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Regional Linkages and Competitiveness of Manufacturing Sector in Tigrai: Challenges and Opportunities

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Abstract

The manufacturing sector is critical for sustained growth, poverty reduction, employment creation, and technology diffusion in Ethiopia. Nevertheless, the performance and contribution of the sector has been unsatisfactory and declining. While there are abundant raw materials the sector is with low production base, low competitiveness, and uses imported inputs. Hence, this study is conducted to analyze the supply chain linkages, raw material, and challenges affecting the competitiveness of the sector in Tigrai. Data collected through a survey questionnaire from 620 enterprises, focus group discussions, and key informant interviews were analyzed using SPSS. The result showed that shortage, inferior quality, and high cost of raw materials, Poor upgrading strategy, and ineffective upstream linkages are the main challenges for the manufacturing sector's competitiveness. Hence, proper development of the industrial inputs and use of the supply chain linkage in the domestic and export markets should be strategically solved to improve the sector's competitiveness and growth.

Keywords: Competitiveness, Linkage, Manufacturing, Raw Materials, SMEs, Value-Added

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1. Introduction

Industrialization is a strategic tool for economic growth and development. Manufacturing is one of the sectors that have the highest prospects for sustained growth, poverty reduction, and employment creation in Africa [1]. This sector has been historically the leading source of innovation in contemporary economies [2]-[4]. The research and development activities of manufacturing firms have contributed a lot to the development and diffusion of technologies in the world economy [3],[5]-[6]. It also creates strong spill-over effects on other economic activities like banking, transport, insurance, and communication services [3],[6]. Besides, it creates a demand stimulus for the agricultural sector, offers more opportunities for employment creation and export market growth [3],[7]. Despite the aforementioned and other benefits of the manufacturing sector, the performance and contribution of the manufacturing sector in Ethiopia has been unsatisfactory and deteriorating [4]. The global manufacturing value-added share from Africa fell from 1.2% in 2000 to 1.1% in 2008, on the contrary, in Asia; it rose from 13% to 25% over the same period [1].

Moreover, the manufacturing share of Africa's GDP has been low and has followed a declining trend since the 2000s due to the low competitive advantage and incapability to cope up the fierce global competition [4],[7]-[8]. Compared to the rest of the developing world, Africa is the least diversified continent [9]-[10]. In fact, some countries have made slower progress than others elsewhere to catch up on industrial development and others even regressed [4]. In Africa, the industrial sector share of GDP fell from 32% to 27.8 between 2005 and 2013 and the manufacturing sector share of GDP declined from 17.7 in 1975 to 11 in 2013. It is therefore not surprising to observe that on average, the share of Sub-Saharan Africa (SSA) manufacturing sector in the global manufacturing value-added is insignificant [9]. Its share in global manufacturing value-added fallen from 5% in 1992 to 3% in 2012 [9]. This contrasts sharply with the developing Asia for instance which saw an increasing share from 13 to 25 over the same period [9],[11]-[12]. The developing countries have been focusing their developmental strategies on enhancing the growth of the manufacturing sector using available raw materials and selling their finished or semi-finished industrial products to the national and international markets. Never the less, there has been a surge and steady increase in the import of manufactured goods and raw materials from China, which is more competitive than most African countries [7],[13]. Hence the share of manufacturing in production and export, level of technology, and productivity

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remained low across the countries [8]-[9]. In reality, SSA has comparative advantages of low-cost labor and abundant natural resources that can supply raw materials needed for the industries [8]-[9]. In addition, China's advantage in the production of manufacturing goods is diminishing due to an increase in wages and non-wage labor costs, a rise in land prices and regulatory costs. Thus, increasing labor and land costs in China offers opportunities for SSA including Ethiopia to develop manufacturing activities [8]. Nonetheless, SSA needs to fix challenges like trade logistics, input industries, and access to finance, industrial land, labor, and entrepreneurial skills to develop light manufacturing[13].

The current economic structure of many African economies, in particular, those that have been growing very fast in the last decades including Ethiopia, will not meet the development aspiration without transformational and sustainable changes [4],[8]. The economic structure needs going beyond exporting untransformed commodities, towards diversifying and the development of other sectors of the economy [9]. Commodity based industrialization provides the leverage to drive growth on the continent and enhance its participation [12]. This calls for the countries to make maximum use of their resource endowments to reverse the trends of the deindustrialization of the last decades and put particular emphasis on the development of backward and forward linkage in the resource linkages. The optimization of economic linkage is one of the numerous reforms required to change the trend [6],[9],[14]. There is untapped potential for stimulating the development of the manufacturing sector through the optimization of economic linkage in Ethiopia [9],[14]. The local content has gained particular attention as a means to develop a domestic supply chain for manufacturing industries by maximizing the use of local factors of production. Nevertheless, the use of local inputs is declining in recent years and manufacturing industries have become increasingly dependent on the imported raw materials as inputs. The quality of products tends to increase in firms that are able to access foreign inputs [15]. This implies that the upstream linkages within the economy are weakened, the competitive advantages are diminished and firms become more vulnerable to global price fluctuations. Obviously, Ethiopia is lacking the comparative advantage even in some of the priority industries, such as textiles, leather, food and beverages, and chemical sub-sectors. The share of manufacturing real value-added in total industrial GDP is falling, and the manufacturing sector is lagging in comparison to peer economies and relative to its aspirations. The manufacturing value added (MVA) share in GDP and MVA per capita are both well below the Eastern Africa regional

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average and selected Asian countries [15]-[16]. Moreover, the MVA per establishment showed a declining trend as the number of establishments grew, indicating growth is predominantly driven by an increment in the number of small and medium-sized enterprises rather than from the expansion in the scale of production by existing enterprises [15]-[16]. Besides, Ethiopia exports very few manufactured commodities compared with the Eastern African average and selected Asian countries, indicating both a low manufacturing production base and a lack of competitiveness of the sector [8],[15]-[16].

Manufacturing is central to the Growth and Transformation Plan of Ethiopia in general and Tigrai in particular. Then the question is: what are the factors that make the manufacturing sector in Tigrai competitive and thriving? There is a need for evidence-based policies to guide policymakers to promote the development of the manufacturing sector. In recognition of the key role of the manufacturing sector in economic development, this study is conducted to analyze the supply chain linkages, availability and use of local raw material, and their effect on productivity and competitiveness of the manufacturing sector in Tigrai. It further explored the challenges and possible solutions.

2. Research Methodology

2.1. Description of the study area

Tigrai Regional state is found in the Northern part of Ethiopia and is bordered by Eritrea in the north, the State of Afar in the east, the State of Amhara in the south and southwest, and the Republic of Sudan in the west. This study was conducted in all areas of the Tigrai where there are manufacturing enterprises.

2.2. Methods

The data for the study were collected through a survey questionnaire, focus group discussions, key informant interviews, and review of available information and studies from publications, offices, and agencies. A Series of brainstorming and consultative meetings were also held with relevant stakeholders.

p- ISSN: 2664-0791, e-ISSN: 2664-0716

2.3. Sample size determinations

The survey sample size is determined by taking into account both the required level of precision for the most important estimates within each reporting level (domains) and the amount of resources needed to conduct the survey.

According to the manufacturing agency, there are about 5120 small, medium, and large manufacturing enterprises in the region. The required number of sample households was determined using the Yamane [17] sample size determination formula as

$$n = N/ (1 + N (e)^2 \quad (1)$$

Where, n= required sample size, N= total population size, e= the level of precision or acceptable error (at 96.5% % confidence interval). The sample size for each category is determined based on this formula at 3.5% level of precision:

Total sample size sample size: **n=5120/ (1+5120*(0.035*0.035)) = 704**

Therefore, the total sample size of the survey was seven hundred four manufacturing enterprises.

2.4. Source of data

The main source of data used in this study were both primary and secondary data. Primary data was collected through questionnaire from the sample respondent enterprises. From the 704 enterprises selected, 620 questionnaires were correctly and successfully collected and used in the analysis. Besides, secondary data were gathered from different regional offices, national and international reports, and articles.

2.5. Data analysis procedures

The responses collected through questionnaires were processed and analyzed using the Statistical Package for Social Science (SPSS). The data were manually edited, summarized, and rearranged according to the obtained responses. After having done such a process it was converted to tables and percentages that finally lead to data interpretation and description of the entire problem.

3. Result and Discussion

p- ISSN: 2664-0791, e-ISSN: 2664-0716

The result and discussion part are presented in terms of the situational analysis, the challenges of raw material availability and costs, supply chain linkages, potential solutions, and recommendations to make the manufacturing sector more competitive.

3.1. Situational analysis of the manufacturing sector in Tigrai

Based on the data from Tigrai Manufacturing Agency and the Central Statistics Agency, the size, sector, and geographical distribution of manufacturing enterprises in Ethiopia and Tigrai are shown below. Nationally, the size category of manufacturing enterprises is defined based on capital and number of employees. In this regard, manufacturing companies are classified as micro-enterprises (1-5 employees), small (6-30 employees), medium (31-100 employees), and large firms (with 100 and above employees).

Although specific data on the number of microenterprises in Tigrai was not found, based on the data from Manufacturing Agency, there are about 5120 small, medium and large manufacturing enterprises in the region (see Table 1:). More than 86 % of the enterprises are small manufacturing enterprises and few (less than 0.5%) are large enterprises. Sector-wise, the majority of the enterprises are concentrated in light manufacturing. The metal and woodwork sector alone accounts for about one-third. The textile, garment, and leather combined account for about one-quarter.

Table 1: Number of manufacturing enterprises in Tigrai by size and sector

	Number of enterprises by size and sector				
	Small	Medium	large	Total	Share (%)
Metal and wood work	1485	199	0	1684	32.9
textile, garment and leather products	1214	77	5	1296	25.3
construction inputs	742	218	3	963	18.8
agro-processing	526	78	12	616	12.0
mining, energy and products	385	55	0	440	8.6
packaging and chemical products	83	35	3	121	2.4
Total	4435	662	23	5120	100
Size share (%)	86.6	12.9	0.4	100	

Source: Tigrai Manufacturing Agency

The data from the Central Statistics Agency (2015/16) were used to compare Tigrai with other regions in Ethiopia. Accordingly (see Table 2) there are about 2681 manufacturing enterprises that employ more than five people in Ethiopia. The small manufacturing enterprises account for

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about two-third and the medium scale accounts for about 19%. With regard to the regional distribution, the capital city, Addis Ababa, accounts for about 40.6% of the manufacturing enterprises in the country followed by the Oromia region (28%).

The CSA data also shows that there are 170 manufacturing enterprises of the three size classes in Tigrai. This accounts for about 6% of the total number of manufacturing enterprises in the country.

Table 2: Number of manufacturing enterprise in Ethiopia by region and size category

Region	Small	medium	Large	Total	Share (%)
Tigrai	108	38	24	170	6.3
Afar	5	1	2	8	0.3
Amhara	190	27	29	246	9.2
Oromia	403	208	145	756	28.2
Somalie	20	2	0	22	0.8
Benshangul	4	0	0	4	0.1
S.N.N.P.R.	225	31	14	270	10.1
Harari	17	2	1	20	0.7
Addis Ababa	719	186	183	1088	40.6
Dire Dawa	75	12	10	97	3.6
Total	1,766	507	408	2681	100
Share (%)	65.9	18.9	15.2	100	

Source: CSA Small, medium and large manufacturing enterprises (2015/16 survey)

3.2. Availability and cost of raw material and the competitiveness of the manufacturing sector Tigrai

According to the survey conducted more than 35.2% of the manufacturing firms in the Tigrai region are not operating at their full capacity due to shortage of raw materials (19.6%), limited market opportunities to sell their products (18.8%) and shortage of working capital (18.5%). The availability of raw materials was also investigated and very few respondents (8%) said the availability is excellent with a significant number (31.5%) saying very limited (see Table 3). These results indicate that the availability input raw material for manufacturing firms is greatly affecting their performances.

Table 3: Assessment of availability of input raw materials

	Frequency	**Valid Percent**	**Cumulative Percent**
Excellent	49	8.0	8.0
very good	110	17.9	25.9
Good	253	41.1	67.0

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very limited	194	31.5	98.5
Not available	9	1.5	100.0
Total	**615**	**100**	

Source: Own survey result, 2018

Sector-wise, the agro-processing and pharmaceutical firms (55.9%), packaging firms (50%), and mining and energy firms (44.4%) reported that the availability of raw materials is very limited. Comparatively, firms that produce construction inputs (19.3%) are less affected by the availability of raw materials (see Table 4).

Table 4: Availability of raw materials by sector

Sector	Degree of raw materials availability (%)				
	Excellent	Very good	Good	Very limited	Not available
Metals and woods	7.3	16.2	46.3	29.3	0.8
Textile, garment & leather	11.3	18.9	41.5	27.4	0.9
Agro-processing & pharmaceuticals	2.9	10.3	26.5	55.9	4.4
Packaging	10.0	0.0	20.0	50.0	20.0
Construction inputs	11.8	29.4	38.7	19.3	0.8
Mining and energy	2.2	11.1	42.2	44.4	0.0

Source: Own survey result, 2018

Likewise, the manufacturing firms in Tigrai use limed local materials as inputs due to limited availability, absence, inferior quality, and higher cost of the local inputs compared to the imported inputs. The problems in the raw materials in the domestic market are forcing the local firms to increasingly dependent on imports including those rely on agricultural products (for example, bakery industry, cotton, hides, and skins) as their major inputs, which could have been produced domestically. Despite the rich endowment in Tigrai, the agricultural sector is not able to produce sufficient quantity and quality inputs to meet the demand for the manufacturing industry. The low agricultural productivity, lack of investment in commercial agriculture, time taking, and non-value-adding market system, poor trade logistics are often mentioned as the reasons for the shortage of input supply.

Apart from the availability of raw material, the price-setting roles and their impact on the performance of the manufacturing sector were investigated. In view of this, most of the time the raw materials price is set by raw material suppliers (68.7%) and the remaining by brokering (16.3%), purchasing firms (12.1%), and by other companies (2.5%). Hence, the supplier has a prime role in the price setting of the input raw materials (See Table 5), which is mostly expected.

p- ISSN: 2664-0791, e-ISSN: 2664-0716

But it needs to be controlled to minimize the negative impact on manufacturers' raw material demands.

Table 5: Regarding raw materials price-setting actors

	Frequency	**Valid %**	**Cumulative %**
Raw Material Supplier	413	68.7	68.7
My Company	73	12.1	80.9
Other Companies	15	2.5	83.4
Through Bargaining (Negotiating)	98	16.3	99.7
Others	2	.3	100.0
Total	**601**	**100**	

Source: Own survey result, 2018

The results are also similar on sector-wise, the raw materials suppliers set prices of the raw materials. This is especially true in metal and woodwork firms (80.2%), packaging firms (80%), textile, garment, and leather firms (65%) and agro-processing and pharmaceutical firms (68.3%). Unlike the other sectors, the mining and energy firms (36.4%) have better bargaining power in setting prices for raw materials. Price setting through negotiations (ranging from 10% for packaging firms to 21.4% for textile, garment and leather firms) is a practice that is with limited use among firms and raw materials suppliers (see Table 6). A Chi-squared statistical test for differences in the power for price determination among the different firms from different sectors was also statistically significant (which means firms from different sectors have different power in price setting for raw materials).

Table 6: Price determination for raw materials

Sector	Players in price determination for raw materials (%)				
	Supplier	My Company	Other companies	Negotiation	Others
Metals and woods	80.2	6.2	1.9	11.7	0.0
Textile, garment & leather	65.0	11.7	1.9	21.4	0.0
Agro-processing & pharmaceuticals	68.3	3.2	6.3	19.0	3.2
Packaging	80.0	10.0	0.0	10.0	0.0
Construction inputs	57.8	19.0	2.6	20.7	0.0
Mining and energy	40.9	36.4	2.3	20.5	0.0

Source: Own survey result, 2018

p- ISSN: 2664-0791, e-ISSN: 2664-0716

3.3. Supply chain linkage and competitiveness of the manufacturing sector in Tigrai

Knowing the key actors in the value chain is critical to optimize the production process including material sourcing, production, consumption, and disposal or recycling processes. It is also critical to focus on a few but important stakeholders in the supply chain management process.

Table 7: Actors in the value chain

Actors in the value chain	Number	%	% of Cases
Customers	299	22.5	57.4
Manufacturing companies	228	17.2	43.8
Manufacturing retailers	216	16.3	41.5
Manufacturing wholesalers	183	13.8	35.1
Agents	102	7.7	19.6
Mining producers	78	5.9	15.0
Transport companies	57	4.3	10.9
Unions/traders	52	3.9	10.0
Farming processors (such as agro-industries)	49	3.7	9.4
Mining processors	45	3.4	8.6
Farming producers	14	1.1	2.7
Others	4	0.3	0.8

Source: Own survey result, 2018

Based on the survey, from the many actors in the manufacturing enterprises, the customers (57.4%), manufacturing companies (43.8%), manufacturing retailers (41.5%), manufacturing wholesalers (35.1%), and agents (19.6%) are the top important actors. Additionally, the results showed that the contributions of farm and mining producers and the processors are very low (Table 7). This implies that the manufacturing enterprises are heavily dependent on imported raw or semi-finished materials and the agriculture and mining sectors are not well developed to support the manufacturing sector.

Besides, firms use the upgrading processes to acquire the technological, institutional, and market capabilities that allow firms to improve their competitiveness and enter to higher-value activities. They also engage in different upgrading strategies to build viable value chains. The horizontal coordination, the first step in upgrading, is the process of greater intra-nodal organization, often in the production and processing nodes. This form of upgrading is important specifically for SMEs to achieve economies of scale in supplies and to reduce transaction costs. The other

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upgrading strategy, the Vertical coordination, is the move away from single spot transactions towards long-term inter-nodal relations based on a mutual contract agreement. It results in greater certainty about future revenue flows for the participant enterprises. The functional upgrading changes the mix of functions performed by the actors in the value chain – increasing (upgrading) or reducing (downgrading) the number of activities performed by individuals and firms (producers process some of their output to add value). While the process upgrading involves improving the value chain efficiency by increasing output volumes or reducing costs for a unit of output, product upgrading involves the improvement of the quality and standards. These upgradings are closely related because improving product quality often involves improvements to the production process. Finally, the inter-chain upgrading is the use of skills and experience developed in one value chain to productively engage with another – usually more profitable – value chain (shifting from traditional product to export products).

The current upgrading strategies in practice in the manufacturing companies in Tigrai are shown below (see Table 8). Most of the firms focus on the process (53.4%), product (37.2%), and functional (31.3%) upgrading strategies. These strategies are more inclined to improving efficiency, quality, and reducing costs. Hence to get more advantages, from the upgrading strategies, the firms need to balance the strategies with the value chain actors.

Table 8: Value chain upgrading strategy

Value chain upgrading strategy	Number	%	% of Cases
Process upgrading	254	24.5	53.4
product upgrading (moving to complex and higher value products)	177	17.1	37.2
Functional upgrading (performing more tasks in the chain)	149	14.4	31.3
Horizontal coordination (same stage of the chain,)	137	13.2	28.8
Vertical coordination (different stages of the value chain)	120	11.6	25.2
Inter-chain upgrading (applying skills gained to a different chain)	98	9.4	20.6
Meeting standards and certifications	98	9.4	20.6
Others if any	5	0.5	1.1

Source: Own survey result, 2018

The manufacturing firms form different linkages along with the value chain activities with the raw material supplier, intermediate suppliers, consumer, similar company, and technical service providers to foster multi-actor interactions that empower knowledge exchange; capacity

p- ISSN: 2664-0791, e-ISSN: 2664-0716

strengthening, joint learning and continuous problem solving to improve productivity and the value-adding activities.

The raw material provision and technical skill pooling are the two top-ranked linkages with 20.4% and 7.6% respectively. In this regard, about 68.6% and 59% use raw material provision and technical skill pooling respectively to form linkages with the raw material suppliers. Furthermore, the firms used technology (43.0%), sharing, transfer credit support system (42.4%), management pooling (36.6%), and franchising and merchandising (31.1%) to form their linkages.

Similarly, the raw material provision (16.6%) and technical skill pooling (13.5%) are the two top-ranked linkages in the intermediate suppliers. About 53.4 % and 43.3% of the firms used the raw material provision and technical skill pooling respectively to form a linkage with intermediate suppliers. Besides 41.3%, 40.2%, 40.2%, 36.2% of the firms used technology sharing and transfer, management pooling, credit support system, and sub-contracting respectively to form linkages with the intermediate suppliers. With regard to the linkage with customers, technical skill pooling (15.9%) and credit support system (14.5%) are the important linkage types. About 49.1% and 45.0% of firms used technical skill pooling and credit support system respectively to form linkages with customers. Besides, the management pooling, raw material provision, and sub-contracting are also considered as important linkage types with customers. While about 42.6%, of the firms, used the management pooling to form a linkage with customers, 41.6% and 37.1% of firms used raw material provision and sub-contracting respectively for the same purpose. Yet the firms also used technology sharing and transfer, foreign exchange, franchising, and merchandising to build the linkage with customers.

Firms also form linkages with similar companies and technical service providers. With regard to the linkage with similar companies, technology sharing and transfer (19.5%) and technical skill pooling (19.1%) are on the top rank. About 64.8% and 63.4% of firms used technology sharing, transfer, and technical skill pooling respectively to form a linkage with similar companies. Furthermore, approximately 50.7%, 35.5%, and 32.8% of firms apply management pooling, raw material provision, and credit support system correspondingly to form the same linkage. On the other hand, the technical skill pooling (24.8%) and technology sharing and transfer (18.6%) are on the top list in forming a linkage with technical service providers. More than 78% and 58.5% of firms used technical skill pooling and technology sharing and transfer approaches to form this

p- ISSN: 2664-0791, e-ISSN: 2664-0716

type of linkage. In addition, management pooling, raw material provision, and credit support system are also considered important approaches to form a linkage with the technical and service providers. While 48.2% of firms applied management pooling, 32.1% and 29.3% of firms used raw material provision and credit support system respectively to build the linkage in this type (**Error! Reference source not found.**).

The finding from the linkages analysis shows that, although there are many options to form linkages with raw material suppliers, intermediate suppliers, consumers, similar companies and technical service providers most of the firms used more the technical skill pooling, technology sharing and transfer, raw material provision, and credit support system.

Table 9: Linkage in the Value chain actors or sectors

Types of Linkages in the value chain	Raw material supplier		Intermediate suppliers		Consumer		With a similar company		With technical service providers	
	%	% of cases	%	% of cases	%	% of cases	%	% of cases	%	% of cases
Technical skill pooling	17.6	59.0	13.5	43.3	15.9	49.1	19.1	63.4	24.8	78.2
Management pooling	10.9	36.6	12.6	40.2	13.8	42.6	15.3	50.7	15.3	48.2
Technology sharing and transfer	12.8	43.0	12.9	41.3	11.8	36.4	19.5	64.8	18.6	58.6
Foreign exchange	6.7	22.7	7.3	23.2	5.2	16.2	5.2	17.2	5.7	17.9
Credit support system	12.6	42.4	12.6	40.2	14.5	45.0	9.9	32.8	9.3	29.3
Franchising and merchandising	9.3	31.1	11.3	36.2	11.7	36.1	9.8	32.4	7.6	23.9
Sub-contracting	8.6	28.8	11.3	36.2	12.0	37.1	8.9	29.7	6.8	21.4
Raw material provision	20.4	68.6	16.6	53.1	13.4	41.6	10.7	35.5	10.2	32.1
Others	1.1	3.8	1.8	5.9	1.8	5.5	1.7	5.5	1.7	5.4

Source: Own survey result, 2018; % =percent

All firms face different problems that hinder the formation of linkages with their raw material suppliers, intermediate suppliers, consumers, similar companies, and technical service providers. These problems can significantly minimize the interactions and limit the knowledge exchange, capacity strengthening, joint learning, and continuous problem-solving processes with the network. Hence, they negatively affect the productivity improvement, value-adding processes, and activities of the firms. As can be seen from the table below, the problems along the different

p- ISSN: 2664-0791, e-ISSN: 2664-0716

networks are similar. But the experience of the firms and the frequency of the problems differ with respect to the linkage types. While more companies face technological limitations (61.8%), credit availability (57.1%), market demand (51.6%) related problems in linkage with raw materials suppliers, the most frequent problems in the linkage with intermediate suppliers are technological limitations (55.2%), bureaucratic bottlenecks (53.5%) and limited credit availability (53.5%). Alternatively, most firms experienced problems related to customer unawareness of the products (61.3%), market demand limitations (59.6%), and infrastructure inadequacy (50.1%) in their relationship with customers. Moreover, the technological limitations (52.4%), market demand limitations (51.4%), and high global/local competition (49.7%) in the linkage with a similar company and technological limitations (64.2%), infrastructure inadequacy (54.7%) and management capability and logistics (48.6%) in the linkage with technical service providers were the important problems hindering the smooth relationships (see **Error! Reference source not found.**).

Linkage problems	Raw material supplier		Intermediate suppliers		Consumer		With a similar company		With technical service providers	
	%	% of cases	%	% of cases	%	% of cases	%	% of cases	%	% of cases
Technological limitations	12.8	**61.8**	10.9	**55.2**	10.5	49.9	11.5	**52.4**	13.8	**64.2**
Management capability and logistics	10.1	48.7	10.1	51.0	9.7	46.2	9.6	43.8	10.5	48.6
Foreign exchange (hard currency)	8.3	40.2	9.3	47.0	7.4	35.2	7.9	36.1	7.5	34.7
bureaucratic bottlenecks	9.9	47.6	10.6	**53.5**	9.2	43.9	9.1	41.6	10.5	48.6
Infrastructure inadequacy	10.5	50.7	10.3	52.1	10.6	**50.1**	10.0	45.7	11.8	**54.7**
Institutional inefficiencies	7.9	38.0	9.2	46.5	8.4	40.0	9.0	41.3	10.0	46.4
Customer unawareness on products	8.9	43.1	9.2	46.7	12.9	**61.3**	9.4	42.9	9.0	41.7
market demand limitations	10.7	**51.6**	10.4	52.7	12.5	**59.6**	11.2	**51.4**	9.2	42.8
high competition (globally or nationally)	8.1	39.1	8.3	41.9	8.5	40.2	10.9	**49.7**	7.1	33.1
limited credit availability	11.8	**57.1**	10.6	**53.5**	9.4	44.7	10.0	45.9	9.7	45.0

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Others	1.0	4.9	1.1	5.4	0.8	4.0	1.5	7.1	1.1	5.0

Table 10: Problems hampering effective Linkage

Source: Own survey result, 2018; % =percent

The manufacturing firms also identified and prioritized the opportunities that should be exploited to build effective linkages with raw material suppliers, customers, related companies, and technical and institutional service providers. While improving technical capability (71.9%), growing demand for manufacturing products (70.6%) and strong policy emphasis on manufacturing (62%) are on the top list of the opportunities in the customer linkage, growing demand for manufacturing products(68.2%), strong policy emphasis on manufacturing (62.3%) and improving in management capability (61.7%) are on the linkage with intermediate suppliers. The firms also identified the growing demand for manufacturing products (77.6%), improving technical capability (62%), and improving in management capability (60.1%) the important opportunities to improve the linkage with customers. Besides, improving technical capability (74.4%), improving in management capability (70.7%) and growing demand for manufacturing products (61.3%) with similar companies and improving technical capability (77.3%), improving in management capability (61.8%) and growing demand for manufacturing products (54.2%) with technical service providers correspondingly are described as the opportunities to improve these linkages (see Table 11).

Table 11: Opportunities for effective linkages

Opportunities	Raw material Supplier		Intermediate suppliers		Consumer		With a similar company		With technical service providers	
	%	% of cases	%	% of cases	%	% of cases	%	% of cases	%	% of cases
Improving technical capability	19.6	71.9	17.0	60.2	17.4	62.0	20.4	74.4	23.0	77.3
Improving in management capability	16.7	61.0	17.4	61.7	16.9	60.1	19.4	70.7	18.4	61.8
growing demand for manufacturing products	19.3	70.6	19.3	68.2	21.8	77.6	16.8	61.3	16.2	54.2
strong policy emphasis on manufacturing	16.9	62.0	17.6	62.3	16.3	57.9	15.8	57.6	15.4	51.6
improving infrastructure	14.9	54.4	14.6	51.9	14.3	51.0	14.4	52.4	15.4	51.6

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prospects for contract farming, franchising and merchandising	11.3	41.5	12.9	45.7	12.3	43.8	12.1	44.2	10.9	36.4
Others	1.2	4.6	1.2	4.3	1.0	3.6	1.2	4.3	0.8	2.6

Source: Own survey result, 2018; % =percent

3.4. Enhancing the regional domestic manufacturing capacity through raw material and supply linkage development

Tigrai has the potential to further develop the manufacturing sector and become a hub for manufacturing activity in the region and the country at large. The manufacturing sector in the region has, however, shown little progress despite ambitious targets. This study identified critical bottlenecks and provides recommendations to solve these challenges and highlight long-term directions to develop the manufacturing base in the region.

The evidence so far shows that the domestic investors have been reluctantly entering the manufacturing sector at the national level as well as in the region. As presented above, the bulk of the light manufacturing activities in Tigrai are dominated by small enterprises. Only a few large firms are currently operating in the region. The region, thus, needs to encourage a massive flow of large scale investment, both domestic and foreign. Another critical route for the development of the industry sector is to support the small manufacturing enterprises to grow and become large and internationally competitive. We argue that the region should give special attention to the development of small firms as a basis for nurturing domestic industrialists.

The shortage of raw materials in terms of quantity, quality, sustainability, and competitive price are among the critical bottlenecks for the development of the manufacturing sector in Tigrai. This is largely caused by low productivity of the agriculture sector and poor linkages with industry given the majority of manufacturing activities rely on agriculture products as major inputs. The main solutions are, therefore, to improve the productivity of the agriculture sector and strengthen the linkage with the sector to supply industrial inputs through modernizing the input supply, improving the production and marketing system, enhancing out-grower schemes, and improve the productivity of smallholders.

Poor supply chain linkage in the domestic and export markets is the weakness of the manufacturing sector in the region. The manufacturing firms are not able to tap the domestic market adequately let alone exporting. Hence to improve market access and capacity

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development of the supplier industry linkage, enhancing SMEs' competitiveness and export capacity are two strategic directions.

Enhancing backward linkage in the industry sector has been in the development debate for a long time. Governments had employed more coerce policies to create linkages for example through local content requirements and mandatory technology transfer provisions. This approach has shifted to a more market-friendly mechanism, promoting industrial (supplier) linkage program by way of incentivizing both multinational enterprise and local SMEs to form linkages. The current dynamics of global production favor the creation of business linkages between large firms or transnational corporations and their suppliers. Hence to strengthen SMEs' capacity to penetrate domestic and foreign markets the supplier and industry linkage program is critical. This scheme helps the domestic SMEs to be competitive manufacturers and suppliers of components and parts to large firms both domestic and multinationals enterprises, supplying domestic (import substitution) as well as international market (export promotion).

4. Conclusions

A competitive and thriving manufacturing sector that optimizes the local resources along the upstream linkages is central to the growth and transformation of Tigrai. The findings indicated that shortage, higher cost of raw materials, Poor upgrading strategy, and ineffective linkages are the main challenges that hamper the competitiveness, growth, and contribution of the manufacturing sector in Tigrai. Hence, developing the local industrial inputs, optimizing the regional supply chain linkages, and increasing the flow of large scale investment in manufacturing industries that make use of the potentially abundant inputs to make the sector competitive and thriving are critical points that should be strategically resolved. Besides, the region should give special attention to supporting small and medium manufacturing enterprises to grow and become large and internationally competitive. This could be achieved by providing high-quality infrastructures such as adequate energy supply, appropriate logistics infrastructure, effective market interlinkages with material input provides and between enterprises, providing special support packages for high growth enterprises, etc.

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