linkages with the agriculture sector particularly in relation to cotton production, in Ethiopia, the current level of linkages between the textile industry and the cotton sector remains below its full potential. (Cornelia Staritz, Leonhard Plank & Mike Morris, 2016)

Therefore, in this project, taking EIZ as the case, how to restructure the flows of elements around the textile and apparel industry, mainly including products, raw materials and machinery, labor, knowledge and technology, energy and waste, is the core of the exploration. (*Figures 129&130*) First, the share of products or semi-finished products produced in the industrial park that go to the domestic market will increase. For example, raw materials are initially processed and then sold to other small local enterprises for reprocessing at cost, thus deepening the cooperation between the two sides through the industrial chain. Locally, the potential of cotton cultivation will be exploited, and for the rough processing of cotton, it can be integrated with agricultural production. And local farmers can establish a long-term and stable supply relationship with the industrial park. Foreign companies can play a crucial role in sharing their product expertise and knowledge with local micro and small enterprises as well as farmers. This exchange of knowledge facilitates the overall enhancement of the industrial chain. Moreover, there is an opportunity to effectively manage and utilize agricultural waste and waste generated by local industrial clusters. The waste can be centrally recycled and disposed of by the planned waste treatment and bioenergy generation center in the EIZ. This approach could ensure the efficient utilization of resources and promote environmental sustainability.

Legend

Clothing products produced in EIZ
Fibre/Machinery
Cotton
Related Knowledge & Practical Experience
Waste
Power
Local Labour Force

Fibers are mainly from Egypt, India, Uganda, Sudan, Pakistan.
Machinery is mainly from China, India.
(Ethiopia Textile and Clothing Value Chain Roadmap 2016-2020)

Garment exporting countries are mainly Germany, Sudan, UK.
(Ethiopia Textile and Clothing Value Chain Roadmap 2016-2020)

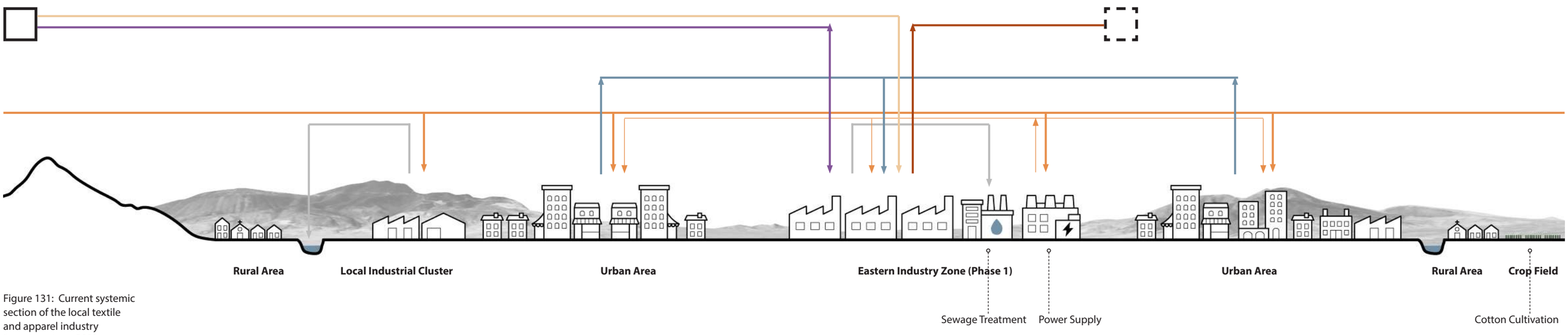
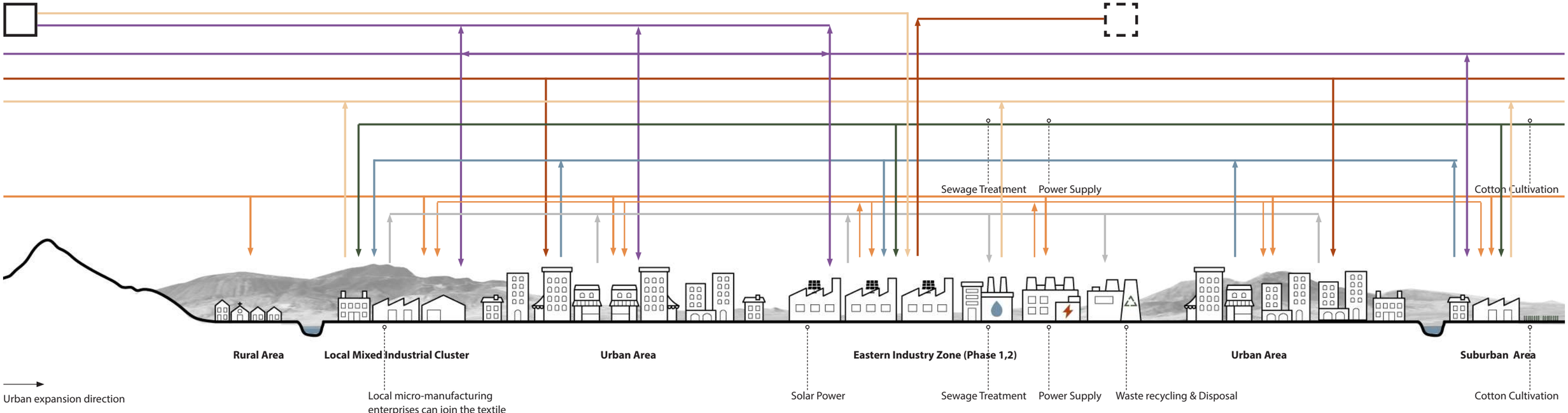


Figure 131: Current systemic section of the local textile and apparel industry
Source: Author, 2023



Urban expansion direction

Local micro-manufacturing enterprises can join the textile and apparel industry chain to produce fibers and needed machines.

The domestic cotton production area can provide raw materials for the textile and apparel industry to process.

Figure 132: Systemic section of local circular textile and apparel industry
Source: Author, 2023

2b

Implement a waste management system:
In this project, actions to manage organic waste are proposed to integrate the internal waste treatment system of the Eastern Industry Zone, the local greenhouse industry, agriculture and community waste treatment systems. Organic waste, such as food scraps, agricultural residues, and green waste, is collected from various sources, including industrial facilities, greenhouse operations, and community waste recycling points. In the second phase of the construction of EIZ, a waste recycling and processing center located on the east side of the EIZ is planned, equipped with specialized infrastructure and technologies to efficiently process and transform organic waste into compost. (*Figure 131*) It could act as a management and dispatch center and play a crucial role in the local composting system. And based on the distribution of greenhouse industry and agriculture in the Dukem-Debre Zeyit region, three major composting facilities are planned (*Figure 132*) The compost is used in local agriculture and greenhouse as organic fertilizer.

As a result, a new organic waste treatment system with local characteristics can be established that promotes sustainable waste management practices, improves soil fertility, and contributes to a more environmentally friendly and self-sustaining local economy.

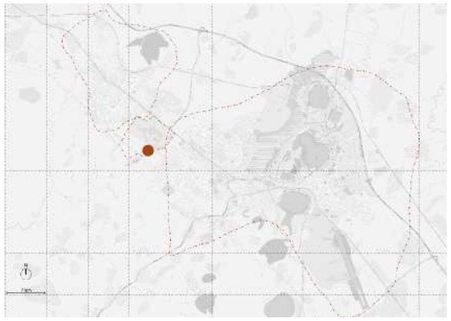


Figure 134: Location of the waste recycling and processing center in Phase 2 of EIZ
Source: Author, 2023

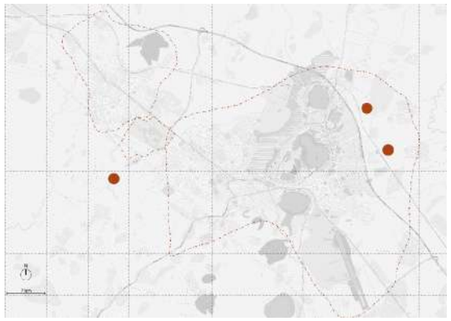


Figure 135: Location of local composting facilities
Source: Author, 2023

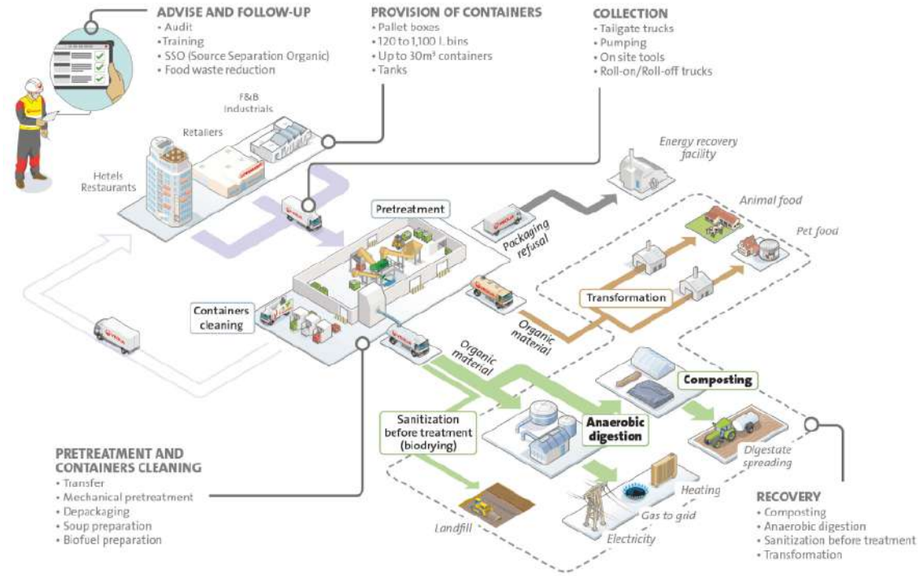


Figure 133: Referenced organic waste treatment system
Source: Veolia case, www.veolia.com/en/newsroom/thematic-reports/organic-waste-recovery

2c

Encourage agricultural eco-efficiency:
To the west of the Eastern Industry Zone, a future agricultural processing center is planned and laid out in conjunction with the current companies, while another planned agricultural processing center is located in a small local industrial park to the east of Debre Zeyit. (*Figure 134*) Local farmers and small agro-processing enterprises are able to cooperate with both centers, supply raw materials or rent equipment, and learn relevant knowledge and technology on a regular basis. In turn, a portion of the related products are able to enter the local market and promote consumption. By-products such as crop straw and animal manure can enter the local organic waste treatment system (*Action 2b*) as renewable resources. This approach can lead to the transformation of local agriculture and manufacturing industries to a circular economy model.

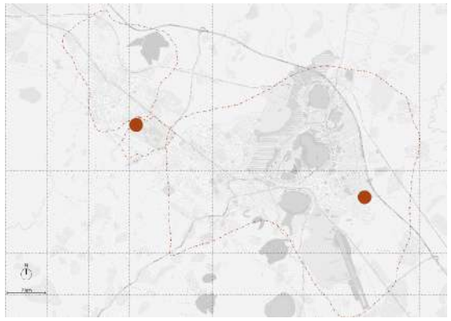


Figure 137: Location of agro-processing centers
Source: Author, 2023

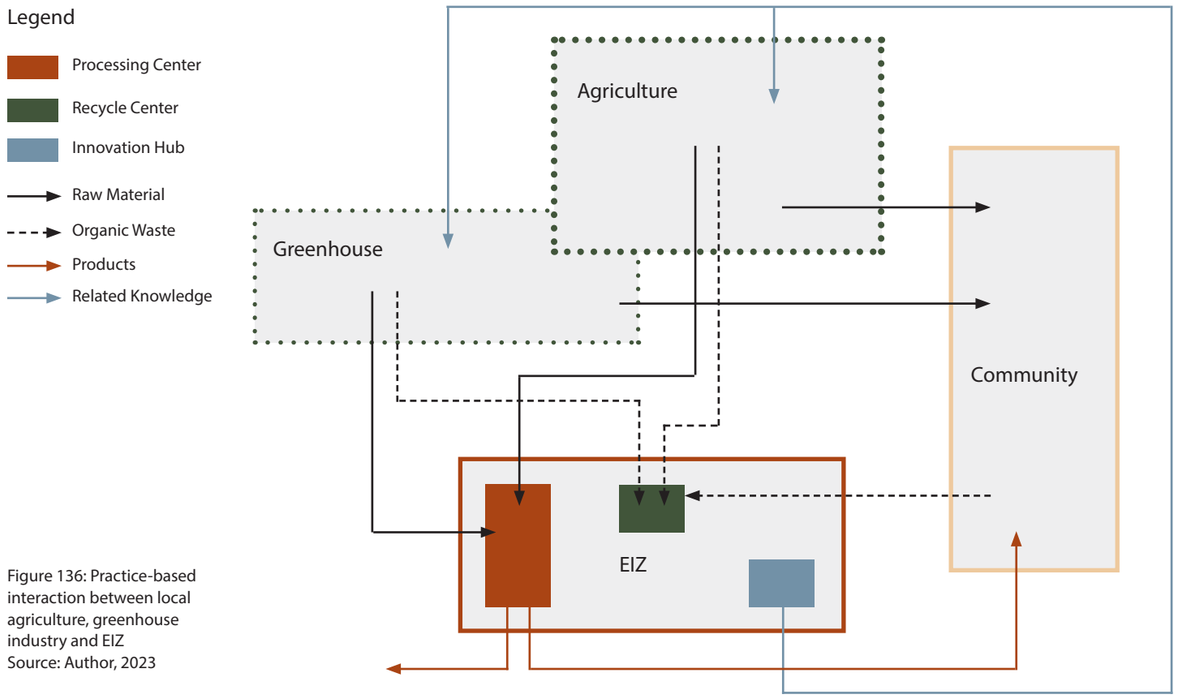


Figure 136: Practice-based interaction between local agriculture, greenhouse industry and EIZ
Source: Author, 2023

Stakeholder	Interest	Importance	Engagement Strategy
Ethiopian Industrial Parks Development Corporation (IPDC)	Development of EIZ and ability to attract investment in sustainable projects	Promote the implementation of circular measures and waste treatment projects in EIZ and attract relevant investment	Stakeholder consultations and public forums; collaborative partnerships; establish communication channels
Ethiopian Investment Commission (EIC)	Investors' willingness to invest in sustainable projects	Promote and facilitate investments in sustainable projects	Stakeholder consultations and public forums; proposal presentation and communication
Dukem and Debre Zeyit Municipality	Sustainablee development of the towns and Agricultural Transformation	Set policies, regulations, and incentives to encourage the adoption of circular economy principles	Regular communication and updates; collaborative partnerships
Local Micro & Small Enterprises	Stable profits	Provide local knowledge and participate in sustainable projects	Incentives to involve; optimization of business model
Research Institutions	Development, testing and application of technologies	Technology promotion, and knowledge sharing	Regular communication; incentives to involve
Waste Management Companies	Benefits from the transition to a circular economy	Establish efficient waste collection and recycling systems	Incentives to involve; optimization of business model; provide support and facilitate processes
Private Investors and Developers of EIZ	Prospects for investing in sustainable projects	Prioritize financing initiatives that align with circular economy principles	Incentives to involve; optimization of business model
Companies in EIZ	Stable profits	Implement cleaner production techniques, and adopt sustainable manufacturing practices	Incentives to involve; foster public-private partnerships
Local Communities & Civic Society Organizations	Improvement of quality of living environment	Raise awareness about sustainable waste management practices, and promote recycling initiatives	Collaborative partnerships; the publicity of circular economy principles
Local Farmers	Stable incomes	Participate in sustainable projects	Establish communication channels; share knowledge and technology

Table 14: Stakeholder management for Strategy 2
Source: Author, 2023

Legend

Public Sector

Private Sector

Civic Society

Policy Recommendation

A Circular Economy Roadmap

Dukem and Debre Zeyit Municipality should create a comprehensive roadmap outlining the transition to a circular economy in and around the Eastern Industry Zone. This roadmap should include clear goals, targets, and a timeline for achieving specific circular economy objectives. It should also identify key sectors and industries that can lead the transition and outline specific policy measures to be implemented. At the same time, relevant environmental standards are formulated for the production of the EIZ, which can be applied to other industrial parks.

Extended Producer Responsibility (EPR) Programs

EPR is an environmental policy approach defined by the OECD as extending a producer's responsibility for a product beyond the manufacturing stage to include the post-consumer phase of its life cycle. The producer will assume part or all of the responsibility for managing or financing the disposal or recycling of the product. And incentives for environmental considerations will be adopted. (For more details, see the OEDC website: www.oecd.org/environment/extended-producer-responsibility.htm)

Transformation plan to eco-industrial park for EIZ

For the construction of the second phase of the EIZ and the renewal of the first phase of the EIZ, it is necessary to refer to the construction principles of the eco-industrial park, consider the symbiosis between enterprises and develop relevant industrial access standards.

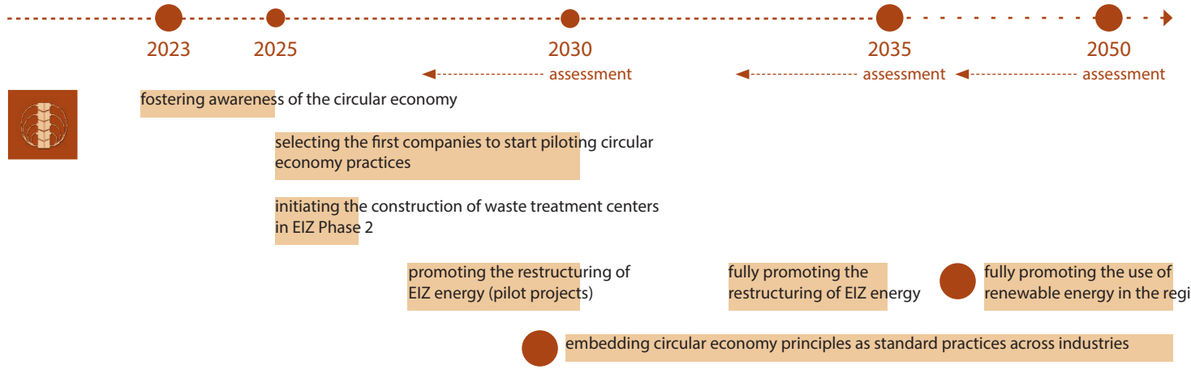


Figure 138: Diagram of phasing for Strategy 2
Source: Author, 2023

Strategy 3: Stimulating the Local Endogenous Growth

Local endogenous growth refers to the economic development that arises from within a local community or region through the creation and expansion of locally-owned businesses, innovation, and entrepreneurship. This type of growth is characterized by the development of local industries and the creation of new jobs and opportunities, which in turn leads to increased income and higher standards of living for the local population. Unlike traditional economic development strategies, which often focus on attracting large corporations or industries from outside the region, local endogenous growth strategies focus on building local capacity and promoting locally-owned businesses. This approach is seen as more sustainable and resilient in the long term, as it reduces the dependence on external sources of investment and promotes self-reliance and local ownership.

And to Dukem and Debre Zeyit, balancing internal development forces with external transnational opportunities through local endogenous development strategies will create a special development path.

Goals:

Socioeconomic goals:
To increase the number of local skilled workers, and businesses; to create a stable and supportive environment for businesses and residents to encourage economic diversity.

Spatial goals:
To encourage the development of a skilled workforce within the Dukem-Debre Zeyit region, and the growth of local businesses; to foster a sense of community and ownership among residents of Dukem-Debre Zeyit region, encouraging them to take an active role in the development and growth of the area.

Governance goals:
To encourage collaboration between local educational institutions, government agencies, community organizations and businesses; to provide support and resources to local businesses to help them succeed, including access to financing, training, and mentorship.

Related SDGs:

Figure 139: Icons of SDGs
Source: sdgs.un.org/goals

3a

Encouraging education and training programs

Actions:

① Develop a knowledge park in/beside EIZ
② Cluster educational institutions and training providers
③ Improve the knowledge and technology network

3b

Supporting micro and small enterprises (MSEs)

Actions:

① Establish an MSE incubation center in EIZ
② Create business clusters with shared infrastructure and services
③ Create marketplaces and trade fairs for local products

3c

Strengthening local institutions

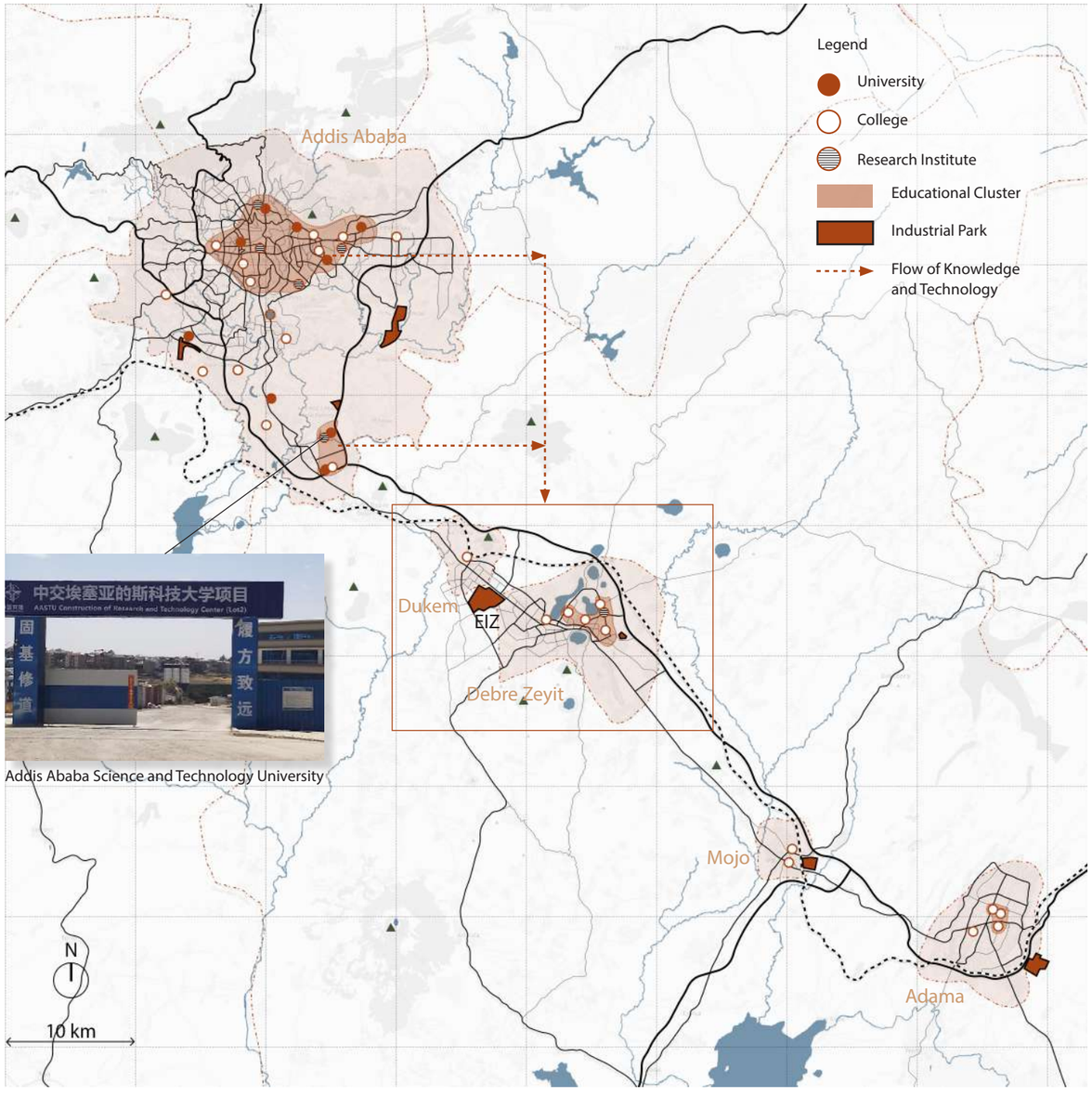
Actions:

① Develop a municipal service center
② Establish a citizen feedback mechanism

Firstly, creating a modern and well-equipped knowledge park, and the collaboration and innovation between businesses, research institutions, and academia could attract knowledge-intensive industries to the area, which is in preparation for the transformation and upgrading of local industries. And clustering educational institutions and training providers will ensure that the local workforce has access to high-quality education and training programs that are tailored to the needs of local businesses.

Secondly, providing support and resources to local micro and small enterprises (MSEs) is also an important policy in Ethiopia at the national strategic level. And providing shared infrastructure and services, such as transportation, logistics, and marketing could help to reduce costs for MSEs. Incentives for locally made products are also important, which will enhance local endogenous dynamics.

Thirdly, citizens will be given a voice in the development and implementation of local policies and projects, especially foreign-invest projects. This also facilitates multi-party cooperation.



Addis Ababa Science and Technology University

Figure 140: Map of clusters of educational, research, and innovation institutes and the distribution of industrial parks at the macro scale
Source: Author, 2023

According to *Figure 139*, there are relatively obvious clusters of educational, research, and innovation institutions in Addis Ababa, and essentially all Ethiopian universities have campuses in Addis Ababa. In the southeast corner of Addis Ababa, there is a new district where Addis Ababa Science and Technology University, founded in 2011, is located. The university is also an important platform for cooperation in education and research between China and Ethiopia. And the Ethiopian Chinese Chamber of Commerce has launched a special education fund for Addis Ababa University of Science and Technology since 2016. According to the cooperation agreement signed between the Chamber and the university, the education fund provides 500,000 Birr scholarships per year with first, second and third prizes. In addition Chinese enterprises in Ethiopia will also host 50 university students for internship every year. This program is working well and has facilitated interactions between China and Ethiopia at the civil level. This real case shows that educational institutions can be a bridge between enterprises, civil organizations, workers or student groups. That is why, in this project, the focus will be on education and innovation networks in the Dukem-Debre Zeyit region, at the meso scale.

3a

Encouraging education and training programs :
A front knowledge park close to the EIZ will be established. This park will serve as a front hub for the delivery of knowledge-based services to industries in the whole region. The front knowledge park can be developed through a public-private partnership and could provide shared resources such as libraries, laboratories, conference facilities, incubation centers, co-working spaces, and student housing. The park can also house innovation and startup centers to encourage entrepreneurship and innovation among the youth. Educational institutions and training providers will be clustered on the east side of Debre Zeyit, based on the current conditions. The cluster will include vocational and technical schools, universities, research institutions, and training providers. They can be developed in partnership with the companies in the EIZ to provide relevant training and skills to their employees.

The knowledge and technology network will be improved over a larger area, which will involve links to relevant institutions in Addis Ababa, to regional innovation networks in East Africa and to innovation institutions in foreign countries such as China. The network will facilitate the exchange of knowledge, skills, and technology. Additionally, from a long-term perspective, it will help to attract more investors and industries to the Dukem-Debre Zeyit region, further boosting economic growth locally. Besides, capacity-building efforts should be strengthened while the physical spaces are optimized. This can be done by providing scholarships and grants to students and researchers, developing mentoring and internship programs, and offering continuing education and skills development programs.

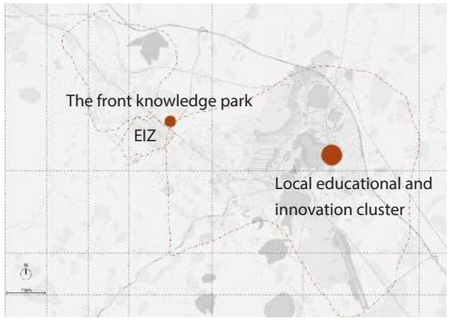


Figure 142: Location of Education and Training Programs
Source: Author, 2023

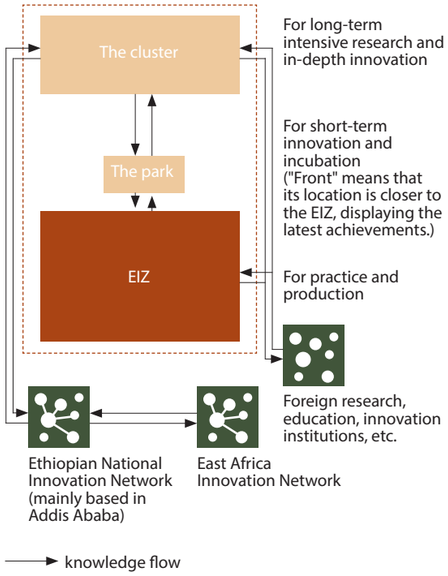


Figure 143: Diagram of knowledge flows
Source: Author, 2023

Case Study - IKP Knowledge Park in India
IKP Knowledge Park, located in Hyderabad and Bangalore, India, is a renowned Science Park and Incubator spanning 200 acres. Established in 1999, it stands as a leading research and development center in the country. IKP facilitates the progress of technology-driven innovators, entrepreneurs, and companies, providing tailored facilities, shared equipment, incubation support, mentorship, and funding opportunities. To date, IKP has assisted over 430 companies from seven countries, with startups comprising 90% of the beneficiaries.
The park's architecture is inspired by the concept of an innovation ecosystem. It encompasses diverse spaces like offices, laboratories, conference rooms, and communal areas such as cafes and lounges. With a focus on adaptability, the park's design allows for flexibility to meet evolving member requirements. Collaboration is a key aspect of the park's layout, fostering interaction and networking among its occupants. Common areas are thoughtfully designed to encourage informal exchanges and facilitate knowledge-sharing among the park's community.

Figure 141: Photos of IKP Knowledge Park
Source: www.ikpknowledgepark.com/

Figure 144: Collage of the knowledge park
Source: Author, 2023

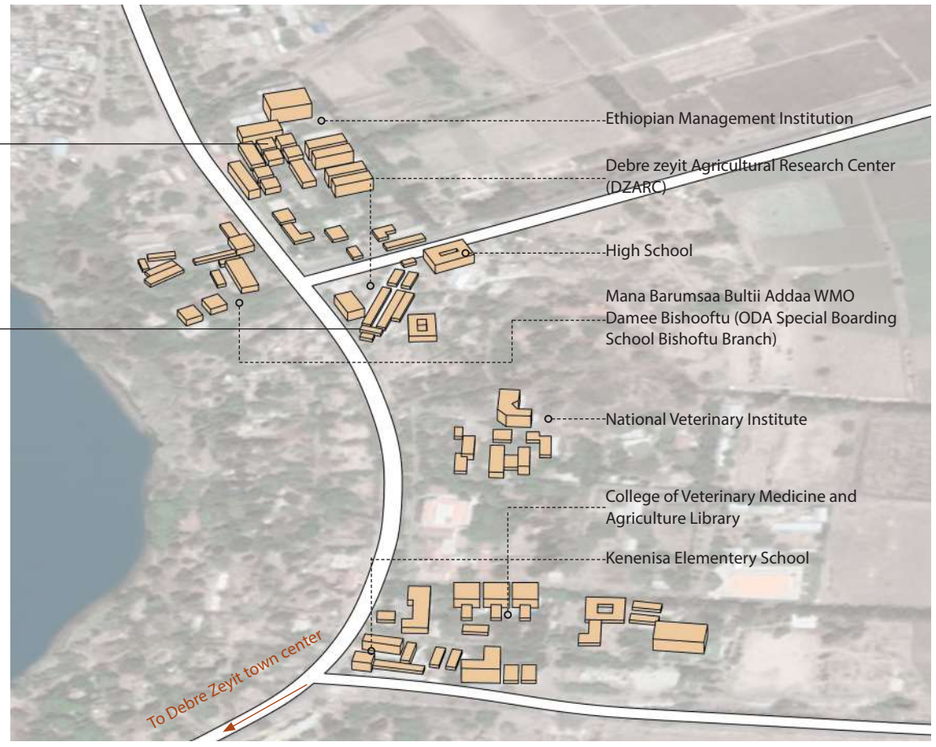


Figure 145: Diagram of the education cluster in Debre Zeyit
Source: Author, 2023
(Photos from Google Map Photos)

This current agricultural research-based cluster in Debre Zeyit will be transformed into a collaborative ecosystem that integrates agriculture and industry, driving innovation, knowledge exchange and economic development. It will provide the city with new technologies and advanced research in sustainability. And the Eastern Industry Zone could have an office here to facilitate collaboration with local institutions on workforce training programs. This will further facilitate technology transfer and commercialization and promote collaboration between academia, industry and government agencies.

As for the spatial features, the layout of the education and innovation cluster includes dedicated facilities such as research labs, workshops, and collaborative spaces. It embraces a campus-like environment that encourages interdisciplinary work and networking.

3b

Performance of MSEs in the Ethiopia context:
Wubet and Mmopelwa (2020) projected that MSEs employed between 17 and 27% population, approximately double the employment of large-scale enterprises and the public sector, based on a review of national surveys (conducted in various regions of Africa). In Ethiopia, the MSEs sector employs over 2.3 million people and accounts for nearly 14% of Ethiopia's Gross Domestic Product (GDP).

Support micro and small enterprises (MSEs): Ethiopia has a wide variety of micro and small enterprises (MSEs), which play a critical role in the country's economy. Since MSEs exist in several sectors, in this project, MSEs in the manufacturing sector will be selected for further analysis, research and design.

An MSE incubation center will be established in the front knowledge park to provide training, mentoring, and technical support to start-ups and existing MSEs. The center will offer services such as business plan development, financial management, marketing, product development, and access to finance. The center will collaborate with universities, research institutions, and development partners to provide training and technical support to MSEs. The center will also provide shared office space, meeting rooms, and equipment to MSEs.

Two business clusters will be created in Dukem and Debre Zeyit to bring together local MSEs in the same or related industries. The clusters will provide shared infrastructure and services such as production facilities, storage, logistics, and marketing. The clusters will reduce costs and increase competitiveness by facilitating economies of scale and scope. The clusters will be supported by the MSE incubation center and EIZ, which will provide technical support and linkages with markets and financial institutions. Marketplaces and trade fairs will be created in and around the EIZ to promote market access for local products. The marketplaces will provide a platform for MSEs to sell their products directly to consumers. The trade fairs will provide a platform for MSEs to showcase their products and services to potential buyers and investors. The marketplaces and trade fairs will be organized in collaboration with local authorities, business associations, and development partners.

The improved definition of MSEs in Ethiopia			
Level of enterprise	Sector	Human power	Total asset
Micro enterprise	Industry	≤5	≤Birr 100000($ 6000)
	Service	≤5	≤Birr 50000($ 3000)
Small enterprise	Industry	6-30	≤Birr 1.5million($ 90000)
	Service	6-30	≤Birr 500000($ 30000)

Table 15: Definition of MSEs applicable in Ethiopia
Source: Ethiopian Micro and Small Enterprise Development (2011)

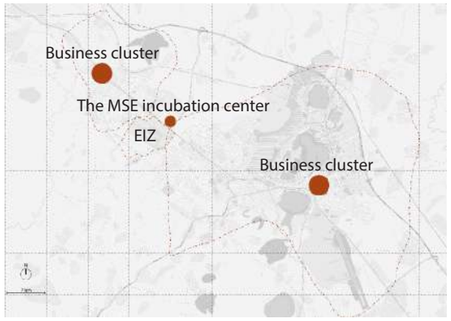


Figure 146: Location of Incubation Center and Business Clusters
Source: Author, 2023

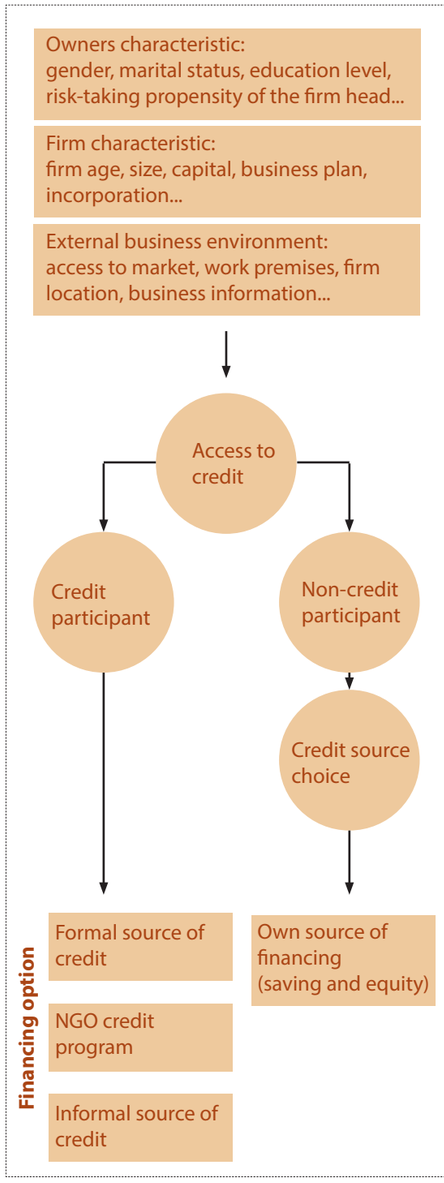


Figure 147: General Workflow of financing options for MSEs
Source: Getachew Ayalu, 2020

At present, financing options for MSEs are still relatively limited (*Figure 146*), but as the Ethiopian national government gradually tilts its policies toward encouraging MSEs' development, MSEs will have easier access to formal channels of credit. Related policies such as providing business development services, guidance and financing opportunities for MSEs, and facilitating linkages between MSEs and large companies will also be implemented to further address the practical problems of MSMEs due to their size, production capacity, etc.

Micro and Small Enterprises (MSEs) in Ethiopia can use various types of spaces, depending on the nature of their business, available resources, and other factors. The common types of space used by MSEs are production space, storage space, retail space, office space, and living space. Among them, production space can be divided into shared space and independent space for micro and small enterprises. The core of the optimization strategy is to lay out these programs flexibly according to the conceptual space layout (*Figure 147*) and to improve the flows of transportation, commuting, and sales.

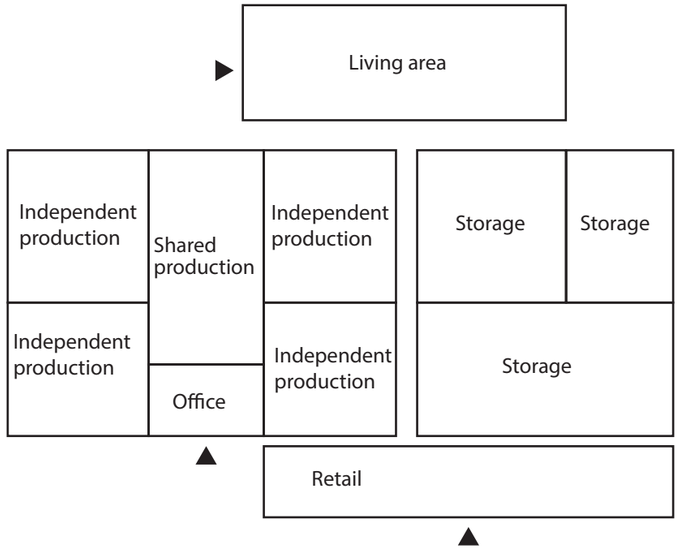
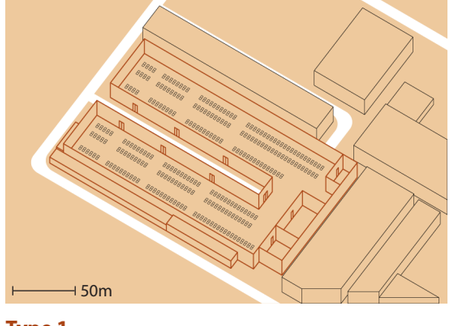


Figure 148: Conceptual space layout of MSEs
Source: Author, 2023
(Photos from Google Maps Photos)

Four Types of MSEs in Dukem-Debre Zeyit Area

Figure 149: Location of factory-based MSEs case
Source: Author, 2023



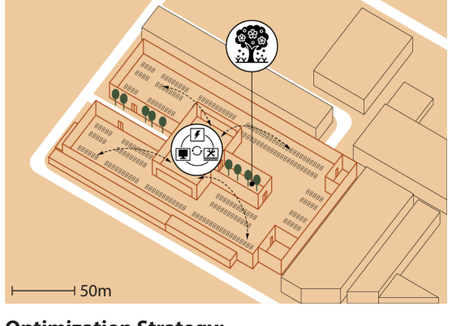
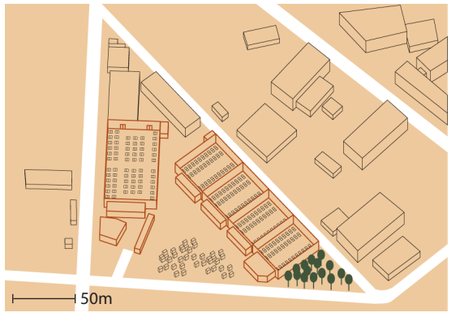


Figure 150: Diagrams of Factory-based MSEs
Source: Author, 2023

Type 1
Factory-based MSEs:
They typically have more formalized production spaces, such as assembly lines or production rooms, and may have access to shared services such as utilities, security, and transportation.

Optimization Strategy:
The shared space (including green space) is used to break the monotonous and boring spatial experience of large factories, while promoting the sharing of equipment and other facilities to improve the quality of the working environment for employees.

Figure 151: Location of shared-production MSEs case
Source: Author, 2023



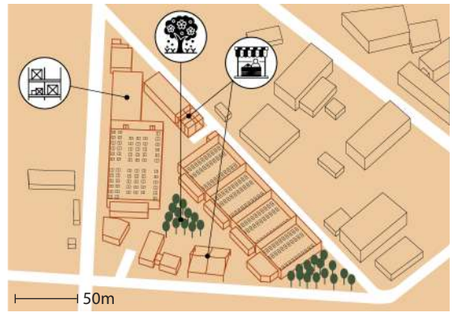


Figure 152: Diagrams of Shared Production Spaces
Source: Author, 2023

Type 2
Shared Production Spaces:
These are MSEs that share production spaces with other businesses, either informally or through more formal arrangements such as co-working spaces or shared production facilities. This can help to reduce costs and increase access to shared resources such as equipment, utilities, and services.

Optimization Strategy:
The main entrances are designed in conjunction with the retail space to increase the display of products. Refurbishment of open yards and upgrading of storage facilities. Not only production is shared, but green space is also shared.

Figure 153: Location of cottage-industry MSEs case
Source: Author, 2023

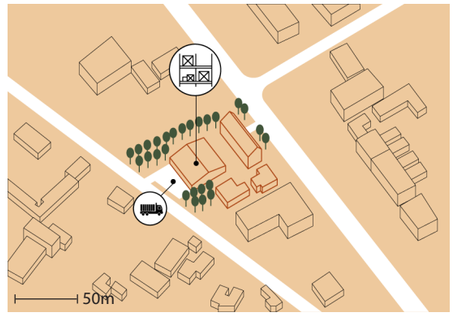


Figure 154: Diagrams of Cottage Industry MSEs
Source: Author, 2023

Type 3
Cottage Industry MSEs:
These are MSEs that operate out of homes or small workshops, often using traditional techniques and tools. They typically have more informal production spaces that are integrated with their living spaces.

Optimization Strategy:
Separate living flows from logistics flows to ensure the safety of all activities. Consider the safety area for loading and unloading, and the impact on daily life. Optimize storage facilities to minimize losses.

Figure 155: Location of informal MSEs case
Source: Author, 2023

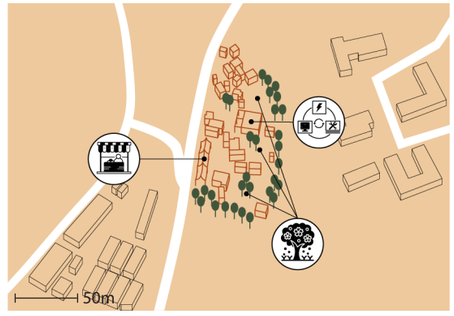


Figure 156: Diagrams of Informal MSEs
Source: Author, 2023

Type 4
Informal MSEs:
These are MSEs that operate in smaller, often informal spaces such as small shops, or on the street. They may have limited access to formal services or infrastructure, and their production spaces may be more flexible and adaptable to changing needs.

Optimization Strategy:
As informal production spaces are usually small in scale, consider building renovations that aim to share and complement each other. The retail space can be used for the centralized display of products.

3c

Strengthen local institutions
A municipal service center will be developed in Dukem to improve the efficiency and effectiveness of public service delivery. The center will provide a one-stop shop for citizens to access public services such as business registration, licensing, tax payment, and land administration. The center will also provide a platform for citizen engagement and participation in local governance.

A citizen feedback mechanism will be established in and around EIZ in Dukem-Debre Zeyit region to enhance citizen participation and accountability in local governance. The mechanism will provide citizens with a platform to provide feedback on public services, report grievances, and make suggestions for improvement. The mechanism will be accessible through various channels such as social media, SMS, and email. The feedback received will be analyzed and used to improve public service delivery and enhance citizen participation in local governance.

The implementation of this strategy will require the collaboration and support of various stakeholders, including local authorities, business associations, development partners, and citizens themselves. With the successful implementation of this strategy, local institutions in and around EIZ in Dukem, Ethiopia, will be strengthened to promote sustainable development and improve the quality of life for citizens.

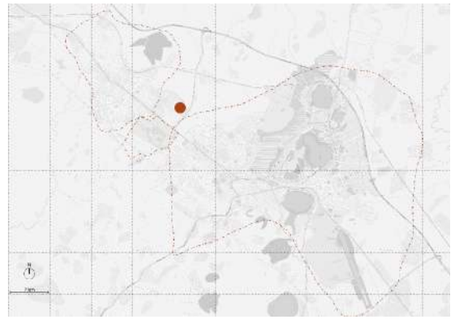


Figure 158: Location of The Municipal Service center
Source: Author, 2023

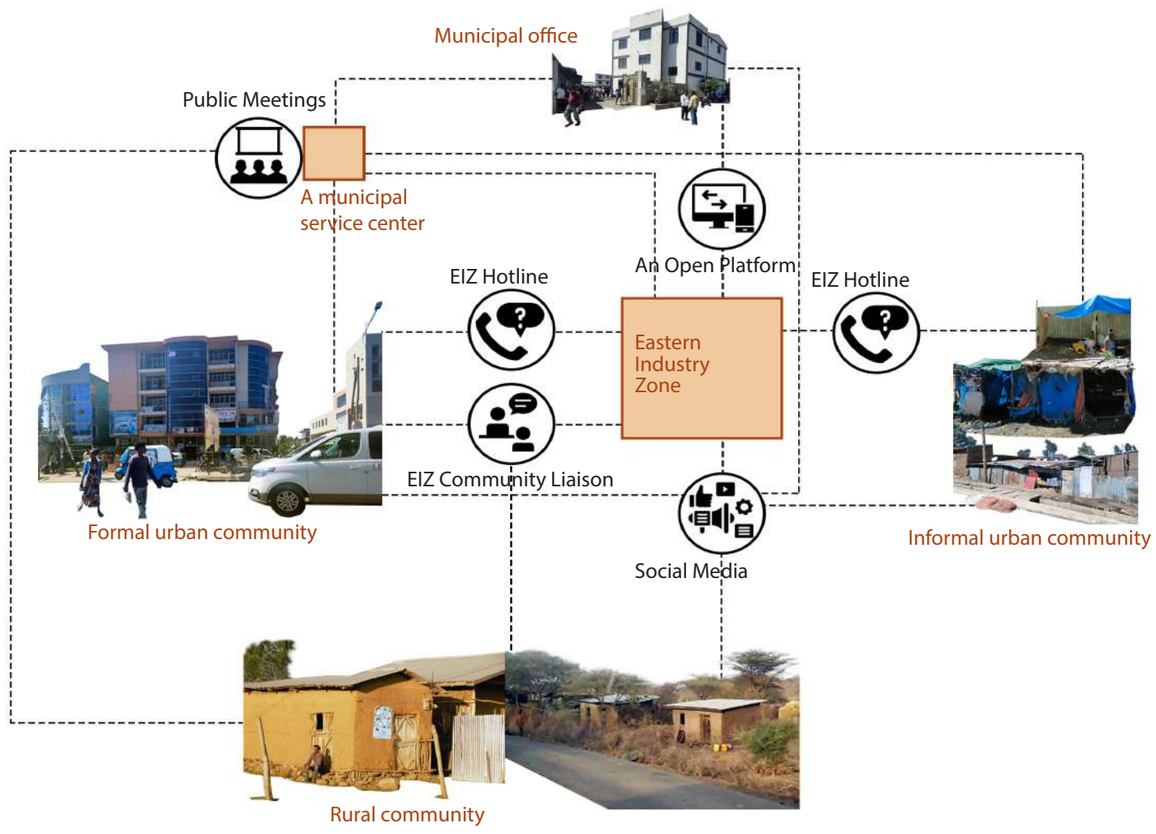


Figure 157: Diagram of local citizen feedback mechanism
Source: Author, 2023

Stakeholder	Interest	Importance	Engagement Strategy
Ethiopian Industrial Parks Development Corporation (IPDC)	Development of EIZ and ability to attract investment	Promote educational programs and encourage cooperation between China and Ethiopia based on EIZ	Stakeholder consultations and public forums; collaborative partnerships; establish communication channels
Ethiopian Investment Commission (EIC)	Investors' willingness to invest in Dukem-Debre Zeyit area	Promote and facilitate investments in educational programs	Stakeholder consultations and public forums; proposal presentation and communication
Dukem and Debre Zeyit Municipality	Local education and innovation levels increase & business dynamics	Coordinating all parties to build local knowledge and innovation network	Regular communication and updates; collaborative partnerships
Educational Institutions	Human resources & improvement of education level	Offer specialized courses and degree programs targeted to industry development needs	Collaborative partnerships; workshops; training programs
Research Organizations	Technology Promotion & Cooperation	Collaborate with educational institutions, industries, and government agencies & provide technical expertise	Collaborative partnerships; workshops; training programs
Industry Associations and Chambers of Commerce	Business dynamics	Facilitate collaboration between businesses and educational institutions	Collaborative partnerships; Trade Exhibition
Private Investors and Developers of EIZ	Workforce capacity building	Provide scholarships or other funding programs	Trade Exhibition
Local Micro & Small Enterprises	Stable profits & technology learning	Key actors in local endogenous development, especially in knowledge transformation	Support policies; Trade Exhibition
Local Startups and Incubators	Technology and knowledge learning	Key actors in local endogenous development, especially in knowledge transformation	Support policies; Trade Exhibition
Companies in EIZ	Workforce capacity building	Provide internship opportunities and test the application of new technologies in practice, etc.	Trade Exhibition; collaborative partnerships
Local Communities	Access to education and work opportunities	Key actors in local endogenous development	Share information; establish communication channels; training programs
Local Workers	Access to education and work opportunities	Important labor resources	Share information; establish communication channels; training programs

Table 16: Stakeholder management for Strategy 1
Source: Author, 2023

Legend

Public Sector | Private Sector | Civic Society

Policy Recommendation

Tax Incentives

Offer tax incentives and subsidies to encourage companies and institutions to establish their presence in the knowledge park. Provide attractive financial benefits, such as tax breaks and subsidies, to incentivize businesses and institutions to set up their operations within the knowledge park.

Financial Support

Provide financial support for the establishment of joint programs and initiatives that address the specific needs of local SMEs.

Specialized Infrastructure

These specific infrastructures includes high-speed internet, telecommunications and other research facilities. In addition the construction of digital platforms can facilitate the development of online services, and digital platforms can also serve as communication channels, collaboration tools and repositories for knowledge sharing and resource utilization within the knowledge park ecosystem.

Local Partnership

Promote collaboration among government, local authorities, educational institutions, private sector, and community for knowledge transfer and research commercialization. Facilitate linkages between MSEs and larger companies for supply chain integration. Organize marketplaces and trade fairs to showcase local products, fostering connections between producers and potential buyers.

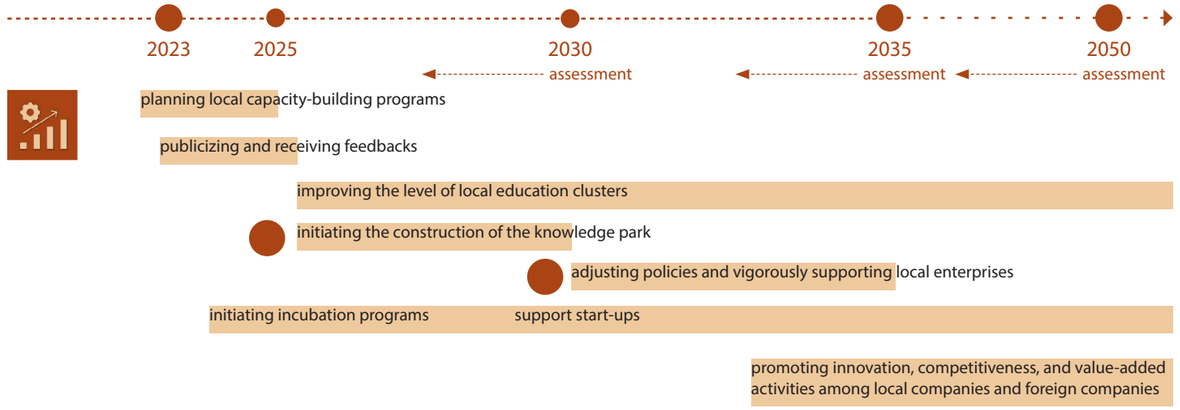


Figure 159: Diagram of phasing for Strategy 3
Source: Author, 2023

Strategy 4: Fostering Collaboration and Partnerships

Fostering collaboration and partnerships around the operational management of the Eastern Industry Zone and the development of the local town, can have significant positive impacts on the local economy, public services, innovation, and social cohesion. By working together, stakeholders can address local challenges and create opportunities for sustainable development and growth.

Firstly, for the EIZ, by collaborating with local businesses, government agencies, and other stakeholders, they can attract more investment and create jobs, leading to increased economic growth in the region. And local partnerships can help to improve the delivery of public services, such as healthcare and education, by pooling resources and expertise. This can also help to ensure that services are tailored to the needs of the community. Besides, collaboration and partnerships can foster innovation by bringing together stakeholders with diverse perspectives and skill sets, which can lead to new ideas, products, and services. Through these, dialogue and cooperation among different groups will be promoted which can help to build trust and promote a sense of shared purpose.

Goals:

Socioeconomic goals:
To encourage all stakeholders to interact and communicate with mutual respect and motivate them to take action for local vitalization.

Spatial goals:
To gradually avoid the division of foreign or local spaces (e.g. the use of elements such as fences) and encourage the development of more public spaces and services for public use based on the principle of equality as the town develops and the related functions become more complex.

Governance goals:
On the basis of optimizing public-private cooperation, more attention will be paid to the value of civil society and ways of participation, and gradually explore effective and positive models of tripartite cooperation in conjunction with industrial park projects.

Related SDGs:

Figure 160: Icons of SDGs
Source: sdgs.un.org/goals

4a

Optimize the cooperation model

Actions:

① Involve all three parties - public sector, private sector, and civil society - in the development of the industrial park
② Establish regular communication channels

4b

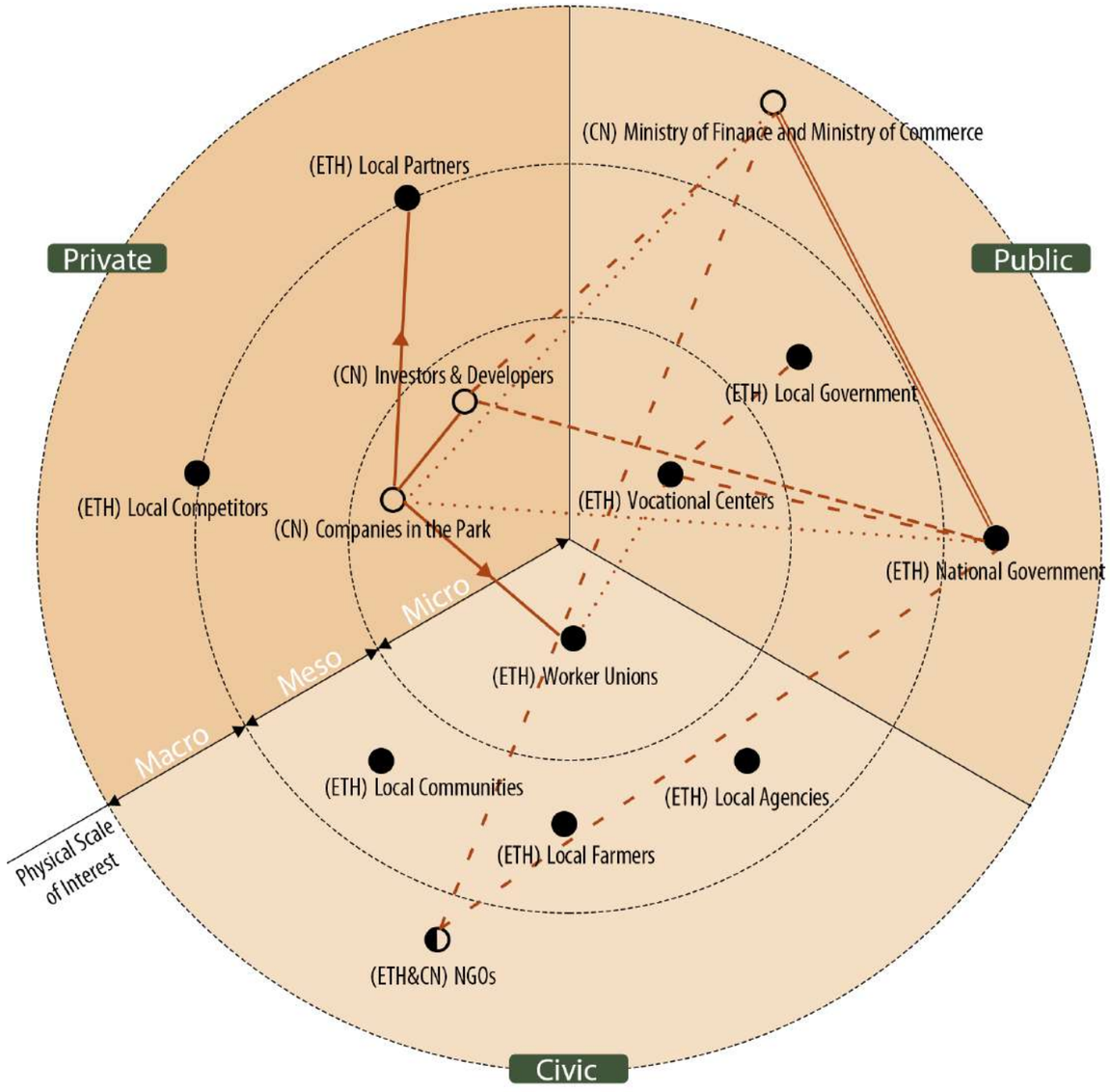
Create participatory decision-making processes

Actions:

① Create a hub for community engagement and participation in EIZ
② Develop a participatory planning process

In this project, work ethic is a theme that needs to be highlighted. This is also common among foreign managers and workers in many African countries, especially when these foreign managers are from East Asia. In Ethiopia, the perceived lack of work ethic and discipline is a major complaint among factory managers, and some typical 'social skills' in East Asia, such as timekeeping, and reactive speed to boost productivity, are imposed on local workers, but they are not fully understood. (Carlos Oya, 2017) This miscommunication and cultural differences have over time led to a growing gap between the two parties, leading to conflict in extreme cases.

In addition, prioritizing endogenous local development is necessary for foreign-invested industrial parks such as the Eastern Industry Zone to embed themselves in local socio-economic networks and to establish effective procedures for interaction between the industrial park and the local community. Currently, the Ethiopian government is committed to promoting public-private sector cooperation, and there is no clear process for cooperation between civil society and the other two sectors due to the complexity and diversity of the actual situations. So it will be explored in this project as well. One of the most important research objectives of this project is to be able to explore some strategies to promote win-win cooperation between foreign and Ethiopian parties based on the Eastern Industry Zone, within which the community or other local groups can also be involved.



Legend

- Chinese
- Ethiopia
- Co-management
- Co-founding
- Co-funding
- Incentivation
- Convincing
- Contracting

Figure 161: Stakeholder Configuration
Source: Author, 2023

As the scale changes from small to large, the stakeholders, or the extent to which stakeholders are connected to the industrial park project, will gradually change from strong to weak. However, weak ties here generally mean that they are not involved in the day-to-day operations of the industrial park very frequently, but at certain critical times, these stakeholders can play an important role. According to *Figure 161*, the interaction between the public and private sectors currently is close and revolves around funding, management, incentives, etc. The promotion of public-private partnerships is also one of the key policies pursued by Ethiopia at the national level.

But because an industrial park is a physical space with a large volume, its very existence has an impact on the environment in which it is located. And this will inevitably have an impact on civil society. How to involve civil society in the planning and supervision of industrial park projects is also a key issue that will affect the embeddedness of industrial parks in local networks. Optimizing collaboration models and creating participatory decision-making processes would be useful actions.

4a

Optimize the cooperation model :
At present, as investors and developers work directly with the government to draw up plans and plan the park, such a strong approach has led to many conflicts, such as the lack of a complete system for safeguarding workers' rights and the lack of standards for controlling the environmental impact of companies' production.

Legend

Synergy

Conflict

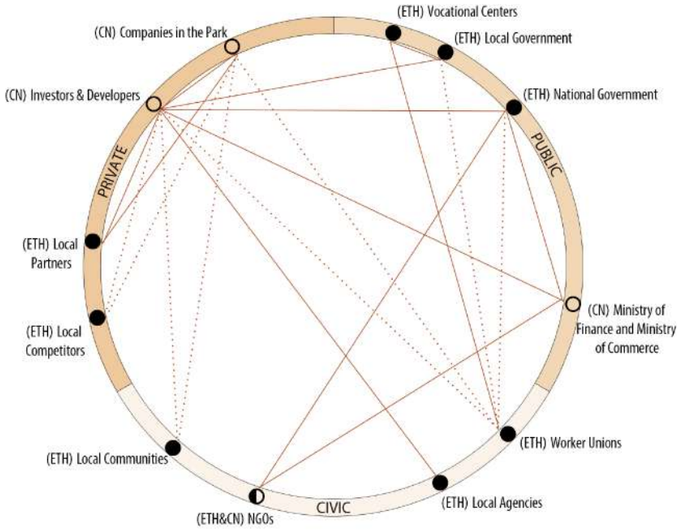


Figure 162: Diagram of current relationships
Source: Author, 2023

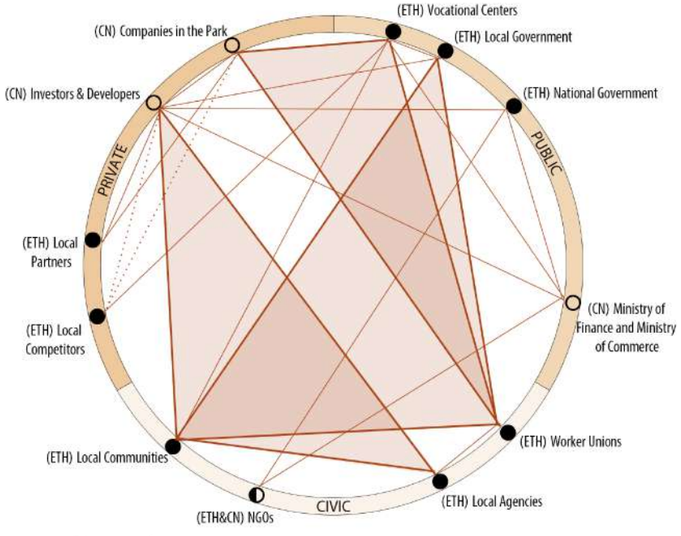


Figure 163: Diagram of future relationships
Source: Author, 2023

Moreover, at this stage of cooperation, spatial quality, social impact and cultural exchange have been neglected due to the priority given to the pursuit of economic development.

So, in the future, the industrial park will be the medium to connect multiple groups. Workers and residents will be more engaged. The local community will be motivated to participate not only in the planning and design phase through public meetings and feedback mechanisms to advise on the future construction of the industrial park, but also to exercise their own regulatory powers during the operational phase of the industrial park to ensure that all production activities are in compliance with regulations and ethical standards.

In the process, unlike the current completely top-down process, the power of self-organization will be amplified. There have been some examples of where local forces should be trusted to achieve bootstrapping development in the face of rapidly developing imperfect systems. The middle-out approach could be applied, which combines top-down and bottom-up forces, using the role of good agencies for effective communication among multiple parties. New solutions would be that various motivated actors to generate new ways of addressing the issues and add creative ideas to the mix. In addition, the effective application of local knowledge can play an important role in socio-cultural and land resource management. This can be done through participatory approaches, such as community consultations, collaborations with local organizations, and the inclusion of local representatives in planning and governance structures. By valuing and incorporating local knowledge, the development of the Eastern Industry Zone can be more context-specific, sustainable, and responsive to the needs and aspirations of the local communities.

And it can be seen in *Figure 163* that the combination of relationships formed by these three triangles allows the local communities and local agencies to be more engaged. And it allows the three parties: public sector, private sector, and civic society, to have checks and balances and oversight of each other to ensure that no one party has too much power. W

Legend

Public Sector

Private Sector

Civic Society

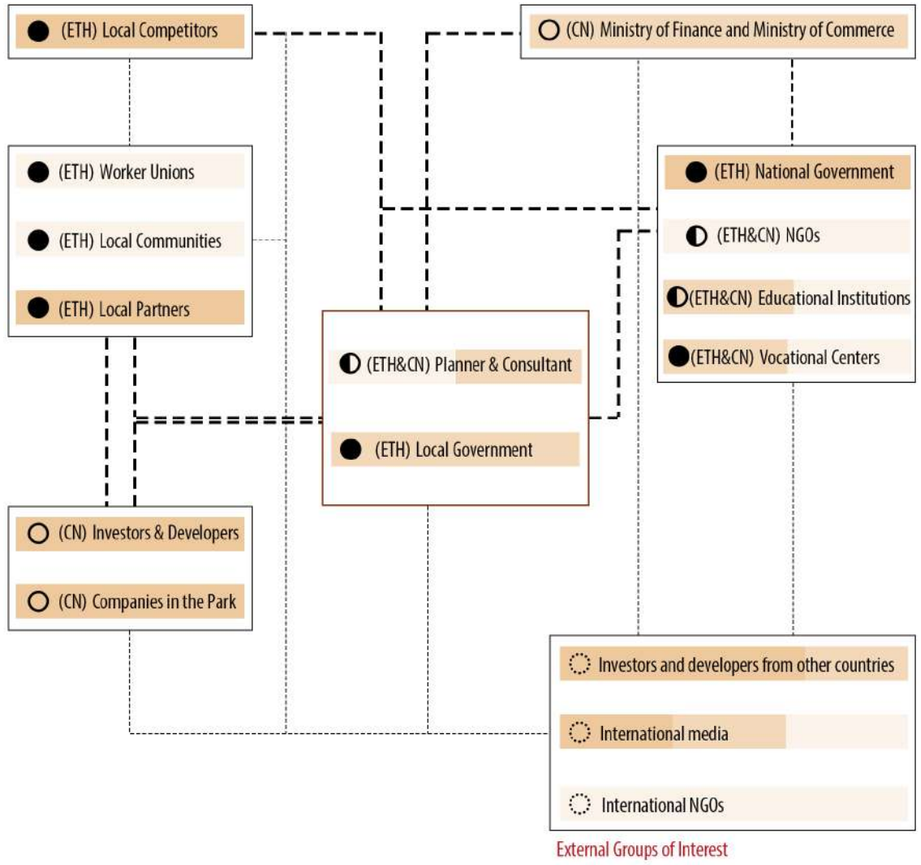


Figure 164: Diagram of co-governance
Source: Author, 2023

Name of Institution	Main Roles
Ethiopian Investment Commission (EIC)	Support investors throughout the investment process, and create a conducive business environment.
Ethiopian Industrial Parks Development Corporation (IPDC)	Coordinate the planning process, and act as a liaison between investors
The Ministry of Capacity Building (MCB)	Serve as the focal point for supervising and coordinating a broad range of national initiatives and maintain the donor-country dialogue
Ethiopian Chamber of Commerce and Sectoral Associations (ECCSA)	Act as the private sector counterpart in the Ethiopian Public Private Consultative Forum (EPPCF) model to dialogue with the public sector.

Table 17: Suitable as the government agency to communicate with the private sector and civic society
Source: Author, 2023

According to *Figure 164*, it can be seen that in the new model of co-governance around Eastern Industry Zone, the three groups: local government, planners and consultants will take on the responsibility of mediators, responsible for reducing misunderstandings in communication and cooperation. This is mainly done based on the space of the industrial park. And mixed tripartite cooperation will allow the three parties: public sector, private sector and civic society, to monitor and promote each other, plus attract attention from outside, and international media and other organizations may also be involved in concrete practices, acting as a check on unequal power. Vocational centers do not only provide education and training for employees of companies within the industrial park, but also work with local companies, as it is also beneficial for Ethiopia to support local companies to improve its competitiveness.

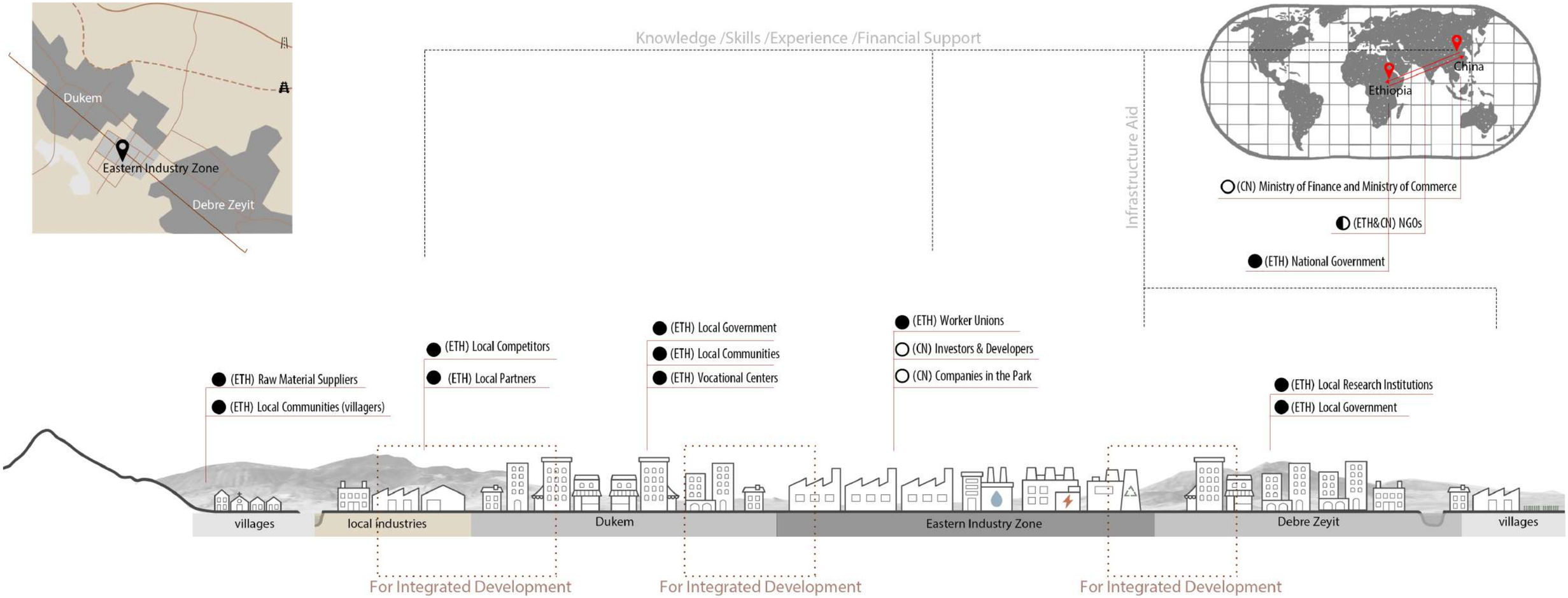


Figure 165: Spatial Connections between Stakeholders
Source: Author, 2023

It can be seen that there is already a coexistence and interaction between the Chinese side and the Ethiopian side in the industrial parks and towns. The villages, on the other hand, are more isolated due to the distance and the lack of relevant industrial links. At the same time, the influence from both sides of the state level is relatively strong to influence the construction of the industrial park and attract investment. In fact, behind the physical spaces and stakeholders, there is also the invisible but important market economy that cannot be ignored.

The space being highlighted has the potential to be used for integrated development. Even if the scale of the building and other spaces are different due to different functional requirements, the transitions and mixes can be made by design means to increase the efficiency of the use of space and vitality. Rapid population growth and changing market conditions in Ethiopia require designs that are resilient to future industrial upgrading and transformation and new urbanization. (And for the specific design of this, see Chapter 7.)

Figure 166: Diagram of current power/interest matrix
Source: Author, 2023

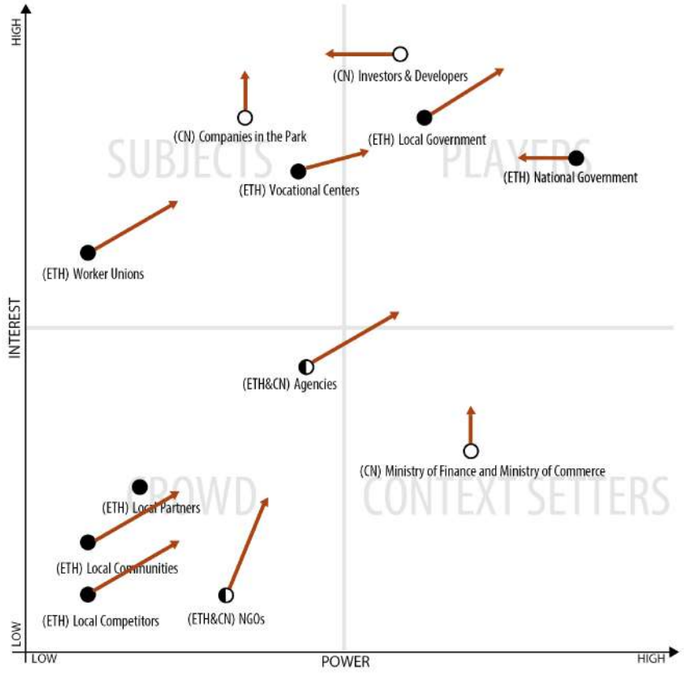


Figure 167: Diagram of future power/interest matrix
Source: Author, 2023

4b

Create participatory decision-making processes:
According to the analysis, there is currently a greater interest and stronger power of the national and local government and Chinese investors and developers for mutual cooperation based on industrial parks. Companies and vocational centers are less powerful but more willing to participate. Worker unions do not play a key role in the decision-making process. And it is clear that the local community, agencies, local companies and other organizations are not actively involved in the construction and development of the industrial park. So, in the future, mutual cooperation will not only take place in the industrial park but will also incorporate the surrounding communities into the overall design. Workers, residents, agencies, and people from other social organizations will be involved in the decision-making process and given more power to influence the role of the industrial park. The power of the government, investors and developers will be reduced and the oversight of their power will be increased. Companies in the park will also take more social responsibility than just producing profits.

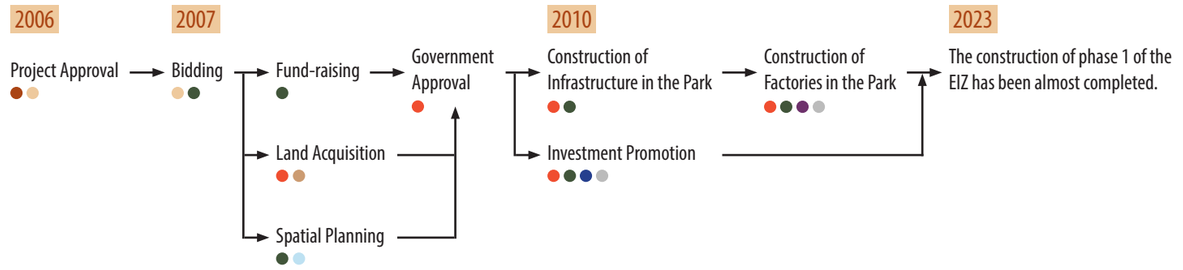
Then the participatory decision-making processes involving all stakeholders could be established. In the planning, implementation, and monitoring stages of an industrial park project, the perspectives, needs, and concerns of various stakeholders could be considered and incorporated into the decision-making. In this process, there are a few points that need extra emphasis. The first is information sharing, which is the foundation of open and transparent communication. The objectives, benefits, potential impacts, and timelines of the IP projects should be shared with all groups for common understanding. Another point is to develop continuous feedback mechanisms. This can include regular communication channels, such as public meetings, online platforms, or dedicated contact points, where stakeholders can receive information and provide input throughout the project's lifecycle.

In short, this participatory process helps to build trust, foster cooperation, and enhance the overall sustainability and success of the IP projects.

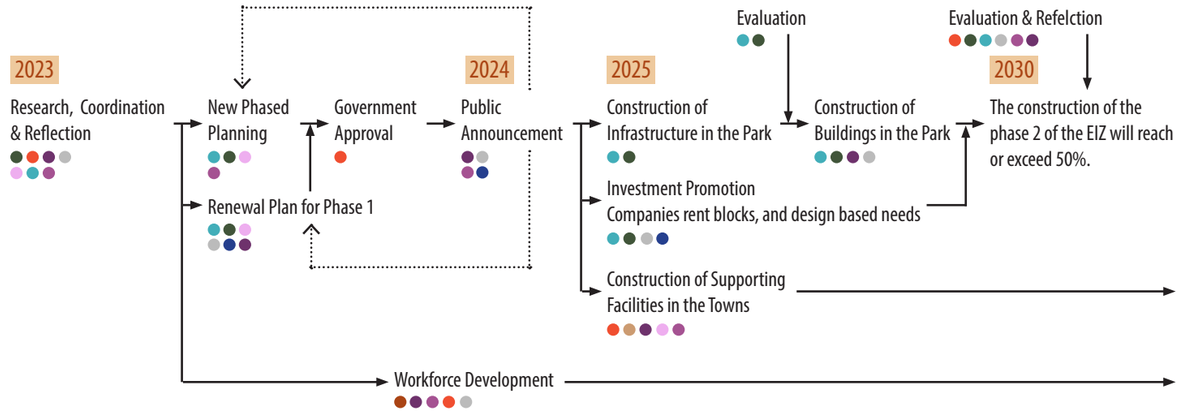
"The early years of EIZ development were far from being smooth, and its growth was associated with a deep learning curve for both Chinese developers and the Ethiopian government." (Ding Fei & Chuan Liao, 2020)

According to relevant research and reports, the construction of the first phase of the Eastern Industry Zone has been almost completed from 2006 to 2023, and only a few small plots of land are currently under construction. It can be seen from *Figure 168* that the entire planning and construction procedures of the first phase are relatively simple, and the follow-up development is basically fully undertaken by Chinese developers. In this process, attracting investment and promoting production are given top priority. I think now is a good opportunity to start to reflect on the planning and construction of the first phase, and it is also an opportunity to optimize the planning and construction procedures of the second phase. Therefore, before proposing the planning scheme, the planning of the industrial park and other official plans of Dukem or Debre Zeyit need to be considered as a whole, and the selection of industries and spatial requirements need to be discussed in a forward-looking manner. In addition, after the finalization of the plan, it needs to be publicized and all stakeholders would be invited to make suggestions and these suggestions should be evaluated. Throughout the construction of the second phase of the industrial park, the construction of other infrastructure and service facilities in the two towns will also need to be carried out. It will also be an ongoing process to develop the local workforce according to the needs of the development of the local industry.

The planning and construction procedures of phase 1 (2006-2023)



The planning and construction procedures of phase 2 (2023-2030)



(The Ethiopian Industrial Parks Development Corporation (IPDC) was established in 2014, as one of the public enterprises.)

Figure 168: Satellite image of local industrial cluster in Dukem
Source: Google Map, 2023

Main stakeholders invloved in the process

- Ethiopian National Government
- Ethiopian Regional government
- Manufacturing Companies
- Chinese National Government
- Ethiopian Land Owners
- Planning Experts & Researchers
- Chinese Private Developers
- Chinese Design Company
- IPDC(The Ethiopian Industrial Parks Development Corporation)
- Investors
- Employees in EIZ
- Citizens in Dukem-Debre Zeyit Area

6.5 Conclusion of Strategies

The strategy action plans for promoting local revitalization in Dukem and Debre Zeyit, Ethiopia, taking Eastern Industry Zone as the positive medium, encompass several key areas: infrastructure development, transitioning to a circular economy, stimulating local endogenous growth, fostering collaboration and partnerships. These strategies are interconnected and mutually reinforcing, forming a comprehensive approach to promoting sustainable development and revitalization.

Infrastructure Development: Infrastructure development forms the foundation for economic growth and community development. The strategy focuses on improving transportation systems and energy systems within the EIZ and its surrounding areas. Enhancing infrastructure, such as roads, public transportation, and electricity, supports the efficient functioning of industries, attracts investment, and facilitates the overall development of the region.

Transition to a Circular Economy: The transition to a circular economy aims to minimize waste generation, promote resource efficiency, and enhance sustainability. This strategy encourages businesses within the EIZ to adopt eco-friendly practices such as waste reduction, recycling, and the use of renewable energy sources. The establishment of the waste recovery, recycling and management system could foster collaboration between industries, waste management entities, local communities, and local agriculture to reduce the environmental impact and promote a more sustainable industrial ecosystem.

Stimulating Local Endogenous Growth: The strategy of stimulating local endogenous growth focuses on knowledge and innovation network construction and human resource building. By promoting cooperation among EIZ, educational and research institutions, and companies, the knowledge park and research clusters are used as spatial platforms to drive local development. Another focus is on supporting local micro and small businesses. By providing support services, access to finance, and training opportunities, this strategy enables local businesses to grow, create employment opportunities, and contribute to the economic vitality of Dukem and Debre Zeyit.

Fostering Collaboration and Partnerships: This strategy involves fostering collaboration between government agencies, private sector entities, academia, and local communities. Promoting dialogue, knowledge sharing, and joint decision-making, facilitates the alignment of interests, pooling of resources, and collective action towards shared goals. A new model of cooperation between Ethiopia and foreign partners could enhance the effectiveness of initiatives, leverage expertise, and create synergies that drive sustainable development.

Overall, these strategies are cross-scale and centered around the Eastern Industry Zone, so focusing only on the industrial park and its impact on the towns. So they don't cover everything. This is also as mentioned at the beginning of this project, this study does not aim to promote the comprehensive development of the region using just one industrial park, which is not possible. This study aims to use the industrial park as an active medium to intervene from small points or small sides to explore how to stimulate a more active role of the foreign-invested co-built industrial park in the interaction with the local cities.

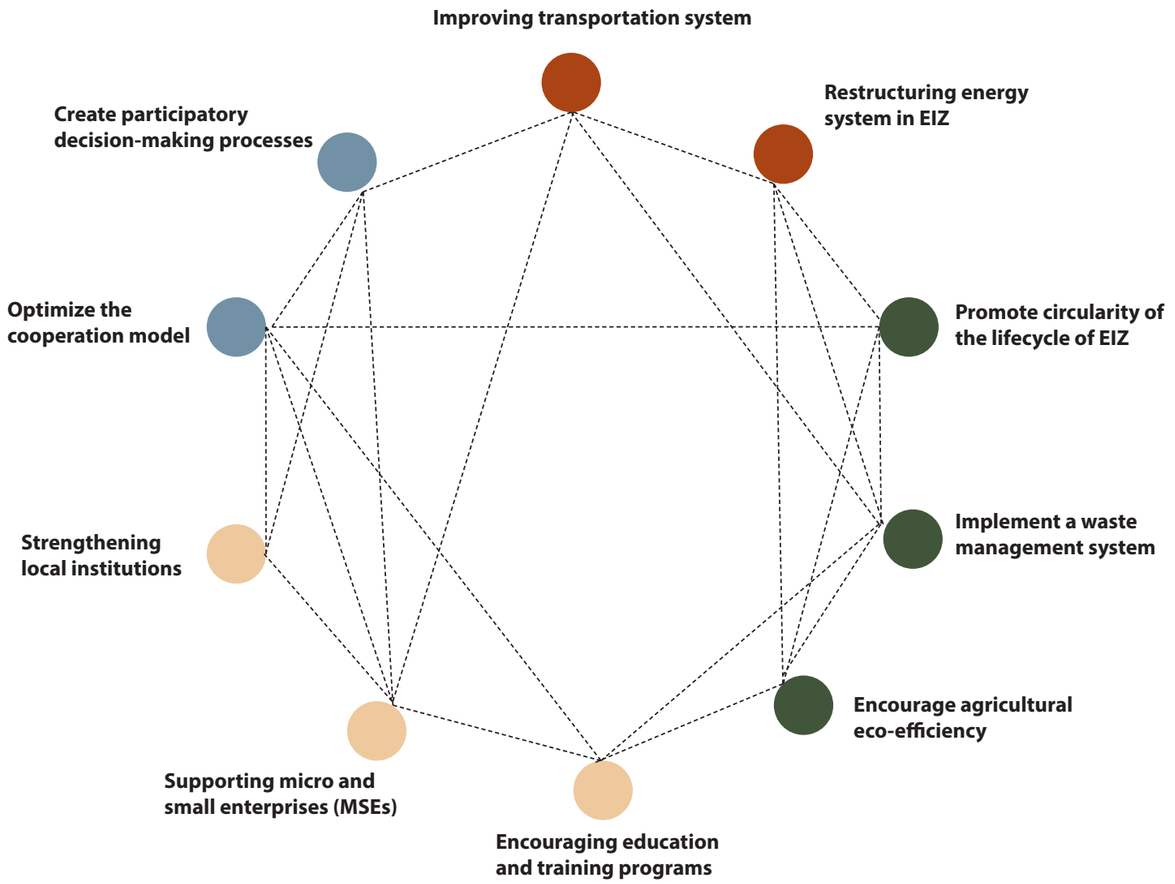


Figure 169: Diagram of connections among actions
Source: Author, 2023

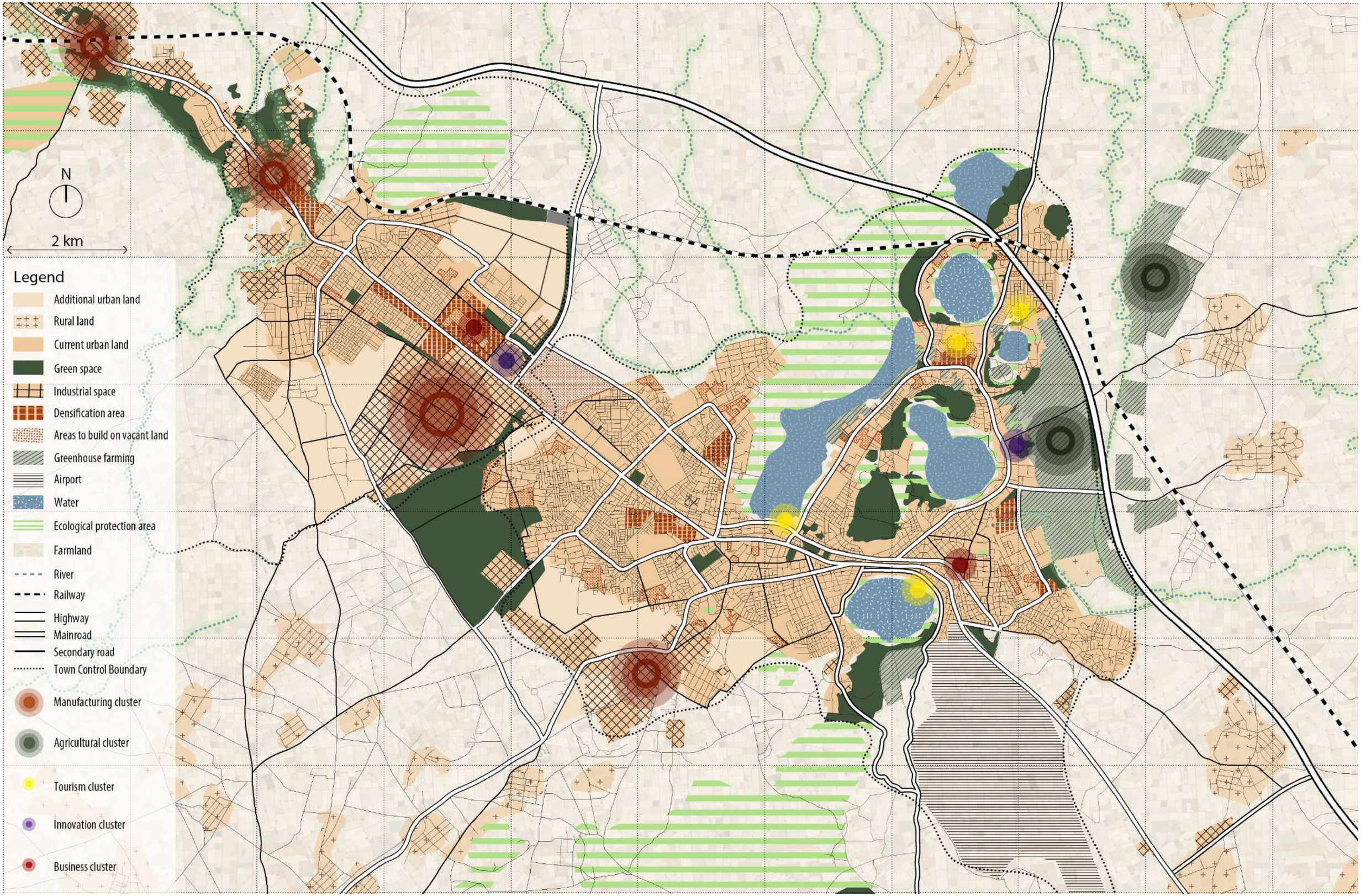


Figure 170: Master plan
Source: Author, 2023

6.6 Phasing

6.6.1 The Incremental Approach

"Incrementalism is a strategy that acknowledges that we cannot deal with the all complexities that ought to be addressed in a once-off, rational comprehensive policy intervention." (G. Hitge & E. V. Dijk, 2012)

The incremental approach was adopted by G. Hitge & E. V. Dijk to explore implementation process of investing in BRT projects in South Africa. They found that this could reduce some of the risks inherent in major interventions, and offer opportunities to gradually implement supporting policies.

Drawing on this case, in this project, the use of an incremental approach in implementing the strategies is proposed. It could offer several benefits, such as resource optimization, risk mitigation, demonstrable progress, etc. This is a more practical approach chosen based on the reality that the Ethiopian government has a limited budget and most investors are conservative-minded. After all, development does not happen overnight, and new risks and challenges in the development process require a more flexible approach.

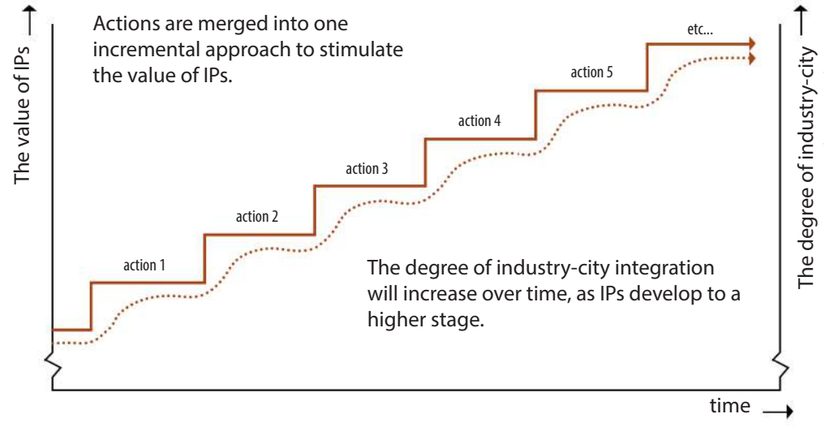


Figure 171: Incremental improvements
Source: G. Hitge & E. V. Dijk, 2012

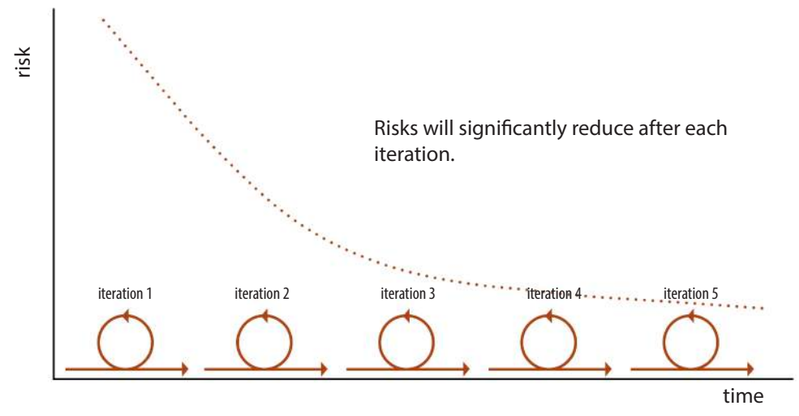


Figure 172: Risk profile-iterative process
Source: Paul Flewelling, 2018

6.6.2 Time Phasing

In this project, the cross-scale strategy can be implemented gradually in four main phases.

2023-2025:
This phase focuses on small-scale improvements, status assessments, establishing communication channels, awareness building, and developing relevant plans and publicizing them. Specifically, it includes conducting comprehensive infrastructure assessments and initiating priority infrastructure improvement projects within and around the EIZ, focusing on transportation and utilities; fostering awareness of the circular economy in communities and companies; planning local capacity-building programs; establishing collaborative platforms and engaging stakeholders through consultations and workshops to initiate partnerships and joint initiatives; assessing current urban services.

2026-2030:
This phase focuses on the initiation of priority or pilot projects, program adjustments based on public input from the previous phase, and the initiation of partial programs. In terms of infrastructure development, continue to improve projects, expand and upgrade the network; select the first companies to start piloting circular economy practices and initiate the construction of waste treatment centers in the second phase; initiate the construction of knowledge parks and incubation programs and expand support for local companies in conjunction with policy adjustments; further strengthen the construction of networks for knowledge sharing and innovation; initiate the regional development of pilot projects.

2031-2035:
In this phase, a comprehensive and systematic assessment of the results of all previously implemented actions is first conducted, reflected upon, and made public through public meetings and digital platforms. Based on the evaluation results, adjustments of measures, optimization of policies, etc. are carried out. Then in terms of infrastructure development, consolidate and optimize the infrastructure improvements made in the earlier phases; embed circular economy principles as standard practices across industries, and continue to encourage resource efficiency and sustainable production methods; continue to promote innovation, competitiveness, and value-added activities among local companies and foreign companies; institutionalize collaboration mechanisms and public-private partnerships to ensure sustained cooperation and collective action; continue to enhance social infrastructure, public services, and community engagement.

2036-2050:
At this stage, local capacity should be sufficient to deal with changes in the international political environment, fluctuations in economic markets, etc. Infrastructure development, human resource building, sustainable development, international cooperation and partnership building, etc. should be at a higher level. And there are also still some actions that need to be continued. The first is to focus on maintaining and upgrading existing infrastructure to meet the evolving needs of the EIZ and its surrounding areas. And explore new opportunities for waste reduction, recycling, and renewable energy generation. Further support local businesses to achieve long-term sustainability and competitiveness. Besides, due to the continuous integration of industry and city, the action plan can be more oriented to the city's needs during this phase.

This time phasing provides a general framework for the implementation of strategies over the specified time periods. However, it's important to adapt and adjust the timelines based on local conditions, resources, and the pace of progress. Regular monitoring, evaluation, and adaptive management should be undertaken.

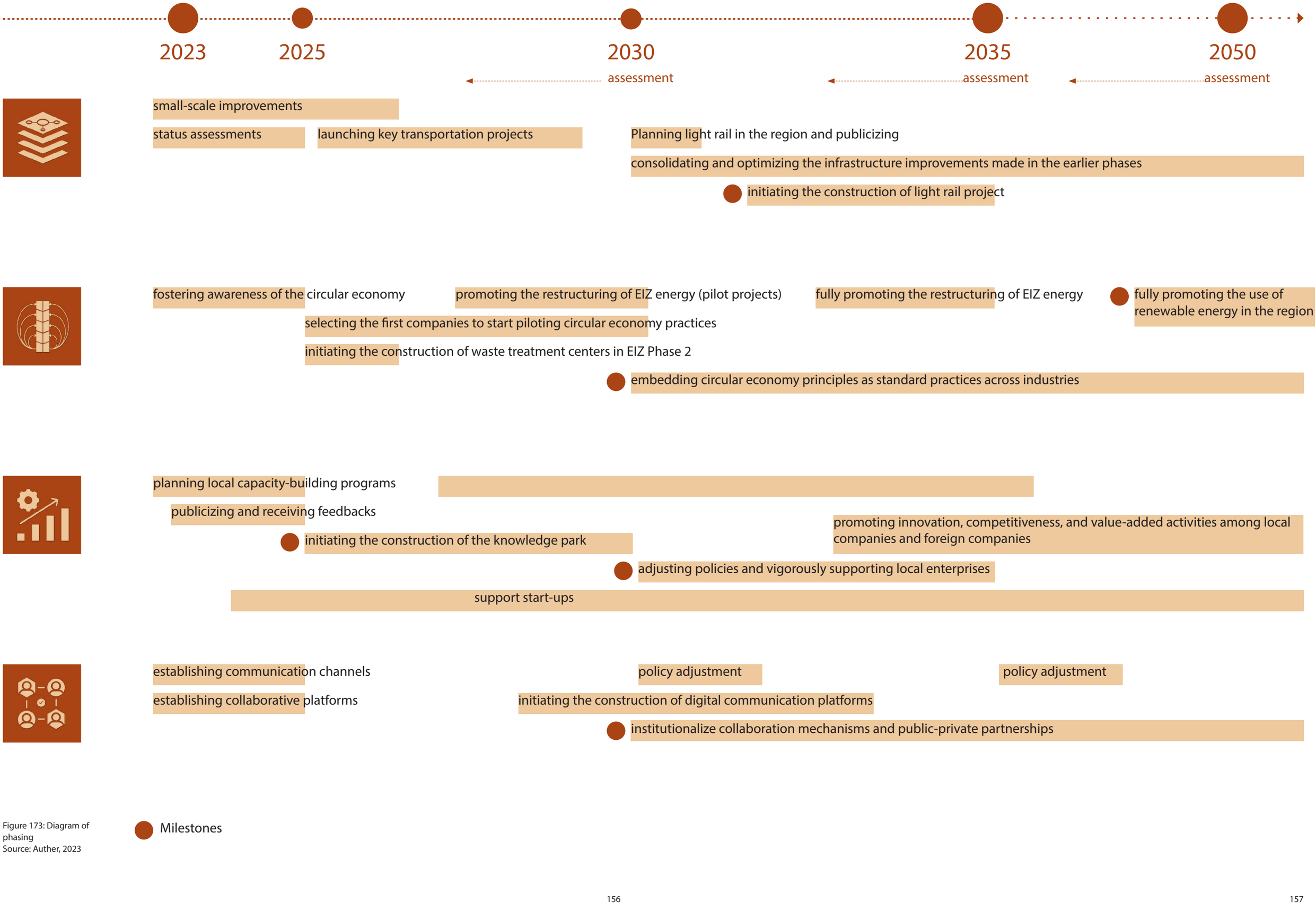


Figure 173: Diagram of phasing
Source: Auther, 2023

6.6.3 Assessment Framework

Here is some key considerations for a comprehensive assessment of progress, outcomes, and impacts in the implementation of strategic action plans:

① Set Clear and Measurable Goals: Define measurable goals for strategies, and specify indicators to track progress. Goals may encompass infrastructure development, circular economy adoption, local business growth, collaboration, and community development.

② Monitor Key Performance Indicators (KPIs): Define relevant KPIs to monitor the implementation of actiwons. These may include metrics such as the number of infrastructure projects completed, waste reduction rates, employment generated by local businesses, the number of collaboration initiatives established, and community satisfaction surveys.

③ Data Collection and Analysis: Collect data on an ongoing basis to assess the implementation progress. Create a relevant database at the beginning. Data sources can include project reports, surveys, interviews, financial records, and other relevant sources. Analyze the data to identify trends, patterns, and areas for improvement.

④ Stakeholder Engagement: Involve stakeholders in the evaluation process by seeking their feedback and perspectives through interviews and surveys. Conduct consultations, focus groups, and interviews with representatives from government agencies, private sector entities, academia, local communities, and other stakeholders. Their insights can provide valuable information on the effectiveness and impact of the strategies.

⑤ Reporting and Communication: Prepare comprehensive evaluation reports summarizing the findings, conclusions, and recommendations. Share the reports with relevant stakeholders, including government authorities, funding agencies, and the public. Effective communication of evaluation results helps build transparency, accountability, and support for the ongoing revitalization efforts.

Figure 174: Ethiopia weaving pattern
Source: www.pinterest.com/pin/534591418238463954/

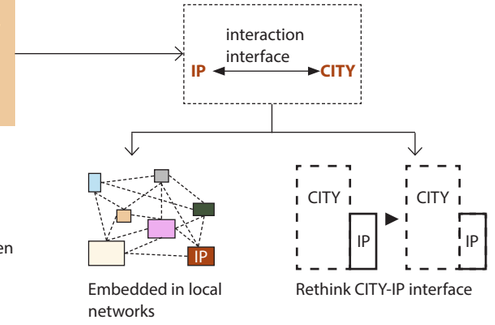
07 DESIGN TEST

7.1 Selection of Pilot Projects

Reviewing the research questions, it is clear that an industrial park, if it is to play an active role as a medium, needs to interact with the local city in different aspects and influence people's experience through the diverse interface. (*Figure 178*) Its integration with the city will occur at different levels of spatial scales. In the last chapter, four cross-scale strategies are proposed, focusing on interventions placed in Dukem-Debre Zeyit region at macro and meso scales. And in this chapter, more specific design guidelines will be presented, based on the local industrial cluster on the west side of Dukem and the second phase of the Eastern Industry Zone. The former is entirely an industrial cluster formed by the spontaneous gathering of micro and small local enterprises (mainly in the manufacturing industry) without any planning by the local government. (In fact, since Dukem is a relatively new small town in recent years, no official spatial plans or schemes have been proposed.) As for the latter, as can be seen from *Figure 180*, the first phase of the EIZ has been fully constructed. The second phase is the expansion of the industrial park to the south, and only part of the roads have been built so far.

RQ

How to exploit external opportunities in Ethiopia, taking Eastern Industry Zone as the medium, to achieve regional vitalization?



Embedded in local networks

Rethink CITY-IP interface

Figure 175: Linkage between design and the research question
Source: Auther, 2023

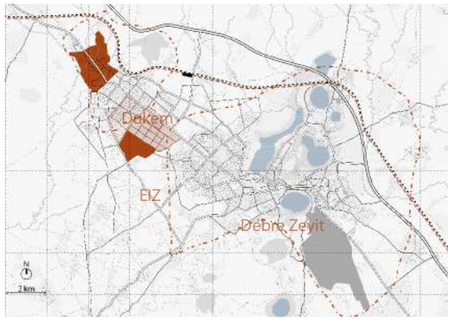


Figure 176: Location of pilot projects
Source: Auther, 2023

On the official website of the Eastern Industry Zone, there is a planning map before the construction of the first phase of the industrial park. By comparison, it can be seen that the actual construction of Phase I is almost consistent with the planning. However, in this project, after the previous research and analysis, this kind of industrial park planning approach which only considers internal investment and production without considering the future integration of the industrial park into the local economic and social network is negative, and not conducive to the endogenous development of the local area, and will lead foreign countries to continue to build the so-called enclaves in Ethiopia. Although *Figure 181* shows that the spatial layout of the Industrial Park Phase 2 has been planned, it was proposed around 2009 and has not been flexibly updated with the development of the Industrial Park over the past decade. And with the completion of Phase 1, it is a good time to reflect on the planning approach of the EIZ.

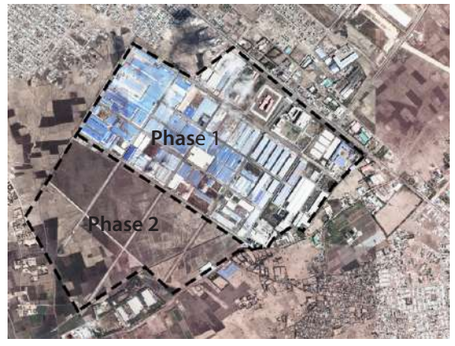


Figure 177: Satellite image of Eastern Industry Zone
Source: Google Map, 2023

Figure 178: Planning layout of Eastern Industry Zone Phase 2
Source: www.e-eiz.com/planning.php?lg=en, 2023

Therefore, in this project, the design guidelines will be re-proposed based on the space of the Eastern Industry Zone Phase 2, and the five cross-scale strategies proposed previously will be applied more specifically. This can also serve as an important reference for the planning and construction of other similar foreign-invested industrial parks in Ethiopia, even in other African countries in the future.

As can be seen from *Figure 182*, in this project, spatial and activity analysis will be conducted starting from the small industrial cluster (pilot project 1) in Dukem. Combining case studies from Addis Ababa and Foshan, China, and previous strategic action plans, three bottom-up patterns - mixing of programs, the use of public space, the transition of industrial space to community space - will be summarized, and design guidelines on designing mixed, inclusive, and safe industrial communities will be proposed. The guidelines will be then applied to the new planning and design of the second phase of the Eastern Industry Zone (pilot project 2). Finally, the design results are then combined with a reflection on pilot project 1 and the strategic action plans.

As for the reasons for the selection of the two cases, there are 3 reasons: firstly, from the spatial scale and industrial characteristics, there are manufacturing clusters similar in scale to Dukem Industrial Cluster and EIZ in both Addis Ababa and Foshan, China. Secondly, since this project mainly focuses on the cooperation between Ethiopia and China on industrial development, it is reasonable to choose cases from Foshan, a typical manufacturing city in China and the capital of Ethiopia. Both cases are bottom-up clusters formed under similar government-led circumstances, which is consistent with the theme of this project - "The Power of Imperfection". Moreover, these two cases show well how the independent industrial space can interact and integrate with the urban space, which can provide a valuable reference for the design guidelines in this project.

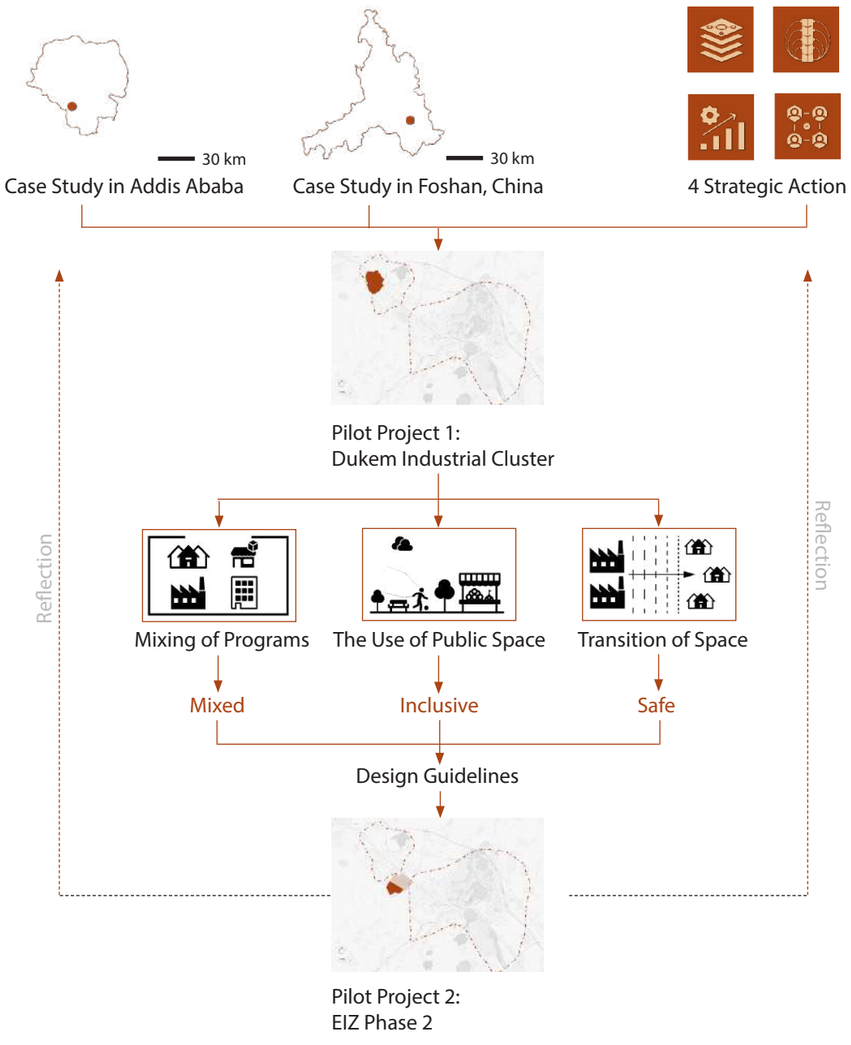


Figure 179: Framework of design test part
Source: Author, 2023

Case Study - Addis Ababa Industrial Cluster

Mixed Land Use
Industrial and manufacturing facilities are often integrated with commercial and service-oriented establishments within the same vicinity. This integration allows for efficient use of space and facilitates the flow of goods and services. For instance, factories may coexist with wholesale markets, warehouses, and related businesses, creating a symbiotic relationship within the cluster.

The Use of Public Space
The cluster management and local authorities ensure that public spaces such as parks, plazas, and pedestrian areas are well-maintained and accessible to workers, residents, and visitors. These public spaces serve as gathering spots, recreational areas, and venues for community events, fostering a sense of belonging and enhancing the social fabric of the cluster.

The buffer between Production Space and Residential Areas
Buffer zones include green spaces, landscaping, and soundproofing measures to minimize noise and pollution. This spatial arrangement helps create a harmonious coexistence between industrial and residential areas, ensuring a conducive living environment for nearby residents.

Figure 180: Photos of Addis Ababa Industrial cluster
Source: www.worldbank.org

Figure 181: Satellite image of Addis Ababa Industrial cluster
Source: Google Map, 2023

Case Study - Foshan Shunde Industrial Cluster

Mixed Land Use
Within the cluster, industrial facilities coexist with commercial enterprises, research and development centers, logistics hubs, and service-oriented businesses. This integration allows for efficient supply chains, knowledge exchange, and collaboration between companies, enhancing productivity and competitiveness.

The Use of Public Space
The local cluster emphasizes the importance of public spaces in creating a vibrant and cohesive community. These public spaces serve as recreational areas for workers and residents, venues for social gatherings and events, and platforms for cultural activities.

The buffer between Production Space and Residential Areas
As the cluster is connected to rural areas, the farmland becomes the main buffer area that isolates noise, but care must be taken not to lay it out with production activities that generate water pollution, otherwise food security issues will arise. The farmland also acts as a control boundary for industrial land, limiting the endless spread of local industry.

Figure 182: Photos of Foshan Industrial cluster
Source: Google Map Photo, 2023

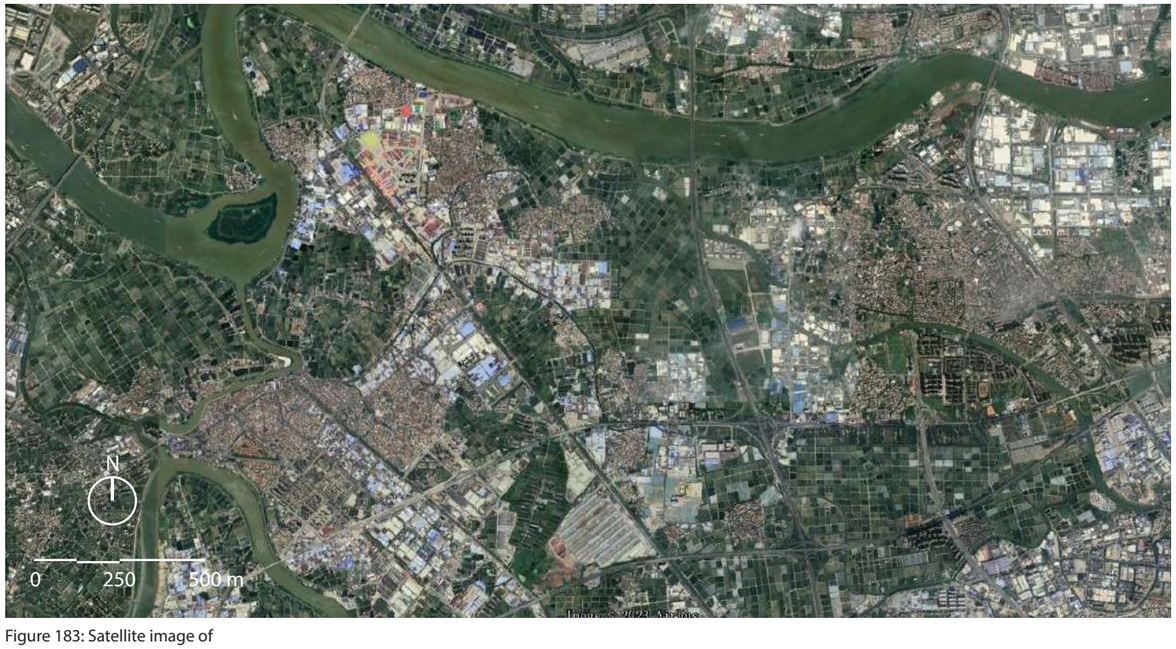


Figure 183: Satellite image of Foshan Industrial cluster
Source: Google Map, 2023

7.2 Analysis of Local Industrial Community

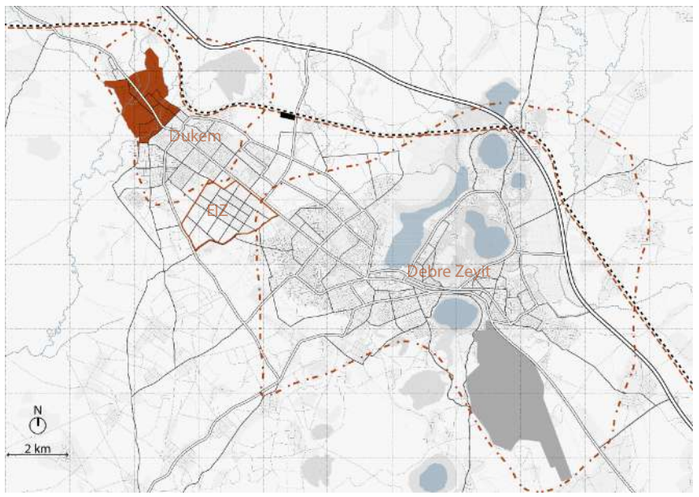


Figure 184: Location of local industrial community in Dukem
Source: Author, 2023

Legend
Dukem Industrial Cluster
EIZ

There is currently a spontaneous local industrial community of about 330 ha on the west side of Dukem. The companies in this community are mainly micro or small manufacturing companies. Here, there is no clear boundary between production and life, and all kinds of activities are intertwined. The social and spatial interaction process around this community is a typical example of the bottom-up approach in the Dukem-Debre Zeyit area. And the analysis of its spatial elements, activities, and stakeholders can make important guidance for the proposed design guidelines.

Figure 185: Satellite image of local industrial community in Dukem
Source: Google Map, 2023

Some Typical Spatial Elements Based on Observation:

Architectural Elements

Facade

Canopy

Urban Elements

Streetscape

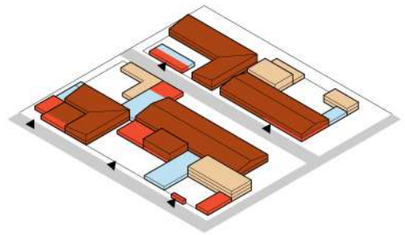
Open Space

Figure 186: Photos of spatial elements in/around local industrial community in Dukem
Source: Google Map Photo/ Photoed by Nan Ma, 2023

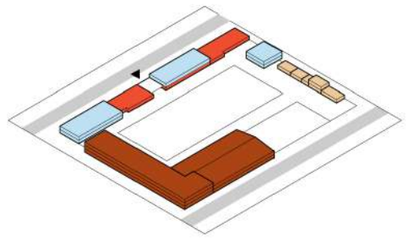
Mixing of programs

Legend

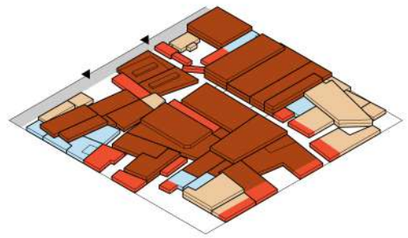
- Production Space
- Office Space
- Retail Space
- Living Space



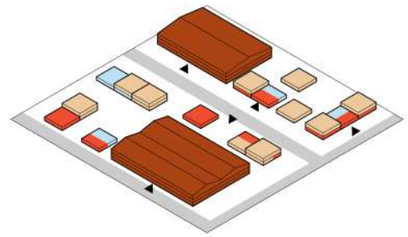
Yard (a)



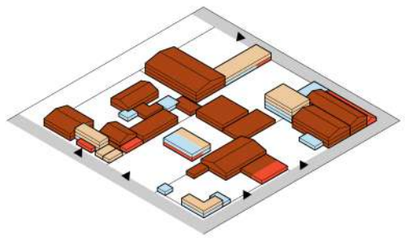
Enclosed (a)



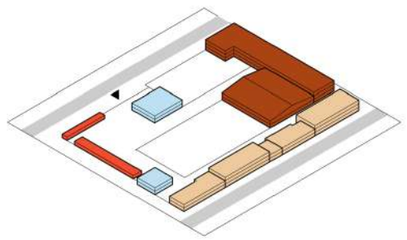
Block Composition



Detached

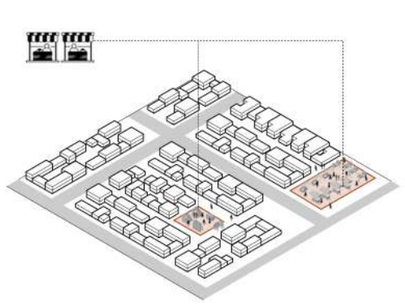


Yard (b)

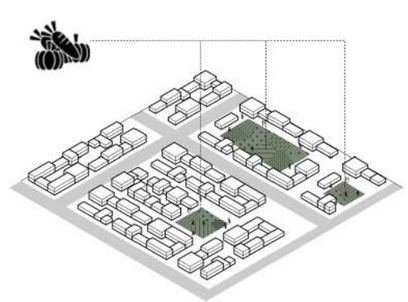


Enclosed (b)

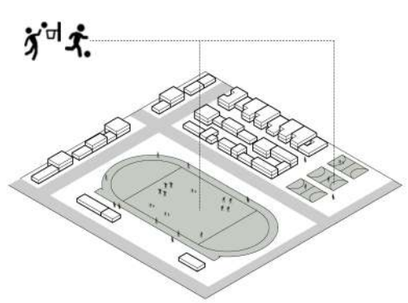
The use of public space



Market

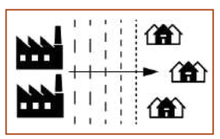


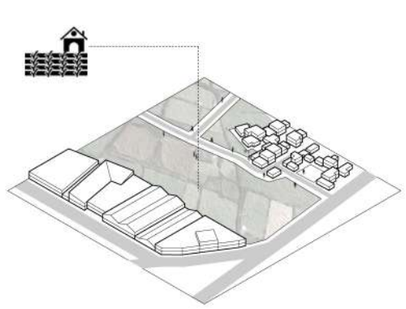
Vegetable Field



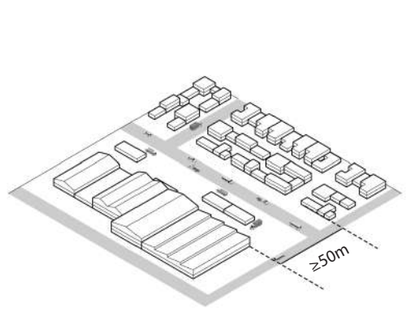
Sports Field

Transition of space

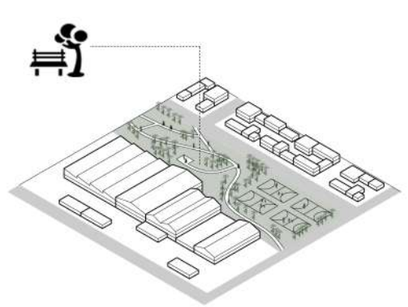




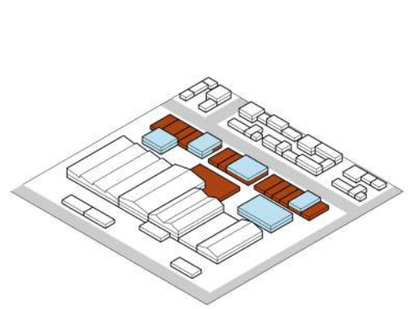
Crop Field



Road



Park/Sports Field



Retail/Office Buildings

Figure 187: Diagrams of three spatial patterns
Source: Author, 2023

7.2.2 Three Bottom-up Spatial Patterns

To design a more mixed, inclusive, and safe industrial community, three spatial patterns can be considered. (*Figure 190*)

Firstly, the integration of diverse programs within the community, such as residential, commercial, recreational, and educational facilities should be encouraged. The combination of production space and other functional spaces can meet the diverse needs of people on a daily basis. Thus, the community becomes more vibrant and fosters interaction among various user groups. This promotes inclusivity and creates opportunities for social and economic exchanges.

Next, attractive public spaces are often not adequately designed, but rather give citizens a certain freedom to use them in a variety of ways. Therefore, it is important to ensure the accessibility of public spaces of multiple scales and types. They can include parks, plazas, vegetable fields, pedestrian-friendly streets, sports fields etc. These spaces serve as gathering points for residents, workers, and visitors, facilitating social interaction and enhancing the overall livability of the community.

Then a smooth transition is needed between different types of spaces. This involves carefully designing the interface between industrial zones and other areas to ensure compatibility and minimize negative impacts. It is crucial to create buffer zones, green areas, or transitional spaces that help mitigate noise, pollution, and other potential conflicts. This approach contributes to the security and well-being of the community.

7.2.3 Activities, Corresponding Spaces, and Stakeholders

Table 18 shows the different types of activities, corresponding spaces (including some planned) and stakeholders in this local industrial community in Dukem.

Activities	Corresponding Spaces	Stakeholders
Manufacturing and Production Activities	Industrial factories, production facilities, warehouses, and assembly lines	Factory owners, workers, production managers, maintenance personnel
Research Activities	Research and development labs, innovation centers, and testing facilities	Researchers, engineers, technicians, and product developers
Training and Skill Development Activities	Training centers, vocational schools, and skill development institutes	Trainers, instructors, trainees, and educational institutions
Business and Commercial Activities	Office buildings, showrooms, open markets	Business owners, entrepreneurs, salespersons, and customers
Logistics and Supply Chain Activities	Warehouses, distribution centers, transportation networks, loading and unloading area	Warehouse staff, truck drivers, and suppliers
Community Services and Amenities	Residential areas, healthcare centers, schools, parks, and community centers	Residents, healthcare professionals, teachers, and community organizers
Government and Regulatory Activities	Government offices, regulatory agencies, and permit processing centers	Local government officials, regulatory authorities, and legal advisors

Table 18: Activities, corresponding spaces, and stakeholders
Source: Author, 2023

Figure 188: Mood board of different activities
Source: afktravel.com/
www.catholicnewsagency.com/
www.actaonline.org/

7.2.4 Design Guidelines for Industrial Community

Objectives	Design Guidelines	Details
Mixed	**Compatible design of blocks and programs**	Set up relevant rules for blocks and programs to ensure a certain degree of openness. Plan the layout to facilitate efficient circulation of goods, services, and people, while minimizing conflicts and congestion.
	Transformation from a single production building to a multifunctional production complex	Design flexible and adaptable spaces to accommodate different types of industries and activities. Provide shared amenities and resources, such as shared utility infrastructure, common areas for collaboration, and flexible spaces that can be easily reconfigured to meet evolving needs.
Inclusive	**Diversified streetscape experience**	Incorporate landscaping, street furniture, public art, and pedestrian-friendly features to offer a diverse and visually appealing experience. Consider incorporating green spaces, trees, and vegetation along streets.
	Integration of open space and amenities at human scale	Integrate open spaces, such as parks, plazas, and courtyards, within the industrial community. These areas should be designed at a human scale, and including amenities such as seating areas, walking paths, outdoor fitness facilities, and playgrounds to cater to the needs of both workers and residents.
Safe	**Active and flexible buffer areas**	These areas can serve as transitional spaces that help mitigate noise, pollution, and other potential conflicts. Incorporate landscaping to create pleasant buffer zones while allowing for adaptability and future expansion.
	Safe and sustainable production	This includes incorporating proper ventilation systems, fire safety measures, and ergonomic considerations for worker well-being. Integrate sustainable practices, such as energy-efficient lighting, and waste management systems to minimize the environmental impact of industrial operations.

Application in the design of Phase II of the EIZ

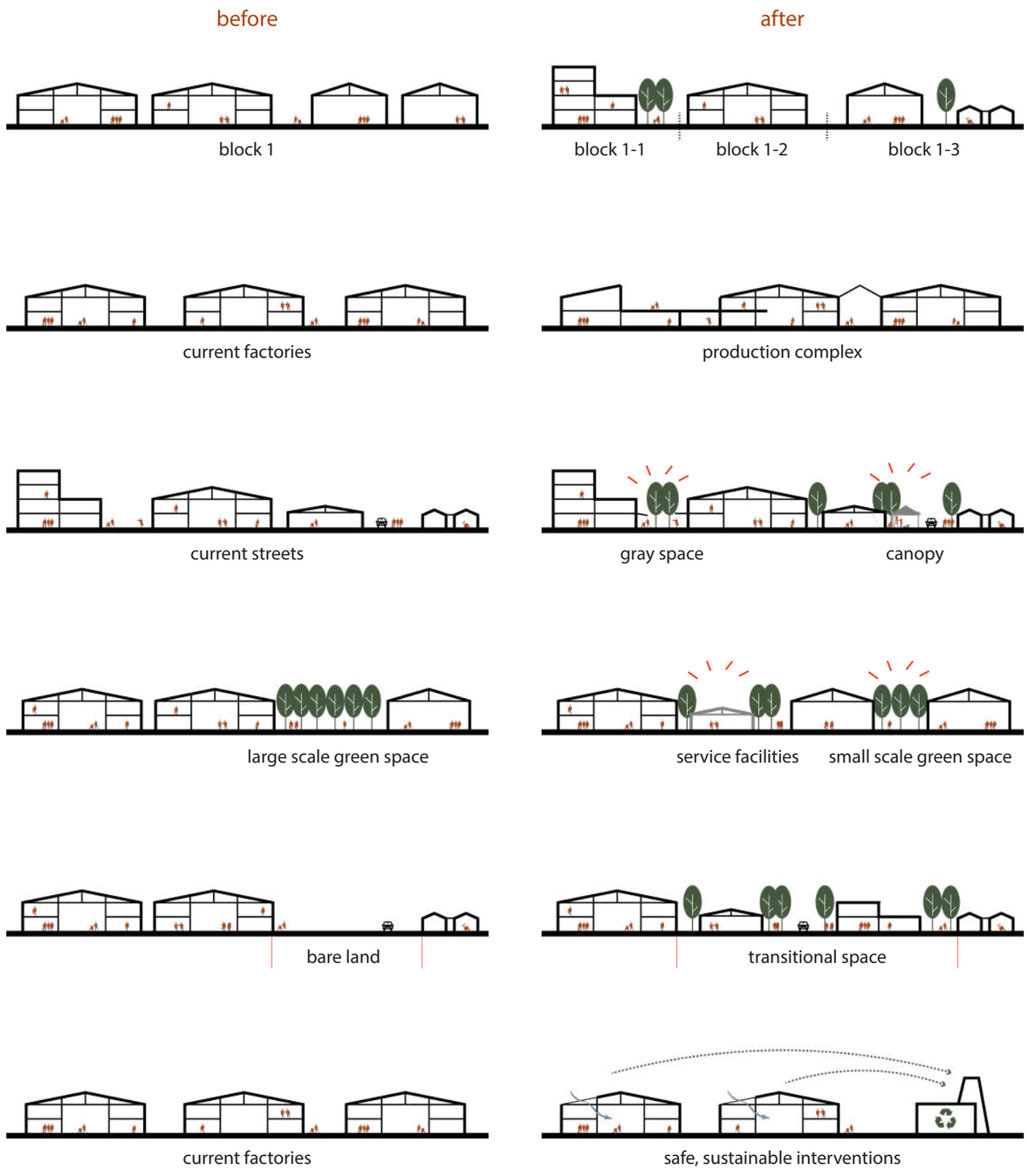


Figure 189: Diagrams of application of design guidelines
Source: Author, 2023

7.3 Design of The Industrial Community

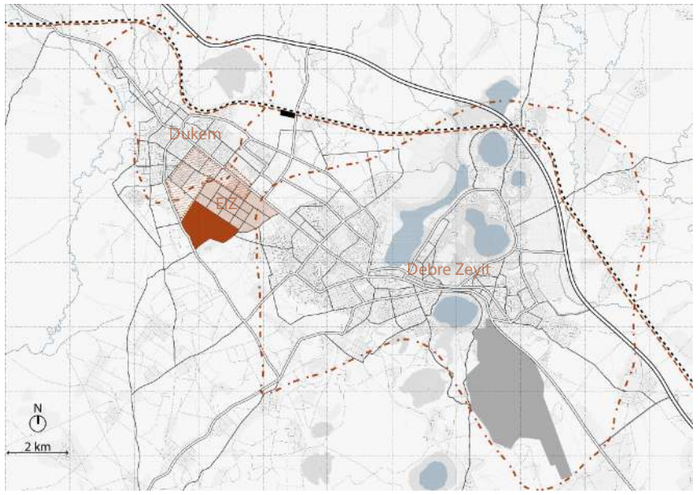


Figure 190: Location of Phase 2 of EIZ
Source: Author, 2023

Through the previous analysis, it is foreseen that the construction of the second phase of the Eastern Industry Zone will be accompanied by rapid town expansion. Therefore, how to design smooth and inclusive vibrant transitional spaces between the living and production areas, not only within the industrial park but also around the industrial park, will be the core of the design testing part of this study to explore. So two blocks are selected to test detailed design guidelines. One is the planned new living area in Phase Two of EIZ, and another is the block between current communities and west side of Phase One of EIZ. (*Figure 194*)

Figure 191: Location of two blocks
Source: Google Map, 2023

Figure 192: Analysis of boundary and road system
Source: Author, 2023

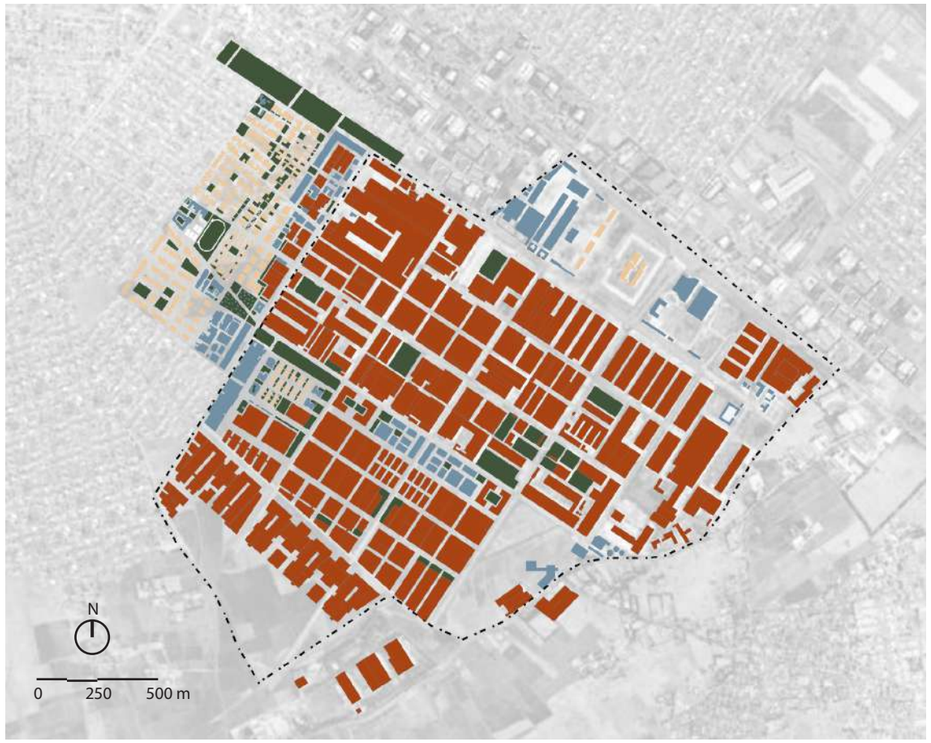


Figure 193: Functional zoning
Source: Author, 2023

Figure 194: Plan of Phase 2 and the surrounding area
Source: Author, 2023

Legend

- Current Green Space
- Planned Green Space
- Current Buildings
- New Buildings
- Reserved Land

Here is the overall design plan for the second phase of the EIZ, as well as the transitional space on the western part of the industrial park. More details are in the two selected blocks. New programs combined with new spatial forms are laid out in the site, considering both the interface with the spatial layout of Phase I and the transition to the local community as the town expands. Considering the direction of the town's expansion and this technical boundary to the east of the industrial park (where the power supply station, the sewage treatment station and the new waste recycling center are arranged), part of the southwest side of the site is used as reserved land to meet the needs of the future dynamic development of the industrial park.

The layout of Phase Two applies the previously proposed design guidelines to transition between industrial space and living space through the placement of retail, office, education and other shared programs; at the same time, both the building volume and the scale of open space are smaller and more human-scale than in Phase One. New communication-enhancing activities will take place here: people from different backgrounds can work, live, eat together, grow vegetables, play sports, etc., so that the industrial park can become vibrant. Green space will continue from the surrounding city into the park, and similarly, mixed office and retail will be located inside and outside the park. Exhibition spaces and education and vocational spaces can be shared, and individuals, companies or organizations that need them can use them if they apply and make reservations through a streamlined process.

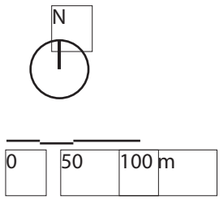


Figure 195: Detailed plan of living area in Phase 2 of EIZ
Source: Author, 2023

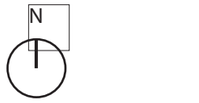
Figure 196: Axonometric
Source: Author, 2023

Figure 197: Streetscape
Source: Author, 2023

On one side of this wide street are the factories already built in the first phase of the industrial park. In the future, the functions of these factories will become more complex, and as the industries are upgraded, office and test functions will be placed. New sustainable measures such as the installation of solar panels on the roof and measures to improve internal air circulation will also be applied. On the other side, there is a buffered green space that combines a walkway and a sports field to become a place for people to rest and play outdoors in the future.

Figure 198: Public space
Source: Author, 2023

The new public spaces can be designed to be more functional and to facilitate interaction between people from different backgrounds. The inclusion of features such as vegetable plots and sports fields will allow people to interact more in their daily lives. This is a great opportunity for different groups of people to act for the same small things.



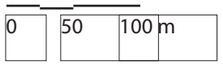


Figure 199: Detailed plan of the transitional area
Source: Author, 2023

Figure 200: Axonometric
Source: Author, 2023

Figure 201: Streetscape
Source: Author, 2023

The local market is located on the same block as a small mixed office and retail space. The market space is very flexible and regularly sells local specialties and can be used temporarily as an open-air exhibition space when needed. The streets are at human scale and the road width is appropriate for the main local transport-bajajs.

In the future, office space in cities will be more flexible and diverse, and able to be mixed with other functions such as retail, training, and public services. This applies to local policies for the development of micro and small businesses.

Figure 202: Streetscape
Source: Author, 2023

The gray space on the street is an important place to promote people's interaction, and combined with the design of the green space on the street, the street will also have a composite function - access and recreation.

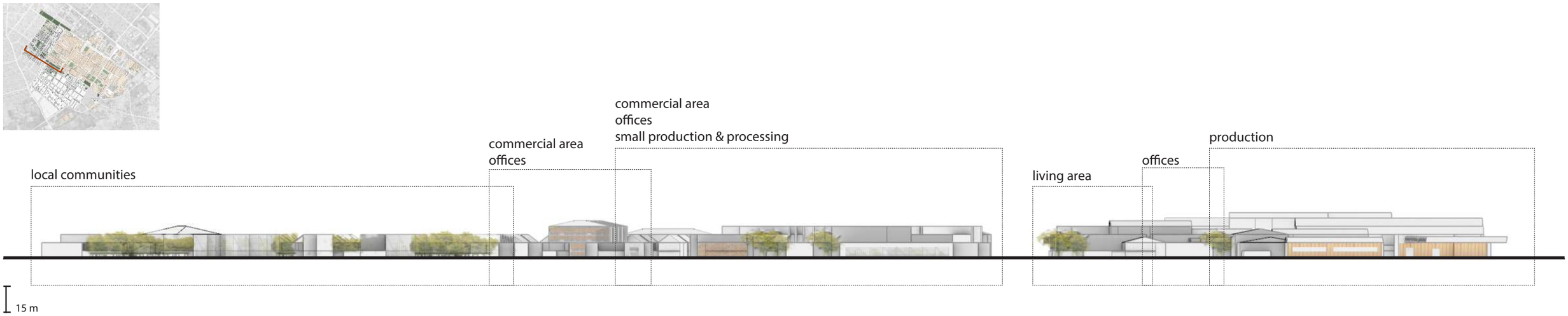


Figure 203: Section A-A
Source: Author, 2023

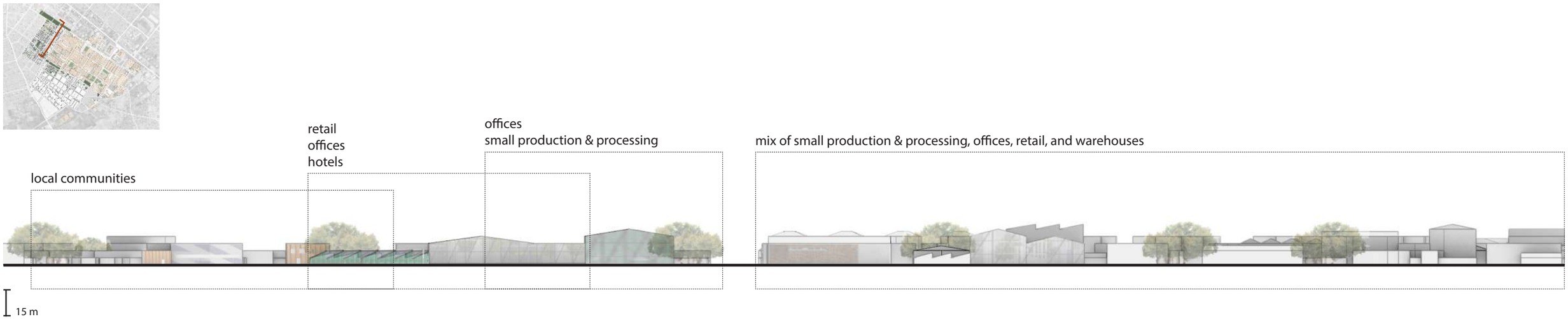


Figure 204: Section B-B
Source: Author, 2023

Phasing

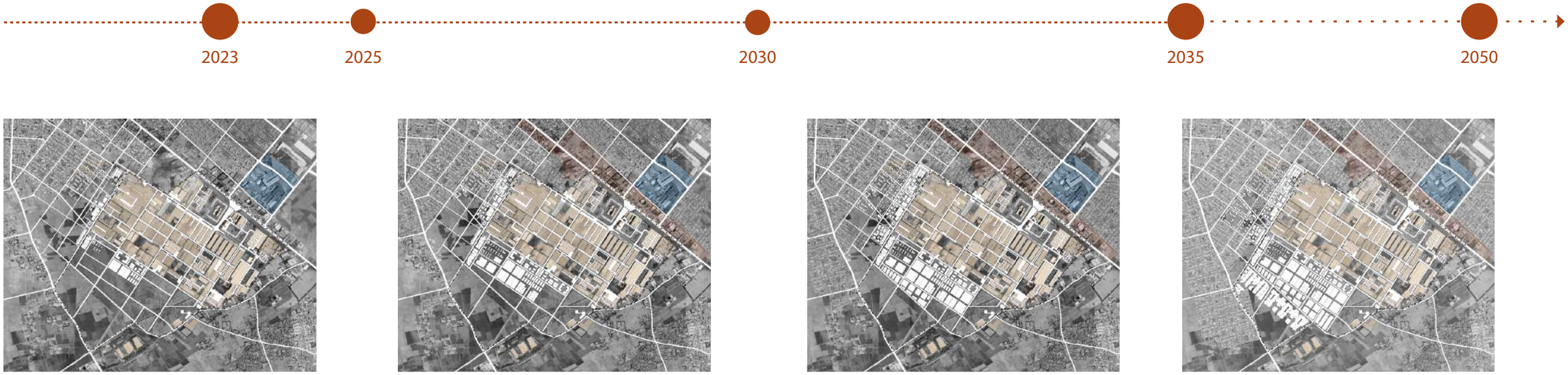


Figure 205: Phasing
Source: Author, 2023

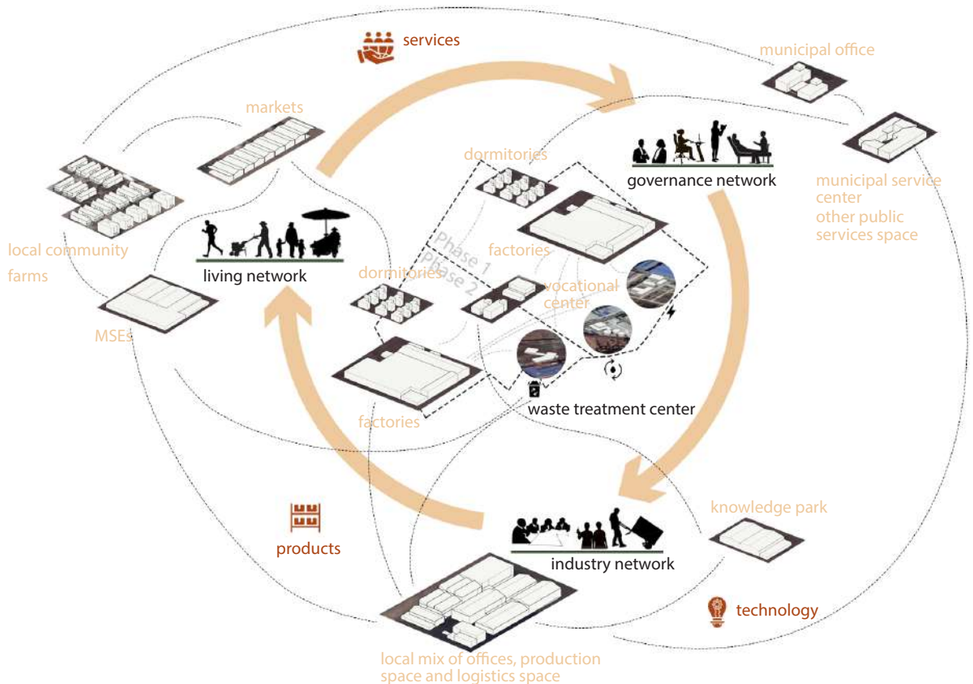
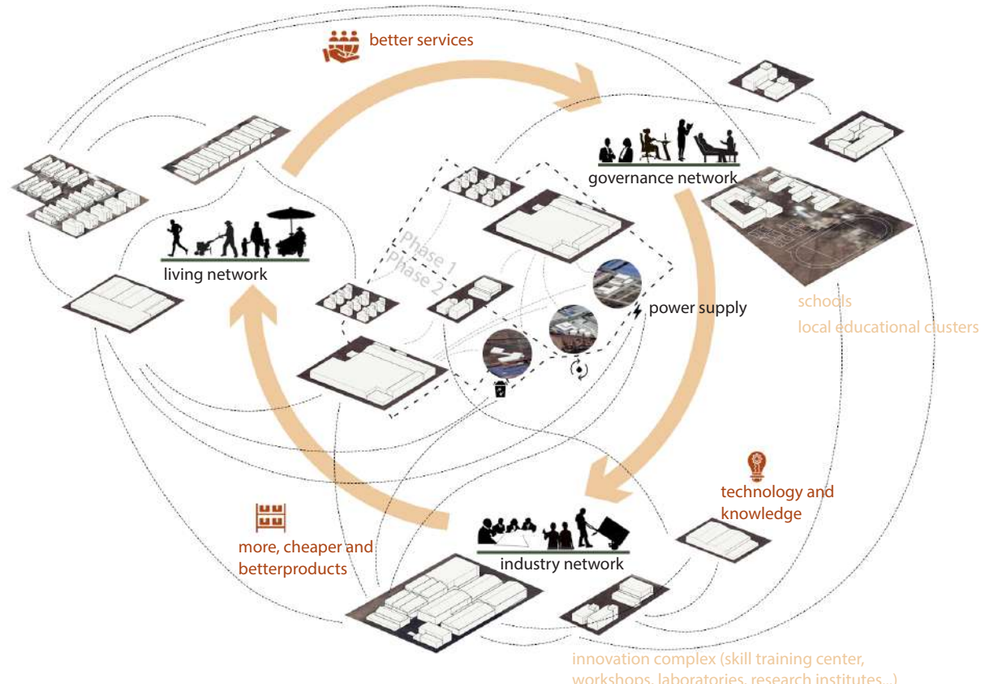


Figure 206: Phasing
Source: Author, 2023

From now until 2030, the development of the industrial park will mainly revolve around the construction of Phase II and the upgrade of Phase I. At the same time, the connection between the industrial park and the surrounding cities, especially in terms of infrastructure, is the focus of development. With the combination of policy adjustment and spatial design, local enterprises and businesses will gradually gather to the west of the industrial park, forming a transition not only between the local community and the industrial park, but also uniting the enterprises within the industrial park to gradually improve the local production and sales network. During this period, in the second phase of the industrial park, the waste treatment center has also been built, which will become an important local key place for the treatment and transformation of production and domestic waste, and the first step towards sustainable development.



Between 2030 and 2050, with local urbanization and industrialization, the most significant change will be the emergence of a more complex and improved knowledge innovation network. Schools, research institutions, knowledge parks, and educational clusters will all be deeply involved. And these changes will be accompanied by changes and upgrades in the types of industries in the industrial parks. At the same time the governance network will be optimized, and the services available to both citizens and immigrants will be more integrated. In addition, the physical boundaries of industrial parks will be further blurred. The industrial park will also provide power to the surrounding area due to the upgrade of the energy system.

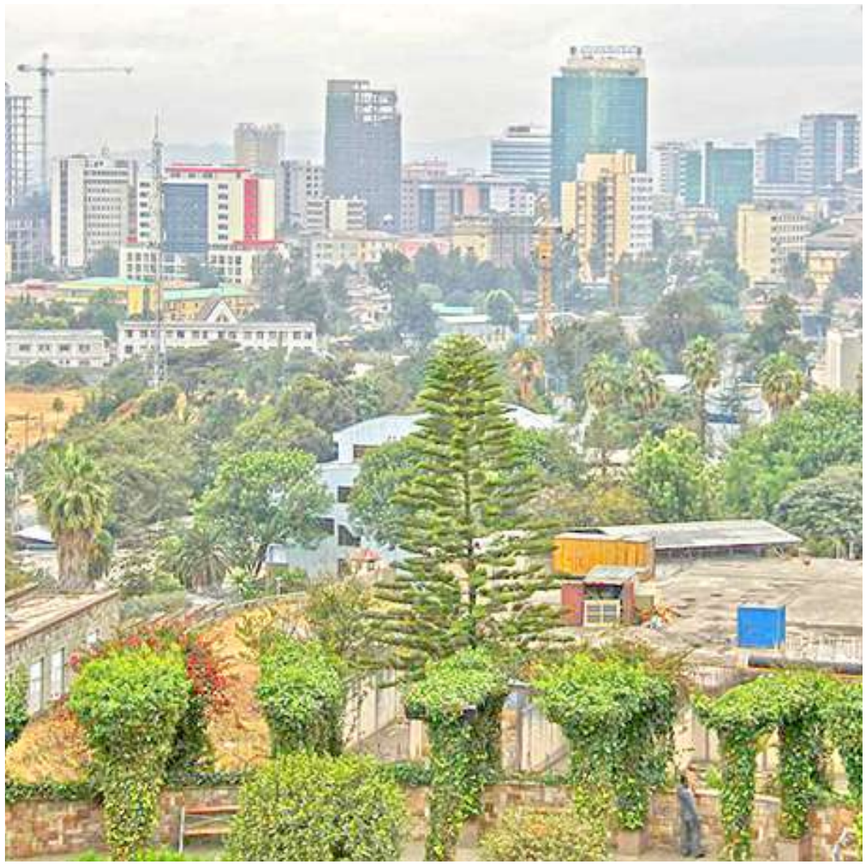


Figure 207: Dream of
Ethiopia's future
Source: Tony Magana, 2022

08 CONCLUSION & REFLECTION

8.1 Conclusion

It has been more than 15 years since Ethiopia advanced its industrial park construction project. During this period, it has experienced from zero experience to gradually accumulating its unique industrial park construction experience, which is closely related to the Ethiopian government's efforts to continuously learn construction experience from other countries, integrate the actual situation of the country, continuously make policy adjustments and build pilot projects. And in this process, China's participation involves not only the construction and operation of Chinese-invested industrial parks in Ethiopia, but also other related infrastructure construction projects. It can be said that the interaction and communication between the two countries in this regard are- very frequent and mutually necessary.

Therefore, this project selects Eastern Industry Zone, a typical Chinese-invested and built comprehensive industrial park in Dukem, Ethiopia, to explore the interaction between its development process and the development of local urbanization, industrialization and related policy systems. Through a series of methods such as surveys, analysis of data, case studies, and comparative analysis, a deep understanding of the operating mechanism of this industrial park and its potential for targeting local vitalization was obtained. The related strategic action plans focus on four aspects: infrastructure development, transition to a circular economy, stimulating endogenous local development, and cooperation and partnership, focusing on the Eastern Industry Zone and its impacts, and proposing different strategies at different scales. Finally about the construction of the second phase of the EIZ and the interaction between the future town expansion and the boundary of the current industrial park, by means of the design test. The related design guidelines can give reference or application to other similar foreign-invested industrial parks' construction in Ethiopia or other African countries.

Local endogenous development and its own economic transformation is in the first place, targeting local vitalization.
For fast-growing regions, such as Dukem-Debre Zeyit area, the industrial park model can be one of the drivers of economic transformation and local development, but only if the industrial park is deeply embedded in an integrated local network in terms of socio-economic, spatial, and governance. This level of embeddedness is across scales, whether at the national and regional levels or at the district and community levels. And while the economic role of industrial parks is usually emphasized by the government, the impact they bring to the local community and physical space, depending on their size, is also something that needs to be taken into account. And as for the role of a foreign-invested industrial park, attracting investments, creating employment opportunities, and stimulating local businesses are its most basic roles. This is its most basic role. Beyond these, the industrial park that can combine local industrial development needs, labor force characteristics, market environment, political system, etc. to achieve comprehensive development is the direction in which this type of multinational industrial park should develop in the future.

The pursuit of sustainable and inclusive growth should be closely intertwined with the pursuit of economic growth, while refraining from adopting short-term growth models.
In this project, some strategies related to sustainable development measures and the transition toward a circular economy are proposed. By promoting a circular economy, adopting renewable energy sources, and implementing environmentally-friendly practices, the project emphasizes the significance of achieving economic growth while minimizing negative environmental impacts. Furthermore, it recognizes the importance of inclusivity, ensuring that the benefits of the project reach all stakeholders and addressing potential social inequalities.

New models of collaboration and partnerships are key to collaborative governance.
This research concludes that involving all relevant stakeholders, including government agencies, private sectors, local communities, and civic society organizations, in decision-making processes and project planning is crucial. At the same time, for special projects such as foreign-invested industrial parks, a cooperation model based on equality and mutual benefit can prevent one party from being too dominant. By fostering collaboration, partnerships, and inclusive dialogue, the project can effectively address concerns, mitigate conflicts, and enhance the overall effectiveness and sustainability of the revitalization efforts. Both parties can not only cooperate in the industry but also share the benefits of knowledge exchange and innovation, thus achieving a win-win situation. By fostering collaboration, partnerships, and inclusive dialogue, the project can effectively address concerns, mitigate conflicts, and enhance the overall effectiveness and sustainability of the vitalization efforts.

8.2 Reflection

Further Recommendations

In this study, the social, economic, political, and cultural interactions between this kind of foreign co-built industrial park, represented by the Eastern Industry Zone, and the host country, the issue is essentially interdisciplinary. Different insights and methodologies from other fields could be combined to contribute to the further study toward a more comprehensive and holistic understanding of the industrial park and its impact. For instance, investment patterns, trade dynamics and the local and regional economic linkages could be examined from economic analysis; the social and cultural implications of the park's establishment and operation could be explored, especially including its impact on local communities, labor relations, gender dynamics, and social inequalities. And from the perspective of urbanism, also in the context of the Ethiopian national context, the study of intermediate cities can be combined with the progressive expansion of the Dukem-Debre Zeyit region around the Eastern Industry Zone, thus providing more valuable research on the linkage between industrial parks and local urbanization.

According to UCLG in 2018, intermediate cities are agglomerations that act as bridges between metropolitan and rural areas, also strategic nodes within urban networks at national or international levels, based on geographic, historical and economic reasons. In Ethiopia, they are an important driver of rapid urbanization, while also providing new opportunities for rural development and structural transformation. (OECD Development Centre, 2020) Although industrial park-based, or special economic zone-based intermediate cities, is a very characteristic type of intermediate city, the actual situation is still very complex and intertwined, and therefore this project does not focus on this direction. However, it is undeniable that the combination of industrial park and intermediate city research will provide new and valuable ideas for local governments and other researchers to think about urban and rural development patterns.

Advantages, Limitations and Challenges

First of all, I think the selection of the case is very critical in this project. As the Eastern Industry Zone is very typical, it is both a very special and important case of industrial park development in Ethiopia, and a very common case (in terms of both spatial layout and economic model) of industrial parks invested by Chinese private developers in African countries. And according to the changes in its surrounding environment on the historical map, it can be clearly demonstrated that the construction of the Eastern Industry Zone is inseparable from the development of the local cities. This laid an important foundation for the subsequent research and design of the interface and interaction between the two sides. Furthermore, by combining literature research with questionnaires and interviews, this project integrates the views, interests and concerns (focusing on the industrial park itself or the impact of the industrial park) of multiple parties, including economic and industrial researchers, spatial planners, policy makers, workers in the EIZ, citizens, etc. This allows me to continuously reflect on my own position in the analysis and design process, and to take into account the positions of others and the contextual reasons for that position in order to propose solutions that answer the research questions from my perspective. The application of the method-research by design, also makes my spatial design not just a plan, but a tool to explore the potential of the site and a means of communication between all stakeholders.

Of course, in the process, I encountered many limitations and challenges. The most difficult part was the accurate data acquisition. Due to data security and related policy restrictions, I had no access to some precise geographic information data, such as the property boundary of the industrial park in Ethiopia, the infrastructure network (especially the electricity supply and water system) in the area where the industrial park is located, etc. In addition, due to the presence of a large number of informal settlements in the region, there is no complete data on buildings, public spaces, public facilities, etc. I relied on Google Maps, Open Street Maps, and field research to analyze and visualize the data. To make this process more reliable, I referred to the official reports of Ethiopia to revise the information obtained from the open maps (especially in Google Maps, there are a lot of errors in the standards of local services and facilities). But another problem arose, most of the reports I was able to find on the official Ethiopian website just had data based on national scales, especially on the economic side. And in my project, I focused on the Dukem-Debre Zeyit region, but trying to collect complete socio-economic, governance data at this scale was particularly challenging. Therefore, I combined official reports with studies by some other researchers (especially some papers written by scholars from Addis Ababa and China after their field research) to analyze and compare them, thus obtaining more realistic and reasonable information. At the same time, I commissioned a friend who was on exchange at Addis Ababa University to help me conduct fieldwork and questionnaires in the Eastern Industry Zone and surrounding towns with a local guide. This was also a very important support for my research.

The Societal Relevance

From the perspective of social relevance, the relations between industrial parks and local communities have gradually become a focus of sociological research. Particularly in East and Southeast Asia, the role of industrial parks is gradually found to shift toward an integrated, hybrid nature as they become more integrated with local communities. In the case of the Singapore-China Industrial Park in Suzhou, China, for example, it is difficult to see giant factories in the area today, but more mixed-use buildings that incorporate business, service and innovation industries. So the development of industrial parks is inevitably intertwined with the social networks in which they are embedded. At the same time, Eastern Industry Zone has a rather special feature - there are a large number of informal settlements and markets around it. The impact of informal activities is also one of the hot issues of sociological research. In this project, the performance of the industrial park will be evaluated not only in terms of economic and employment data, but also in terms of its social impact. This is because based on practical experience, close-knit social communities are a significant factor behind the economic strength and sustainability of industrial clusters. (Pyke, Becattini, & Sengenberger, 1990) To achieve the transition from industry-city separation to industry-city integration, the process of interaction between space and society will be key.

In addition, I believe that this project can serve as a trigger to raise awareness and reflect on the real situation faced by third-world countries in other regions, and to remind people in third-world countries to reflect on whether the current development model is sustainable in the future. My project is just a starting point, but I believe that it is significant in that it has led me to rethink justice, development, institutions, top-down versus bottom-up, etc. The reason why this topic is so controversial is that most people have previously developed stereotypes about these regions, ignoring the fact that the actual situation is different from region to region, and that often times the solution strategies are proposed but not practiced. So I think an incremental approach and iterative design process can be the direction to explore in order to promote real practical local vitalization.

The Scientific Relevance

From the scientific framework, research on industrial parks is usually conducted from the perspectives of industrial economics, industrial ecology, circular economy, and community integration. Especially in developing countries, the number of industrial parks has exploded since the 1990s, while the number of co-located industrial parks has also gradually increased, facilitating transnational cooperation. Since China proposed the Belt and Road Initiative, industrial parks have also become an important platform for cooperation between China and countries along the route. However, Chinese planners do not have a comprehensive consideration of the local role of industrial parks in each region, and most of them, like the planners of the Eastern Industrial Park, design it as a Chinese enclave, applying a simple and sloppy design model, which is negative for both sides. Therefore, this project is an attempt to challenge the already rigid and default approach of industrial park planning, and to regard it as a positive medium to promote local vitalization from spatial planning, socioeconomic integration, and governance optimization.

Furthermore, there is a very practical question, and again a very difficult one to balance: if economic and employment goals are given priority, what do we do with the environmental impacts of construction and production. In many developed countries, the model of eco-industrial parks has been explored since the 1990s. The eco-industrial park in Kalundborg, Denmark, for example, has been operating for more than 40 years. It adopts a circular economy operation model between enterprises, linking different factories to form a symbiotic combination of industries sharing resources and exchanging by-products, so that the waste gas, heat, waste water and sludge from one factory become raw materials and energy for another factory. Although this project only involves the restructuring of the energy system of the Eastern Industry Zone, it can also serve as a start for its transformation into an eco-industrial park.

The Possibilities to Generalise the Results

In this project, the main results are design principles and strategies across scales (mainly focusing on macro and meso scales), and design guidelines in design testing (based on micro scales). Among them, the results of these two aspects include two parts. The first part is specific and is aimed at the Eastern Industry Zone and its surrounding urban environment. The second part is general and can be considered for the planning and design of similar cases, such as other foreign co-built industrial parks in other regions and countries with similar scales and positioning. In addition to the spatial results, the exploration and optimization of cooperation models, interaction models, and governance procedures in this project can also be applied to other projects, and it is not limited to the cooperation between China and African countries, and can also be used as the reference for building partnerships among other countries.

Ethical Reflection

First of all, in literature research, I am keenly aware that the choice of literature to be read may be related to some ethical issues. The topics involved in this project are more concerning and controversial by many news media and scholars from all walks of life. Because China and the African continent carry a super large population, resources, information, etc., the interaction between the two parties has attracted the attention of the whole world. And it involves too many aspects. People from different backgrounds, or people with different purposes (academic purposes, publicity purposes, etc.), write articles or books that will show their personal positions. Therefore, when selecting literature, I carefully selected academic literature, or reports and research published by official institutions, and tried to read different views and opinions as much as possible. At the same time, I always reminded myself that my position in this project was to hope that the Industrial Park Models can have a positive impact on local endogenous development. In addition, I tried my best to make the information and data I have collected real, through continuous integration of fragmented data, field research, and data correction with reference to other people's research. Only fact-based analysis is reliable enough and can reflect the real local situation relatively objectively, thus supporting my subsequent strategies and design proposals.

And in this project, due to safety considerations, I did not come to the site to conduct field research, but entrusted a Chinese friend. The limitation of this approach is that the experience I got is not the most direct, and when he conducts the questionnaire survey, it is inevitable to look at the local situation from the standpoint of the Chinese. The images, videos and other materials provided to me by him are also part of the local area, not the whole picture.

Furthermore, when proposing and designing strategies, I need to learn cases from other countries and regions in some aspects, such as circular economy, establishment of knowledge parks, and participatory planning. These studies are also an important basis for me to demonstrate the feasibility of the proposed strategies. Although this project is based on the cooperation model between China and Ethiopia, in terms of case selection, I chose cases from China, other parts of Ethiopia, India, East Asia, other countries in Southeast Asia, etc., hoping that the results will not be limited to China and Ethiopia.

Finally, regarding the top-down and bottom-up thinking, first of all, in the Eastern Industry Zone selected for this project, the two partners - China and Ethiopia, their domestic political environment is dominated by a strong government. State institutions can have a strong influence on relevant policies and the choices made by the private sector. Just from my personal point of view, based on my previous research and analysis, I think that too much bottom-up promotion is not a positive thing for development, at least in the current stage of local development in Ethiopia. So my idea is to combine bottom-up and top-down methods, but in the actual design process, this level may not be mastered. In short, my personal background (completely grown up in a Chinese environment) also inevitably affects my thinking and my judgment. Faced with such a sensitive topic of China-Africa cooperation, I more often hope to break through national boundaries and look at this topic from the perspective of a "global citizen".

As for the potential application of the results, the design of the transitional space around the industrial park will definitely involve various moral issues surrounding the land, ecological environment, and social network. Therefore, in order to truly realize the integration of cities and industrial parks, it is necessary to avoid ethical risks as much as possible when dealing with related processes.

BIBLIOGRAPHY

Ackerman, J. (2004). Co-governance for accountability: beyond "exit" and "voice". World Development, 32(3), 447-463.

Aljoufie, M. (2014). Toward integrated land use and transport planning in fast-growing cities: The case of Jeddah, Saudi Arabia. Habitat International, 41, 205-215.

Asress, M. B., Simonovic, A., Komarov, D., & Stupar, S. (2013). Wind energy resource development in Ethiopia as an alternative energy future beyond the dominant hydropower. Renewable and Sustainable Energy Reviews, 23, 366-378.

Ayalu, G., Abbay, A. G., & Azadi, H. (2022). The role of micro-and small-scale enterprises in enhancing sustainable community livelihood: Tigray, Ethiopia. Environment, Development and Sustainability, 1-24.

Belaud, J. P., Adoue, C., Vialle, C., Chorro, A., & Sablayrolles, C. (2019). A circular economy and industrial ecology toolbox for developing an eco-industrial park: perspectives from French policy. Clean Technologies and Environmental Policy, 21, 967-985.

Boros, G. P. (2018). How to Tame the Dragon: Understanding Ethiopia's Success in Attracting Chinese Private FDI (Doctoral dissertation, Central European University).

Brown, M. M., O'Toole Jr, L. J., & Brudney, J. L. (1998). Implementing information technology in government: An empirical assessment of the role of local partnerships. Journal of Public Administration Research and Theory, 8(4), 499-526.

Business, O. E. C. D., & Outlook, F. (2018). China's Belt and Road Initiative in the Global Trade. Investment and Finance Landscape.

Carr, A. J. P. (1998). Choctaw Eco-Industrial Park: an ecological approach to industrial land-use planning and design. Landscape and urban planning, 42(2-4), 239-257.

Chen, X. (2019). Change and continuity in special economic zones: a reassessment and lessons from China. Transnational Corporations Journal, 26(2).

Cheru, F., Cramer, C., & Oqubay, A. (Eds.). (2019). The Oxford handbook of the Ethiopian economy. Oxford University Press.

Cho, H. (2012). (2011) Modularization of Korea's development experience: industrial park development strategy and management practices.

Daye (2022). 2022-Ethiopia FDI Policy Report-Policy Studies Institute National Graduate Institute for.

Fanuel, S., Butler, M., & Grinsted, P. (2022). On the Path to Industrialization: A Review of Industrial Parks in Ethiopia-Policy Report.

Fei, D., & Liao, C. (2020). Chinese eastern industrial zone in Ethiopia: Unpacking the enclave. Third World Quarterly, 41(4), 623-644.

Frosch, R.A.; Gallopoulos, N.E. (1989). "Strategies for Manufacturing". Scientific American. 261 (3): 144–152.

Gan, L., Shi, H., Hu, Y., Lev, B., & Lan, H. (2020). Coupling coordination degree for urbanization city-industry integration level: Sichuan case. Sustainable Cities and Society, 58, 102136.

Gebeyehu, S. (2017). THE CHALLENGES AND CONTRIBUTIONS OF INDUSTRIAL PARK DEVELOPMENT IN ETHIOPIA: THE CASE OF EASTERN INDUSTRY ZONE PLC, DUKEM CITY, OROMIYA, ETHIOPA (Doctoral dissertation, St. Mary's University).

Gebre-Egziabher, T. (2009). The Developmental Impact of Asian Drivers on Ethiopia with Emphasis on Small-scale Footwear Producers. World Economy, 32(11), 1613-1637.

Geddes, M. (1999). Local partnerships: a successful strategy for social cohesion?(European research report).

Genc, O., van Capelleveen, G., Erdis, E., Yildiz, O., & Yazan, D. M. (2019). A socio-ecological approach to improve industrial zones towards eco-industrial parks. Journal of environmental management, 250, 109507.

Gärtner, H. J., & Stamps, A. M. J. P. (2014). Ethiopian power grid: electrical power engineering & environment.

Grenestedt, A., Kobylakiewicz, B., Crijns, F., Yilmaz, H., van Eijs, M., de Ridder, M., ... & Shia, Z. M. (2021). Addis Ababa as a Palimpsest.

Hao, X., Li, Y., & Lail, U. (2022). Sustainable development with city, industry, economic and environment: The role of city-industry integration on green economic growth. Journal of Regional Economics, 1(1), 1-23.

Hauge, J. (2019). Should the African lion learn from the Asian tigers? A comparative-historical study of FDI-oriented industrial policy in Ethiopia, South Korea and Taiwan. Third World Quarterly, 40(11), 2071-2091.

Horelli, L., Saad-Sulonen, J., Wallin, S., & Botero, A. (2015). When self-organization intersects with urban planning: Two cases from Helsinki. Planning Practice & Research, 30(3), 286-302.

Huchzermeyer, M., & Karam, A. (Eds.). (2006). Informal settlements: A perpetual challenge?. Juta and Company Ltd.

Johnson, C., & Osborne, S. P. (2003). Local strategic partnerships, neighbourhood renewal, and the limits to co-governance. Public money and management, 23(3), 147-154.

Kaiser, M. F. (2009). Environmental changes, remote sensing, and infrastructure development: The case of Egypt's East Port Said harbour. Applied Geography, 29(2), 280-288.

Krishnaveni, R., & Sujatha, R. (2013). Institutional Capacity Building: A Systematic Approach. SCMS Journal of Indian Management, 10(4).

Lambooy, J. G., & Boschma, R. A. (2001). Evolutionary economics and regional policy. The Annals of regional science, 35(1), 113-131.

Morosini, P. (2004). Industrial clusters, knowledge integration and performance. World development, 32(2), 305-326.

Muncy, D. A. (1970). Planning guidelines for industrial park development. Urban land.

Newman, C., & Page, J. M. (2017). Industrial clusters: The case for special economic zones in Africa (No. 2017/15). WIDER Working Paper.

Nicholas, F. (2017). Chinese investors in Ethiopia: the perfect match?.

Oqubay, A. (2015). Made in Africa:: Industrial Policy in Ethiopia (p. 374). Oxford University Press.

Pairault, T. (2022). Industrial Parks in Africa: Building Nests for the Chinese Phoenix.

Polk, M. (2011). Institutional capacity-building in urban planning and policy-making for sustainable development: success or failure?. Planning, Practice & Research, 26(2), 185-206.

Popkova, E. G., & Sergi, B. S. (2020). Social entrepreneurship in Russia and Asia: further development trends and prospects. On the Horizon.

Somerville, P., & Haines, N. (2008). Prospects for local co-governance. Local Government Studies, 34(1), 61-79.

Song, T., Liu, W., Liu, Z., & Wuzhati, Y. (2018). Chinese overseas industrial parks in Southeast Asia: An examination of policy mobility from the perspective of embeddedness. Journal of Geographical Sciences, 28(9), 1288-1306.

Staritz, C., Plank, L., & Morris, M. (2016). Global value chains, industrial policy, and sustainable development–Ethiopia's apparel export sector. Country Case Study, Geneva: International Centre for Trade and Sustainable Development (ICTSD).

Spekkink, W. (2013). Institutional capacity building for industrial symbiosis in the Canal Zone of Zeeland in the Netherlands: A process analysis. Journal of Cleaner Production, 52, 342-355.

Sullivan, J., & Cheng, J. (2018). Contextualising Chinese Migration to Africa. Journal of Asian and African Studies, 53(8), 1173-1187.

Sun, I. Y. (2017). The next factory of the world: How Chinese investment is reshaping Africa. Harvard Business Press.

Tarrósy, I. (2020). China's Belt and Road Initiative in Africa, debt risk and new dependency: The case of Ethiopia. African Studies Quarterly, 19(3-4), 95-28.

Tarrosy, I., & Vörös, Z. (2018). China and Ethiopia, Part 2: The Addis Ababa–Djibouti Railway. The Diplomat, 22.

United Nations Industrial Development Organization, World Bank Group, & Deutsche Gesellschaft für Internationale Zusammenarbeit. (2017). An International Framework for Eco-Industrial Parks.

Vázquez-Barquero, A., & Rodríguez-Cohard, J. C. (2016). Endogenous development and institutions: Challenges for local development initiatives. Environment and Planning C: Government and Policy, 34(6), 1135-1153.

Vázquez-Barquero, A. (2002). Endogenous development: Networking, innovation, institutions and cities. Routledge.

Van Der Pols, D. (2015). Business opportunity report Ethiopia textile & apparel industry Commissioned by Netherlands Embassy in Addis Abeba CBI and Nash international BV.

Wang, X., Shen, D., Yu, G., Nie, T., & Kou, Y. (2013, June). A throughput driven task scheduler for improving mapreduce performance in job-intensive environments. In 2013 IEEE International Congress on Big Data (pp. 211-218). IEEE.

Wekesa, B. W., Steyn, G. S., & Otieno, F. F. (2011). A review of physical and socio-economic characteristics and intervention approaches of informal settlements. Habitat international, 35(2), 238-245.

Weldesilassie, A. B., Gebreeyesus, M., Abebe, G., & Aseffa, B. (2017). Study on industrial park development: Issues, practices and lessons for Ethiopia. Ethiopian Development Research Institute, Addis Ababa, Ethiopia.

Xu, J., & Wang, X. (2020). Reversing Uncontrolled and Unprofitable Urban Expansion in Africa through Special Economic Zones: An Evaluation of Ethiopian and Zambian Cases. Sustainability, 12(21), 9246.

Xu, J., Zhuang, Q., Fu, Y., Huang, Y., Sun, Z., & Liu, Z. (2019). Spatial distribution, pollution levels, and source identification of heavy metals in wetlands of Suzhou Industrial Park, China. Wetlands Ecology and Management, 27, 743-758.

APPENDIX

An interview with a Chinese researcher

Full Name: Shengbo Zhao

Gender: Male

Nationality: Chinese

Academic Degree: PhD Candidate, Faculty of Architecture, Southeastern University, China
(Currently on exchange at Oxford University, the research topic is the study of regional synergistic development and planning guidance of industrial parks in Africa from the perspective of sustainable development.)

Fields of research: Planning for Chinese overseas industrial parks, the Development of China International Cooperation Parks along the Belt and Road

Related experience: fieldwork at the Eastern Industry Zone(EIZ) in Ethiopia in July 2018 and October 2022

Date of interview: 25/11/2022

Key points:
1. About power related to EIZ
Chinese operators dominate. (99 years of land tenure, industry selection, park planning)

2. The economic challenges now faced by the EIZ
Difficulties in attracting companies - the main reason: not a good business environment in Ethiopia and strict foreign (currency) exchange controls lead to a possible reluctance of companies to invest.

3. The conditions of infrastructure
The infrastructure in the EIZ is in good condition and has been shared with the surrounding area (water and electricity) but is not free of charge, while the surrounding area is in poor condition.

4. The promotion of local development through the establishment of EIZ
Creating jobs, generating tax revenue, driving the development of supporting industries in the towns where the EIZ is located. And the EIZ is the only Chinese invested park in Ethiopia with access to the Ethiopian local market and the products can be sold locally, thus working with the local supply chains and industry chains.

5. Challenges to city-industry integration
The main challenge is about housing. There is currently no accommodation for local employees in the park and no public housing outside the park built by the local government to support the development of the park. Some employees have to commute long distances for lower rents. And another challenge is about planning and construction management. Once the local government leased out the land, they stopped managing the park in terms of planning and did not give much thought to the area around the park. The area around the park is currently full of informal settlements. And the third one is financial issue. One of the major problems faced by the local government in the planning and implementation process is the lack of budget. Currently there is quite a big difference between inside and outside the park. The park is built in better conditions to attract investment, but the local government has more than enough to do urban development around the park.

6.The impact of the internationalisation of Chinese standards on the EIZ
The internationalisation of Chinese standards involves national discourse, such as the Chinese standards for the construction of railways and the Chinese standards for the planning of industrial parks (road design, etc.). But it also affects the access of companies from other countries to the parks.

Questionnaire for local residents in Dukem and Debre Zeyit

TUDelft Complex Cities

Questionnaire on the Eastern Industry Zone and the local development (for residents)

Hello!
I would first like to thank you for your willingness to help with my project. I am Jiaying Wu from China, and I am working on my graduation project at TU Delft in the Netherlands. The project is about how to take the Eastern Industry Zone(EIZ) as the medium to promote local development in Dukem and Debre Zeyit. This questionnaire is intended to find out what demands local citizens have around the construction and development of the EIZ. I promise that your information will not be used for any commercial purposes. If you request it, I will not disclose any information publicly at all, but use it only for the project's purpose of planning research about industrial parks.

Please circle the option best describes your opinion.

1. Are you interested in working in the Eastern Industry Zone?
NOT AT ALL → VERY MUCH
1☐ 2☐ 3☐ 4☐ 5☐

2. Do you interact much with Chinese people outside the workspace?
NOT AT ALL → VERY MUCH
1☐ 2☐ 3☐ 4☐ 5☐

3. Are you concerned about the environmental impact of the Eastern Industry Zone?
NOT AT ALL → VERY MUCH
1☐ 2☐ 3☐ 4☐ 5☐

4. Do you think Eastern Industry Zone has made the town a better place where people want to live?
NOT AT ALL → VERY MUCH
1☐ 2☐ 3☐ 4☐ 5☐

5. How interested are you in participating in the decision-making process of Eastern Industry Zone development and town planning?
NOT AT ALL → VERY MUCH
1☐ 2☐ 3☐ 4☐ 5☐

Please provide further information on your vision for the joint development of the industrial park and the city.

6. What do you think the construction of an industrial park should bring to the city, besides new jobs?

7. Can you imagine what other activities, apart from production activities, will take place in and around the industrial park in the future?

8. Which town do you live in? Dukem ☐ Debre Zeyit ☐
9. Age: _____
10. Gender: Male ☐ Female ☐
11. How long have you lived in this town?

12. What do you do for a living?

13. What is your educational level?

14. Do you live alone or with your family? How many people?

15. What is your most common means of travel?

Thank you kindly!

Questionnaire for local workers in Eastern Industry Zone

Questionnaire on the Eastern Industry Zone and the local development (for workers)

Hello!
I would first like to thank you for your willingness to help with my project. I am Jiaying Wu from China, and I am working on my graduation project at TU Delft in the Netherlands. The project is about how to take the Eastern Industry Zone(EIZ) as the medium to promote local development in Dukem and Debre Zeyit. This questionnaire is intended to find out what demands local citizens have around the construction and development of the EIZ. I promise that your information will not be used for any commercial purposes. If you request it, I will not disclose any information publicly at all, but use it only for the project's purpose of planning research about industrial parks.

Please circle the option best describes your opinion.

1. Are you satisfied with your current working space?

Very dissatisfied → *Very satisfied*

1☐ 2☐ 3☐ 4☐ 5☐

2. Are you satisfied with the atmosphere with your co-workers?

Very dissatisfied → *Very satisfied*

1☐ 2☐ 3☐ 4☐ 5☐

3. Are you satisfied with your current workplace safety?

Very dissatisfied → *Very satisfied*

1☐ 2☐ 3☐ 4☐ 5☐

4. Are you satisfied with the current commuting conditions?

Very dissatisfied → *Very satisfied*

1☐ 2☐ 3☐ 4☐ 5☐

5. Do you think it is currently easy to have access to vocational skills training?

NOT AT ALL → *VERY MUCH*

1☐ 2☐ 3☐ 4☐ 5☐

Please provide further information on your vision for the joint development of the industrial park and the city.

6. What do you think the construction of an industrial park should bring to the city, besides new jobs?

7. Can you imagine what other activities, apart from production activities, will take place in and around the industrial park in the future?

---

8. Which town do you live in? In the Eastern Industry Zone☐ Dukem☐ Debre Zeyit☐ Other places _____
9. Age: _____
10. Gender: Male☐ Female☐
11. How long have you been working in the Eastern Industry Zone?

12. Which industry sector do you work in?

13. What is your educational level?

14. Are you renting or owning a home?

15. How long does it take you to get from your home to your workplace? (By what means of transport?)

Thank you kindly!