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Implementation Strategies for Facilitating Knowledge and Technology Transfer from Foreign Direct Investment

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Abstract

Currently, there are flow of foreign direct investment who establish and invest privately new firms and to the industrial parks that change orientation of developed as well as developing countries to attract process in industrialization in Ethiopia. However, national and regional government face major challenges: absence of clear strategies, implementation guidelines, skilled manpower, governance institutions and university-industry linkages that facilitates as catalysts for knowledge and technology transfer system to domestic firms from foreign direct investment. The objective of this study is to develop a frameworks and guidelines for facilitating knowledge and technology transfer from foreign direct investment to domestic firms in Northern Ethiopia, in ways that offer significant co-benefits. The methodologies employed were systematic literature review of existing studies on knowledge and technology transfer, analysis of opportunities and challenges, benchmarking from international best practices, field observation and semi-structured open ended interview with actors and stakeholders of industrial parks and domestic textile and garment industries in Mekelle. The study identifies main strengths and weakness on knowledge and technology transfer, develops effective strategies and implementation guidelines i.e. Human resource, Finance, Policies that facilitate the knowledge and technology transfer from foreign direct investment to local domestic firms in line to industrial parks development projects in the region. Lastly, organizational structure of the knowledge and technology transfer system, frameworks and implementation initiatives in line with university-industry linkage system are proposed.

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Key words: Industrial Parks, Knowledge and Technology Transfer, Domestic Firms, Foreign Direct Investment

1. Introduction

The Ethiopian government, in its Growth and Transformation Plan-II, has clearly stipulated industrialization with special emphasis on the manufacturing sector, as a key to sustaining growth and impetus for economic transformation. Thus, massive expansion of domestic and foreign direct investments in the manufacturing sector is expected to drive the development of manufacturing industry. Ethiopia's vision is to become a model middle income country by 2025 by achieving an average annual growth of 10% is through sustainably transforming the agricultural sector thereby strengthening its industrial base. To this effect, the GTP-II promotes the development and expansion of light and small manufacturing industries that are globally competent and which ultimately enable Ethiopia to become an industrialized country by 2025 [1].

To accelerate this transformation process to industrialization, strengthening and increasing investments in the manufacturing sector is critical and draws paths to achieve these targets and drive the growth and transformation plan in to reality. In addition, technological development is seminal to significantly improve the economic growth and well-being for Ethiopia in particular and any country in general, regardless of the level of development. Thus, government is creating a conducive business environment to attract foreign direct investment for intensively mobilizing the manufacturing industry and play a vital role for the economy. In parallel, the technological capability, both the hardware and software, will also be mobilized. These will also drive the domestic firms to be more competitive and productive by learning from these FDIs. Consequently, the government is investing huge investments for launching industrial parks, textile and garment industries, electro-mechanical works, infrastructures like railways, electricity, telecommunication etc. facilities to create a base for investors.

However, the domestic investors are not fully equipped with capacity, technological capability and investment requirements to facilitate the knowledge and technology transfer system from FDIs to their internal capability. The global experience shows that with adequate policies aligned with the country's development objectives, Foreign Direct Investment (FDI) can provide significant economic and social benefits to the host country. As a result, Ethiopia is already

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Situation 7: Difficulty in measurement of FDI: even though the term FDI, there are serious performance measurement system problems. Some of the problems are:

- It is not clear, at first, to understand whether a foreign investor has the intention to control or participate in the management. in the Japanese and US balance-of-payments statistics, for instance, investment is considered FDI if the foreign share is 10% or more; otherwise, it is classified as portfolio investment. Clearly, this rule is a bit arbitrary.
- A loan from the parent company is counted as FDI. But, a bank loan guaranteed by the parent company is not.
- Whether the value of foreign investment is recorded at book value or at market value makes a difference. The market value changes due to inflation/deflation and capital gain/loss.
- Actual investment in the region which can go beyond the commitment (approval or promise).

3.2. Analysis of Strengths and Weaknesses of KTT from FDI to Domestic firms

Table 1 below summarizes the existing strength and weakness of KTT in Ethiopia based on the aforementioned situation analysis.

Table 1: Existing strength and weakness of KTT in Ethiopia

Strength and opportunities	Weakness and threats
▪ Peaceful and stable democratic country ▪ Increased flow of FDI ▪ High potential young workforce ▪ Attractive government policy for KTT and FDI ▪ Attractive Industrialization policy ▪ Availability of financial loans (Development Bank of Ethiopia) ▪ High infrastructure initiatives	▪ Weak working culture ▪ Lack of awareness on KTT ▪ Lack of skilled manpower ▪ Lack of financing ▪ Reluctance of foreign firms for collaboration ▪ Lack of proper KTT institutions and centers ▪ Language communication barriers ▪ Lack of proper agreement with FDI to facilitate KTT ▪ Lack of incentives for companies and experts ▪ Lack of proper KTT guidelines ▪ High labor turnout ▪ Poor linkage between university, industry, and other

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(e.g. Industrial parks, lands) ▪ Expansion of varied training institutions ▪ Initiatives by NGOs to change the working culture through soft skill training ▪ High availability of resources	stakeholders ▪ Lack of sector oriented graduates from all training institutions ▪ Lack of comprehensive R&D in the local firms ▪ Lack of proper services such as Utility and infrastructure ▪ Lack of hard currency for local firms ▪ Lack of readiness of FDI to recruit local skilled labor ▪ Lack of capacity of local firms to train their workforce abroad

3.3. Determinants for KTT

The size of spillovers from foreign firms depends on the domestic firms' ability to respond to new entrants, new technology, and new competition [12]. Three major issues to be considered while developing mechanisms of knowledge and technology transfer from Foreign Direct investment to local firms are:

- **Institutions issues:** While the impact of competition could go either facilitating KTT by reducing the inefficiency of domestic firms or driving them out of the market, the existence of a competitive environment is considered as an important institutional factor in determining the extent of technology spillover [9].
- **Firm or industry specific issues:** This issue is about the absorptive capacity or technology base of a firm as technology transfer is a function of the technology gap between the two firms. Therefore, the more the technology gaps between firms the greater the technology transfer. In addition, the absorption capacity of the domestic firm depends on the human capital available in the firms [13]. Thus, low skill level of employees in the domestic firms makes the main rationale for the transfer of lower quality technologies [14]. A large gap also makes the cost of learning prohibitively high for domestic firms [13].
- **Policy issues:** Developing or having an inclusive and clear policy is one of the critical issues in KTT since it is the base for all operations in a country with the aim of attracting foreign investors and utilizing their companies both for direct economic development but also side by side for technological development of the receiving country. Therefore, for

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KTT from FDI, it is crucial that Ethiopia develops clear policies so that KTT could be very effective as is envisaged by the nation.

3.4. Benchmarking

The literature on international experiences showed that there is a huge challenge in finding clear implementation procedures developed and implemented to facilitate knowledge and technology transfer. However, there are some information on the failure and success of KTT in few countries that can be utilized to develop effective KTT strategies as discussed by [15]. The current study analyzed the experiences of China, Singapore, and Malaysia in KTT. The rationale for selecting these countries is mainly triggered from their experiences of the knowledge and technology transfer system, the fast development in industrialization by initiating knowledge technology transfer system from developed countries FDIs, utilizing the technologies and sharing the experiences to their local domestic firms, and ultimately shifted to the development of their own technologies and innovation system. Indications of these lessons are provided below:

- **China perspective: most of the foreign firms in china during** the early 1990s, were relatively low technology, labor intensive, operations that took advantage of China's low wage costs. However, during 1998, the country by changing some investment policies, more than eighteen foreign industries had been engaged and invested in high technology sectors.
- **Singapore perspective:** it is clear that FDIs provides platforms for sources of updated knowledge and technology so as to upgrade the traditional technology level of Singapore, in many industries including heavy metalworking and electronics. Consequently, training institutes and centers were established by joint interaction of the Singaporean government and other foreign countries in which the most up-to-date equipment are donated by suppliers and used for demonstration, training and development purposes.
- **Malaysia perspective:** in Malaysia, it was primarily assumed that the FDIs enhance science and technology institutions, and initiate stimulate private R&D enterprises. As a result, Industrial restructuring programs were planned to provide cheap finance

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for the textile and engineering industries. The restructured sectors retained a role in industries such as automotive, petrochemical, iron and steel, etc.

3.5. Implementation Frameworks and Guidelines

3.5.1. Implementation Frameworks

Owing to the weak institutional and governance structure of the knowledge and technology transfer in ,in general, and Tigrai, in particular, the development of implementation frameworks and guidelines is crucial in realizing sustainable development goals of the country by effectively utilizing the current potential opportunities in order to self-sustain and have sustainable industrialization by adopting important technologies. Thus, this study develops an implementation framework of KTT. Description of the framework is presented below:

Establishment of steering committee: Considering the complexity and difficulty of the task, it is so crucial to establish a steering committee to implement the outlined strategies. There are clear duties and responsibilities for the established organizational structure.

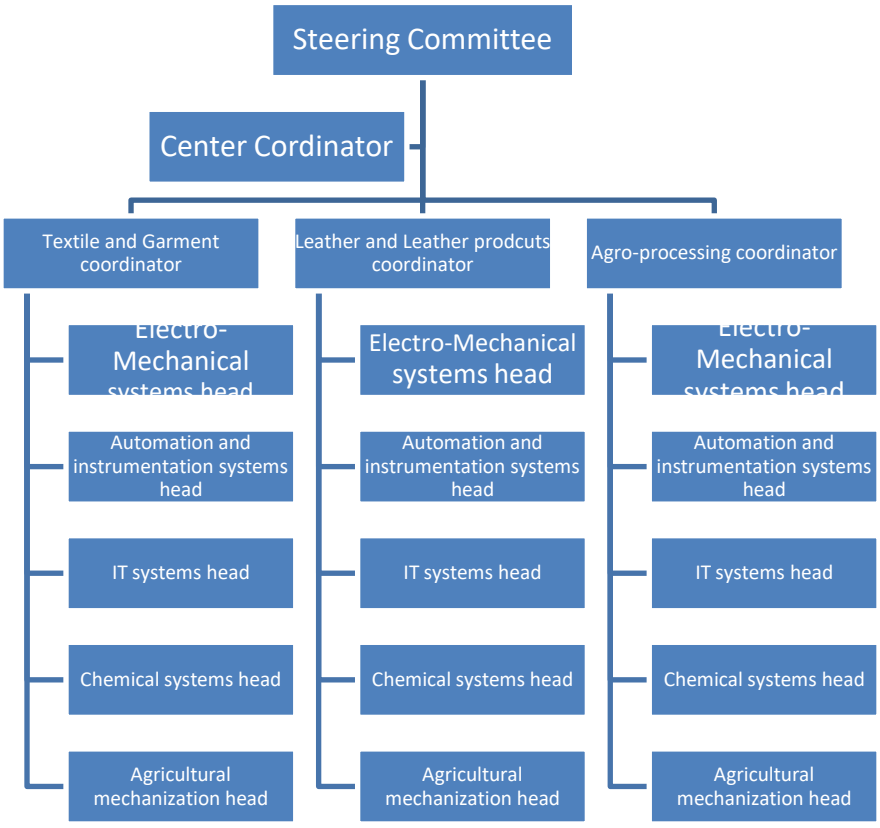

Figure 1: Organizational Structure of a KTT Steering Committee

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Establishment of KTT centers: One of the best mechanisms to facilitate spillovers is to open centers at convenient places for providing different activities. Therefore, opening a center is one of the effective mechanisms as it can serve as hub for conducting different activities. University in collaboration with the regional government would work to open specialized centers in order to provide the platform for facilitating spillovers through the different operational guidelines developed here under:

- **Location of centers:** The vital education programs in higher education primarily include relevant engineering fields in areas of materials, manufacturing, metallurgy, mining, mechanical, electrical, energy, industrial, maintenance, civil, water, geology, management, textile and other related fields. The TVET program produces technicians who would be engaged in the general operations of maintenance, welding, textile, design, improvement, and layout or installation of industrial plants. For the activities to be conducted at the centers, it is highly recommended that the centers to be opened at the University and within the industries with high synergy between the centers. The centers are located at both locations; Centers at the University and Centers at the industries and industrial parks.

The responsibility of the at the university is to bridge stakeholders,, prepare training manuals and provide soft and technical skill trainings, add a verb in the beginning of each responsibility as is in the above, open new programs in collaboration with schools and departments based on the cluster demands, and model development. Moreover, the responsibility and tasks of the center at the industries include: preparing of yearly action plan, serving as a bridge between stakeholders, organizing on job and soft training, providing platform for cultural exchange, assessment of industries demand and communicate with stakeholders, facilitating labor movement, facilitating testing of prototypes, establishment of sector and technology clusters, creating awareness on KTT, and conducting impact assessment of KTT.

3.5.2. Implementation guidelines

The implementation guideline could serve for both the activities conducted at the KTT centers and outside these centers. Its main objective is to make KTT easier by providing the necessary operational guidelines.

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Human resource development: Trained labor in line with the industry demand is a key factor to bring industrial development. Weakness in this area is endemic at all levels from policy implementation institutions to the industrial level. At the policy implementation level, trained human resources, who can address strategy and structure issues, are lacking. Similarly, at operational level trained human resources, who can implement strategies, monitor performances and take remedial action, are missing. Likewise, at firm level, there is lack of skilled manpower both at supervisory and management level. The industries have low labor productivity and high labor turnover. There is also critical shortage of qualified technicians (operators, designers, and maintenance staff) which leads to a mismatch between demand and supply of highly trained labor force.

The human resource strategy focuses on producing human capital with full-fledged knowledge and capacity. Moreover, it includes development of short-term, medium-term and long-term curriculum to equip the industry personnel with soft and technical skills so as to enhance the KTT from the FDI investments to domestic private investments and to ensure the sustainability of the manufacturing sector by improving the productivity and competitiveness. This shall be integrated with science and technology institutes, TVET, and research and development institutes all over the country. In addition, the already established development centres and training institutes in leather and leather products, textile and garment products, metal and engineering products, and others to be established, stimulate and serve as focal points to strengthen priority sectors and receive assistance for technology transfer, capacity development and trainings, etc.

Facilitating movement of labor: Movement and interaction of labor among foreign and domestic firms is one of the best knowledge and technology spillover mechanisms as it provides the local labor force the opportunity to learn from the innovation and experience of foreign firms. The technology diffusion can happen either by simply observing foreign firms and as domestic employees move from foreign to domestic firms. There are also positive spillovers if workers increase their knowledge not only through formal labor training but also through on-the-job training, learning by doing, or learning by observing [12].

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This guideline is developed to facilitate movement of labor from FDIs to local firms. Workers at the foreign companies can gain completely rounded knowledge about effective running of a business. To facilitate KTT through movement of labor, the following three methods can be utilized: Establishment of new company, shifting of employees from foreign to domestic firms and vise-versa, and providing platform for cultural experiences.

Establishment of financial strategy: Foreign direct investments can be made in a variety of ways, including the opening of a subsidiary or associate company in a foreign country, acquiring a controlling interest in an existing foreign company, or establishing a merger or joint venture with a foreign company.

Policy Intervention: In order to facilitate the knowledge and technology transfer process from FDI to the local firms, policy intervention dynamics shall be induced by with a combination of effective governance system, influence of foreign investment and technology transfer augmented with domestic learning strategies. As a result, this guideline focuses on having at the government level a policy on knowledge and technology transfer from FDI and linked with the facilitation of learning strategies of the domestic firms. These strategies are mainly identified as KTT policy from FDI, and developing effective KTT agreement with FDI.

4. Conclusion

One of the challenges from national policy direction for KTT benefits from FDI in Ethiopia is the lack of proper instruments and incentives [3]; Another challenge is the lack of absence of comprehensive FDI policy framework with clear requirements for KTT engagement. Over emphasis on the capital in-flow and employment opportunities seems to undermine the benefits of KTT from FDI. The objective of this study was to develop frameworks and guidelines for facilitating knowledge and technology transfer from FDI, in ways that offer significant benefits for the national and regional firms with the perspective of huge flow of FDI as part of the industrial parks development and beyond. The opportunities and strengths identified using SWOT in the region are increased flow f FDIs, stable business environment, availability of industrial workforce, high vision to industrialization strategy, availability of near-by training institutions and attention to university-industry linkages while the identified challenges and weaknesses in the region are poor industrial workforce culture, weak attention to manufacturing

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sector by the local domestic firms, no much attention to KTT, absence of polices and strategies related to KTT, and weak capacity of domestic firms.

Based on different sectors established in the industrial parks, the study has identified knowledge and technology transfer centers, center for textile and garment sectors, center for agro-processing sector, and center for electro-mechanical sector. The knowledge and technology transfer centres play vital roles in transferring and diffusing technology, building productive and adaptive technological capacities, and enhancing human resources in the local manufacturers. The location of these centres is recommended to be both at university and the industrial parks. Besides, the organizational structure and governance system of these centres are developed.

Based on these situation analyses, and the qualitative data collected from the actors and stakeholders, the researchers developed frameworks that can help to facilitate the knowledge and technology transfer from FDI to the local firms. These frameworks and implementation initiatives are developed are human resource development, movement of labour, financial strategy, and policies of KTT. Thus, considering the results of the situation analysis, a comprehensive framework and guidelines was developed on how, where, and when the Knowledge and technology transfer activities should be conducted. One proposed solution for improving technology and knowledge transfer from FDI to local enterprises is to improve absorptive capacities of local industries. The research output is enriched by conducting a half-day workshop to stakeholders and higher officials from the region.

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