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Research Article

The Regional Performance Impacts in the Supply Chain Integration: Evidence from East Africa Basic Metal Industry

Alie Wube Dametew [a,*], Birehanu Beshah [b], Frank Ebinger [c]

[a] *School of Mechanical and Industrial Engineering, Addis Ababa University Institute of Technology-Ethiopia and Faculty of Engineering Technische Hochschule Nürnberg Georg Simon Ohm-Germany.*

[b] *School of Mechanical and Industrial Engineering, Addis Ababa University Institute of Technology-Ethiopia*

[c] *Faculty of Engineering Technische Hochschule Nürnberg Georg Simon Ohm-Germany*

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Abstracts

The objective of this study was to investigate the relationship between regional firm performance and supply chain integration practices. In addition to literature survey, the primary data collection instrument used was a questionnaire which was administrated to a total sample of 200 industry experts, administrative officers, functional department heads and directors, the industry managing directors and senior staff from 21 manufacturing firms in Ethiopian were incorporated. The data were studied using the AHP, fuzzy TOPSIS, the mind map, and descriptive analysis. Further, the challenges, practices, performance, the practices of East African basic metal industry supply chain integration influences the dynamics contribution of the regional economy was fragmental. According to this study, due to weak, fragmental and non-integrated supply chain systems, the regional economic dynamic contribution of the sector is weak and poor in quality, productivity, flexibility, and global competitiveness were investigated. Moreover, these investigations and analysis of this paper have both practical and scholarly implications. The result is provided to contribute to the future supply chain integration model development and make an action to supply chain integrations for process improvements. Finally, the implications for the design on the dynamic capability of supply chain strategies are showing, and the future research agenda was presented.

***Keywords*:** Firm Performance;; Supply Chain Integration; Basic metal Industry; Economic Dynamics;and Impacts.

1. Introduction

In the African continent have fast demand growth and available for vast raw commodities is increase time to time. The continents have an abundance of resources such as oil, gas, and mineral resources and significant opportunities for agricultural expansion (Custers & Matthysen, 2009).However, the economic performance held firm in 2015, growth in real GDP is estimated at 3.6%, higher than the 3.1% for the global economy and 1.5% for the euro-area. According to (OECD, 2016) shows that, while Africa remained the world's second fastest growing economy after East Asia. Even if quality, logistics systems, flexibility, technological capability, information communication infrastructure, low human capital, weak governance, and electric power inefficiency are the main challenges of the continents(WorldBank, 2011). While a multi-dimensional strong infrastructure capability necessary for development and fast growing but has the lowest projection and numerous challenges have seen in the region. Due to these constraints, the performance and competitiveness of the region in the global markets are weak and an infant. s apply digital supply networks integrate information from many different sources to planning resources drive production and distribution, potentially altering manufacturing's competitive landscape. Whereas Africa carries the potential for economic and social prosperity, it has numerous challenges related to supply chain infrastructure in itself also holds huge opportunity though, especially for those organizations specializing in construction and related industries, that still need to be overcome(Ayenew, 2016),(AW, D, & O, 2017).For example, even in South Africa, the supply chain systems need to continuously progress, innovate and stay abreast with supply chains across the globe. Since in South Africa, there is an urgent need for industries to work more closely with government and state-owned enterprises (SOEs) so that companies can more effectively optimize their supply chains and tackle spiraling costs. Though, such collaboration needs to involve all industries and all public/private partnerships (Prest, 2012). In addition, the challenges generate hard to believe vulnerabilities for delays, non-deliveries, damage of commodities, loss of fleet and higher operational expenses. Unluckily, African

*Corresponding author Email address: wubealie@gmail.com

countries also play host to some of the most poorly maintained road systems in the world, widespread political conflict and hostile weather conditions(Rabiya & Edward, 2016),(Adero, 2015). Accordingly, this study also examined supply chain integration practices on the performance and global comparativeness of East African basic metal industries. Currently, despite the significant expansion of industry in Africa including basic metal industries, there has been very little practices of supply chain systems in the region. This results in the regional basic metal industries, there were weak, fragmental and poor supply chains systems. Though this poor and non-integrated supply chain (internal, external) and inhibitors of manufacturing capacity, the performance and global competitiveness of basic metal industries in the region are poor. Since to tackle that poor infrastructure and difficult business conditions persist in the continents, it is critical to design and develops creative and flexible supply chain integration strategies in the continents so as to upgrading and growing Africa's economies. Thus, it is a serious task to design optimum supply chain systems so as to improve the performance and competitiveness of the sector to the regional dynamic capability. Thus, to tackle these problems this research is designed.

1.2. General objectives of the paper

Mainly this study investigates practices of East African basic metal industry supply chain integration to the dynamics contribution of the regional economy. Though, the practice, roles, challenges, importance of supply chain integration (SCI) on manufacturing industries to dynamics contribution of regional economic performance are incorporated in the study. Further to show research implication on regional integrations and contributes to further research agenda.

1.3. Research methodology

In this empirical and theoretical literature survey are designed for identifying and evaluating the patterns, the theory, practices of supply chain integration, and its contribution to the performance improvement of the regional economy. In addition to the investigations of supply chain practices, the study to contribute to theory-building through a rigorous, systematic and in-depth analysis of how previous studies have been conducted. In addition to a literature survey, the primary data collection instrument used was a questionnaire which was administrated to a total sample of 200 industry experts, administrative officers, industry directors, production, quality, purchasing and procurement heads, the industry managing directors and senior staff from 21 manufacturing firms in Ethiopian were incorporated. Thus, this study was mainly done through theoretical qualitative analysis, the mind map and descriptive and qualitatively the data were analyzed using fuzzy, AHP, fuzzy TOPSIS, analysis.

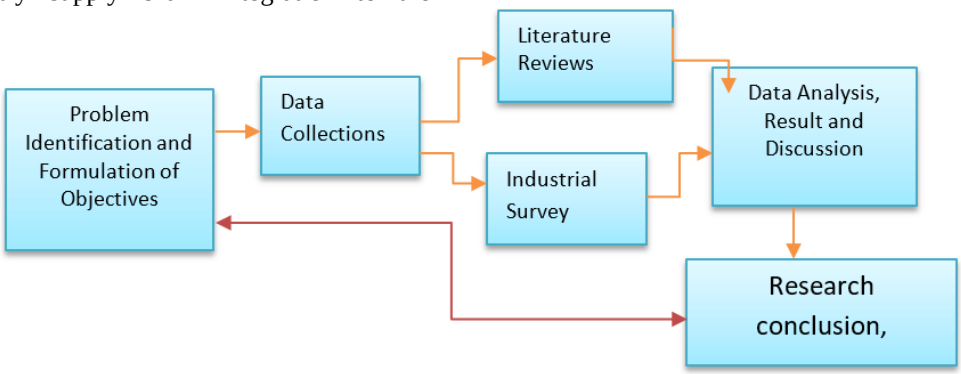

Fig.1. The research methodology framework

2. Literature Analysis and Discussion

2.1. Global supply chain integration practices

Business organizations strategically integrate into both intra- and inter-organizational processes to accomplish the mutual benefits of the supply chain partners (Dametew, Abebe, & Ebinger, 2016). This strategic collaboration with firm organizations is supply chain integrations. The integration provides to an organizations, strategically collaborate with its partners and manages intra and inter-organizational processes in order to achieve efficient and effective flows of products, services, information, money, and decisions Halme (2010). Enormous researches(Guan & Rehme, 2012),(Huo, 2012),(Kurniawan, Zailani, Iranmanesh, & Rajagopal, 2017) were conducted to on the impacts of supply chain strategies on manufacturing industries. For instance, s(Mostert, Niemann, & Kotzé, 2017) shows that, supply chain integration provides the co-operation between various functions in the supply chain systems so as to improve firm performance and effective flow of resources between firm organizations and enhances the competitive environment to manufacturing industries. While, sustainable competitive advantage on supply chain firms achieved by through successful coordination and partnership in the supply chains from transferring inputs to

the consumption stage of the supply chain systems. Therefore, an effective and efficient supply chain integration provides to achieve improved flows of products and services, information, money, and decisions, in order to provide maximum value to the client with minimum expense and agile systems(Bozarth, Warsing, Flynn, & Flynn, 2009). Hence, supply chain integration provides to have a great impact on the performance and competitiveness of manufacturing firm at regional and global levels.

2.2. Regional supply chain integration practices

At this time, firms are now looking at protects cost, quality, technology, resource, systems, and other competitive advantages as an approach to track in a globally competitive and sustainable environment on their system. It is critical that nations, individual organizations focus their policies, systems, and resources in a coordinated way for competitive advantage by practicing advanced performance and management systems in a proper manner(Pulakos, 2014),(Dametew, Abebe, et al., 2016). As a result, many manufacturers industries are focusing on implanting supply chain management practices on their systems. Besides the previous study shows(Geda, A. and Degefe, 2005),(Abegaz, 2013) that, despite the significant expansion of industry and best performances are an increase(Ngatia, 2013),(Kimechwa, 2015) in East Africa there have been very little practices on supply chain systems in the region. As well because of improper and poor supply chain systems in the region, basic metal industries are hampered by numerous challenges,(Kibera, 2016),(Dametew, Ebinger, & Abebe, 2016),(Georgise, Thoben, & Seifert, 2014b). Likewise, due to poor infrastructure, problems green production, problems in management systems, lack of skilled manpower to handle problems, electoral malpractice, regional imbalances, corruption, improper land policy, and problems in resource mobilization (Shuriye & Ajala, 2016),(Thinking, 2012), (Kanyinga, Kiondo, & Tidemand, 1994) are hacked to the regional economy particularly manufacturing sector including basic metal industries. While, as, an opportunity, the East Africa basic metal sector can be practice and depend upon the potentials of regional integration and collaborations for enhancing sustainability and achieve competitive advantages through supply chain systems. Meanwhile, regional integration has played a key role in boosting intra-East African trade and increasing the region's access to global. This regional integration provides to enhance regional cooperation and collaboration in improved access to markets, enabling infrastructure, improve research and technology transfer, technology, and utilize resources and skills development in the firms. Thus, sustainable and inclusive growth in the basic metal industry could enhance through supply chain integration of the sectors at regional levels is crucial.

2.2.1 Supply chain practices in ethiopia

Currently, the Ethiopian government has designed and adopted agricultural development led industrialization strategy to eradicate poverty. The industry expansion policy of the country has set up the principles that primarily focus on the campaign of agricultural-led industrialization, export-led development, and expansion of labour-intensive industries. As (Homma & Ababa, 2010),(Sector, 2014), (Mitiku, 2015),(Gu, 2014) clearly stated in the country's industrial development strategy, the value-adding private sector is considered the engine of the sectors' growth and the economic development of the countries. Although in the five three year Growth and Transformation Plan (GTP) implementation of the country, the industry sector received utmost emphasis by way of encouraging export based and import-substituting industries. Moreover, the industrialization strategy also emphasis on the commercialization process highly support to the agriculture sector within agro-industrialization platforms.

The agro-industrialization mainly alien with value chain approach and systems. Even though the tremendous efforts made and the economic growth achieved, the Ethiopian economy remains beleaguered by structural problems. On the other hand, in Ethiopia supply chain systems are infant limited and found as fragmented supply chain, rigid business process, problems on skill manpower, outdated technology, lack of a relevant literature on practical experience in supply chain integration have been the current trends and the challenges of Ethiopia manufacturing firms(Georgise et al., 2014b).

The table (1) above shows the trends and practices of supply chain systems in Ethiopia that addressed by numerous researchers were investigated. According to the results, the supply chain practices in Ethiopia is infancy, particularly in the case of the basic metal sector is fragmental and null (Georgise et al., 2014b),(Dametew, Ebinger, et al., 2016), (Asmamaw, 2016).Furthermore, this literature analysis found that infancy, poor and non-integrated supply chain, improper supply chain performance measurement, lacks supply chain integration method & strategies, lacks supply chain literature, poor supply chain management practices, and systems were the main constraints and challenges of the current Ethiopian manufacturing sectors. As a result of these problems, the manufacturing capacity, the performance, and global competitiveness manufacturing sectors are weak and poor.

Table 1

Ethiopia Supply Chain Management Practices Investigations

Author and year of publications	Analysis and Methods	Study and findings	Gaps
(Tolossa, Beshah, Kitaw, Mangano, & De Marco, 2013)	Literature survey and analysis	Using literature analysis, the infancy in supply chain integration and industrial cluster process were studied. The research implication, and further research directions on the roles of supply chain management and benchmarking to firm performances also incorporated.	Needs empirical investigation, conducted non-metal industries.
(Georgise et al., 2014b)	Literature survey and analysis	The literature analysis shows the fragmental supply chain practices highly effect on the performance and competiveness of Textile, leather industry and other industries in the country. Mainly, in sufficient literature, traditional supply chain system are the main constraints, addressed in the study.	The study excludes metal and related industries, needs empirical investigation, needs comparative analysis with other nation and sectors.
(Beyene, 2015)	Descriptive	Green purchasing, marketing practices, investment recovery, organizational commitment, eco-design and environmental practices the main challenges of Ethiopian tanneries in related to the green supply chain integration practices on manufacturing industries. Moreover, lack of government support policies were investigated challenges of implementing green supply chain management in the sector also the challenges.	Only emphasis green supply chain process, but before greening first the industry should integrated and need integration strategies but the study does not considered the way and the method of supply chain integrations.
(Jain & Hailemariam, 2010)	Survey by case	The five key areas including corporate culture and decision making, Partnership and collaboration, Airport SC information management system, Performance measurement, Value adding and optimizing in the airport SC activities were investigated, that needs to emphasize for enhancing for improved performance supply chain management processes/practices relevant to the airport industry in were studied and investigated.	The study was conducted on services areas and more emphasis on strategic and leadership systems. Also, study was more emphasis airport sectors but in the aircraft industry the systems is already designed no need for further studied, instead it is batter to study in manufacturing sectors.
(Mebratu, 2013)	Survey study	In Ethiopian many firms have not incorporate supply chain management in department level or in their organizational structure and the practices of supply chain management in Ethiopia is infancy. The survey result shows that, internal (warehouse, Logistics, Inventory related issue), external (shipment, fragmentally material handling, delay Power fluctuation), and improper ERP System (limited capacity server, suppliers 'capacity to send the documents) were investigated as the main constraints of Ethio-telecom, supply chain process.	The study conducted on service industries, excluded on manufacturing industries. The study shows the gaps on the selected sectors not clearly proposed and developed solution models on integrated supply systems.
(Georgise, Thoben, & Seifert, 2014a)	review of literature and survey study	This study shows that due to poor and improper supply chain performance measurement, and lack of supply chain integration model, the performance and practices of supply chains is poor and low.	The study was more theoretical than practical
(Lemma*, 2015)	Literature survey and analysis	Based on an extensive literature review study, non-price coordination, information & relationship, price coordination, and product development were investigated the four key constructs of Ethiopian milk suppliers, processors, and retailers on the supply chain process and practices.	The study more in agro-industry and survey, not supported with empirical
(Asmamaw, 2016)	Case assessment and case studies	The visibility of the inventory status, planning, forecasting and sharing of supply chain information were investigated as gap for joint relation on breweries with their suppliers and customers. According to this study, due to limited local suppliers' capacity and long import process, upstream supply chain systems were less reliable and flexible than the downward supply chain. This implies that the practices and performance of supply chain processes are weak and poor in the sectors.	More related on inventory, and strategic relationships. The study not more studied on technical and operational supply chain integrations
(Gizaw, 2016)	Survey study	The main target of the study is to assess the effects of supply chain integration on operational performance in Ethiopian trading enterprise. According to the study depicts that, there is poor integration along the supply chain.	Emphasis on supply chain integration on operational performance, But it not clearly studied, it is vague. Moreover, excludes other supply chain issues.

2.2.2. Supply chain in kenya

The Kenyan metals industry is relatively old and having been established in 1948. The industry is today dominated by a few Kenyan Asian-owned firms such as Kenya United Steel Company, Steel Africa, Mabati Rolling Mills, in steel, Kaluworks, G sheet and Doshi(Wetangula, Mazurewicz, & Stats, 2017),(Chege, Ngui, & Kimuyu, 2014). Though, basic metal sectors are consist of steel smelting, hot rolling industries to the manufacture of wire and wire products, galvanized and cold-rolled steel products(reinforcement bar, and pipes(squire, round pipes) to supply downstream industries such as constriction sector, engineering, agro-processing, textile and chemical processing industries. In relative to other East African countries, material capability, the technology, and industrial progress of the country are good. For example, canon aluminium is the largest aluminium fabricator in Kenya, having cut a niche in the region as one of the leading aluminium fabricators serving the East African market. Even though the firms rely partly depend on imported material and equipment, most industries are forging owners, currently a few local the minority shareholding they have acquired in a few firms and expatriate technicians but have built up considerable local know-how and skilled manpower. Till now the steel raw steel scrap, steel billets and hot rolled coils for basic metal industries are supplies from both local and international markets. Raw steel imported from South Africa, Japan, India, and China, are the major importers of raw steels to Kenya. Besides, the expansion of the basic metal industry is good, but the performance and competitiveness of the sector in comparison to their age, it is still poor and infant. This industrial infancy is occurred from numerous problems including poor supply chain systems, working individual business process rather than integrate and cooperation systems of firms in developing countries (Lucy Wairmu Kibera1, 2016). As well as the increasing of product cost, the performance and in quality wise of the majority of supply chain practices have been implemented not attractive and poor. Moreover, bulk quantities of iron and steel that could be exploited for saleable schemes. Even though due to quality issue, production capacity and problem in material resource planning, the raw material local, regional, international market performance is low (F.B. Georgise, 2011), (Kazi, 2012), (David, 2014). As a result of this challenge, the dynamic capability to the economic contribution of the firm is weak and poor. As a result of improper supply chain practices implementation, due to quality problems, the contribution of the system to firm performance improvement is little and the industries work numerous challenges/problems. Also the performance improvement in the production process, the GDP contribution of manufacturing industries are comparativeness of the firms are poor. As well, due to weak and non-integrated management and leadership systems, the logistics management system, lean supplier systems and implantation of computerized and coordinated supply chain systems could not improve the performance and competitiveness of firms. Furthermore, in addition to, the local market the Kenya basic metal sectors have a good market opportunity in Rwanda, Tanzania, Uganda and the Democratic Republic of the Congo for sale their product to constriction, agro-processing, engineering industries. But because of insufficient steel products, the satisfaction of both local and international/outside customer satisfaction is poor. This implies that the supply chain process still infant stages and was not properly practicing in the country(Francis & Waiganjo, 2014). Additionally, the practice and trends of supply chain performance including poor infrastructure, bulky material transportation, demand uncertainty, maintenance problems, and lack and qualified manpower problems were investigated as the main challenges of Kenya medical supplies agency (Akinyi & Nairobi, 2017). Moreover, the Kenyan food and beverages firms are practicing green supply chain systems like environmental collaboration, environmental monitoring, purchasing, and inbound logistics through green procurement, green production, green distribution and reverse logistics(Onyinkwa & Ochiri, 2016). Even though the practices of green supply chain processes food and beverages industries begins but the level of waste elimination, pollution control, and environmental conservation, and they employ environmentally friendly logistic systems, the way of energy consumption and pollution control trends were to a moderate and at low levels. As a result of the performance of firms in terms of market shears, rank favorably against their competitors were the moderate extent and at lower stages in the sectors(Onyinkwa & Ochiri, 2016). Last but not least the numerous study above indicates that in Kenya manufacturing industry(including metal and another sector), the expansion and the progress of manufacturing industries are good but due to improper supply chain integration, weak management systems, strategies hassle, problems raw material, un-skill manpower, problems on production capacity, quality problems, environmental protection, problems on infrastructure (Prasad & Sounderpandian, 2003),(Onyinkwa & Ochiri, 2016) were seen in the industries. This challenges and deficiency affect the efficiency, performance, competitiveness, and sustainability

of manufacturing firms. Thus, to improve the performance, competitiveness, and sustainability of manufacturing industries specifically basic metal industries, regional integrations with supply chain can be a crucial gun to tackle the challenges.

3. The Result and Discussion

3.1. Theoretical analysis and results

Globally the steel industry is the largest manufacturing activity in the world that produce the inputs to other manufacturing industries. From an application point of view, iron and steel industry plays a key role in the economy as it provides the basic materials necessary for the production of many industries including construction, automotive, machine tool manufacture and transport sectors goods. This study shows that the basic metal industry is considered as the leading industry to realize speeding up the industrialization of the given economy in a nation in general. Even though in the case of East Africa the steel and basic metal industry come out a downward and poor capability. This is due to various factors includes poor supply chain integration, problems in technological capability, improper resource utilization, un-skill man-power, infant resource utilization, product quality are the main constraints. Due to these fragmental and weak supply chains strategies, the performance and competitiveness of regional basic metal industries are weak and poor. Moreover, this study shows that the poor logistics infrastructure, limited access to finance, problems in electricity, transport infrastructure, technological ability, insufficient raw material, poor resource use, and information communication technology networks problems are the major constraints of the sectors(Dametew & Ebinger, 2017),(African Development Bank, 2014). These results to produce a relatively narrow range of products, often suffer from low productivity, and generally use few people and little capital investments are spent. Therefore, due to these constraints and challenges, the dynamic ability of the sectors at regional economic contribution and global competitiveness is an infant. Though, to tackle the problem and the challenges, regional supply chain integration strategies can consider for being a weapon to regional economic dynamic ability. Because regional integrations through supply chain integration can improve the transportation facility to linkage among all raw material suppliers to production centres, sources of raw materials to the supplier, manufacturers to the markets provide to enhance sector competitiveness. Thus, it is critical to think and needs to an effort to improve regional basic metal sector performance to enhance competitive advantages of the sectors and assure global competitions.

3.2. Empirical study & analysis

3.2.1. AHP-analysis and discussion

As a methodological approach, the Analytic hierarchy process (AHP) is used for the empirical investigations of this study. Commonly this AHP tool provides to evaluate the relative values of all criteria, comparing alternatives for each particular criterion and defining the average importance of alternatives. Furthermore, the AHP tools are one of the commonly used tools for the decision-making process on the enables decision-makers to determine the effects of many complicated and uncertain situations. Thus, this AHP analysis process supports decision-makers with setting priorities allowing for their purposes, knowledge, and experience. Therefore in this study, the AHP evaluation process involves the following six essential steps(Lee et al., 2008), (Lee et al., 2008).

i. Define the unstructured problem

ii. Developing the AHP hierarchy

iii. Pair-wise comparison: For each element of the hierarchy structure all the associated elements in low hierarchy are compared in pair-wise comparison matrices as follows:

$$A = \begin{bmatrix} 1 & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & 1 & \cdots & \frac{w_2}{w_n} \\ \cdot & & & \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & 1 \end{bmatrix} \quad (1)$$

Where A = comparison pair-wise matrix, w = weight of element or alternatives.

iv. In the fourth step the relative weights of the criteria can be determine: In this stage the relative weights (W) of matrix A is obtained from following equation: $A * W = \lambda max * W$, λmax = the biggest eigenvalue of matrix A, I = unit matrix the vectors.

v. Check the consistency: The consistency index CI and the consistency ratio CR for this matrix that should be calculated by the following formulas$CI = \frac{\lambda max - k}{k-1}$. The formulation of CR is:$CR = \frac{CI}{RI}$ Since the consistency index of a randomly generated reciprocal matrix shall be called to the random index (RI), with reciprocals forced.

vi. In this stage the decision maker makes to the overall rating of the criteria: Since, the relative weights of decision

elements are combined to obtain an overall rating for the alternatives as follows:

$$w_i^s = \sum_{j=1}^{m} w_{ij}^s w_j \qquad ,i = 1,\ldots,n \tag{2}$$

Where, $w^s i$ = total weight of site i

Application of AHP Analysis

While the above procedures are applied in the following sections. Therefore, the AHP analysis initially breaks down a complex multi-criteria decision-making problem into a hierarchy of interrelated decision elements including the criteria and decision alternatives. Followed by the objectives, decision criteria and alternatives are arranged in a hierarchical structure similar to a family tree. Though once the problem has been decomposed and the hierarchy is constructed, the prioritization procedure starts in order to determine the relative importance of the criteria of supply chain integrations. Though in the fowling section the performance indicators of supply chain integration to basic metal industrial are evaluated and personalized and to know the levels of basic metal industry regional performance. The global competitiveness, customer satisfaction, financial performance, regional profit margin, and operational performance are used as the evaluation criteria to sector performance.

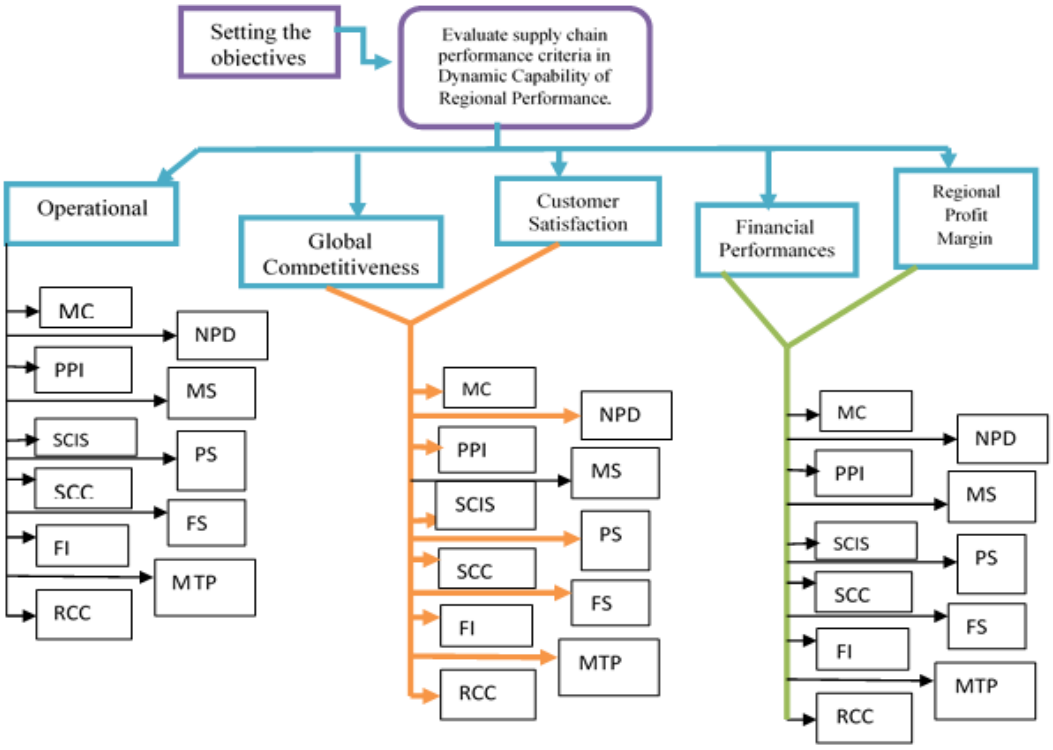

Fig. 2. AHP decomposition of research variables in various criteria

In the figure (2) above the most supply chain integration variables are decomposed in various criteria and driving parameter to investigation the performances of the firms in the regions. Further, as the analysis of comprehensive ranking index should cover reasonableness and viability of the other twelve sub-criteria also investigated. The sub-criteria consists material capability(MC), process product and process innovation(PPI),logistics infrastructure capability(LIC),SC information sharing(SCIS), supply chain collaboration(SCC), finance(FI), product quality and standardization(PS) ,regional cooperation capability(RCC), flexibility of the systems(FS),new product development strategies(NPD),manufacturing technology and process competitiveness(MTP) and market sharing(MS) are considered. Thus, the status, impact, and role of various criteria or factors in the evaluation process of regional supply chain integration to regional manufacturing

industries performances impacts are studied. Having this information the results of the weighting values, and their impact on supply chain performance are incorporates in the following ways.

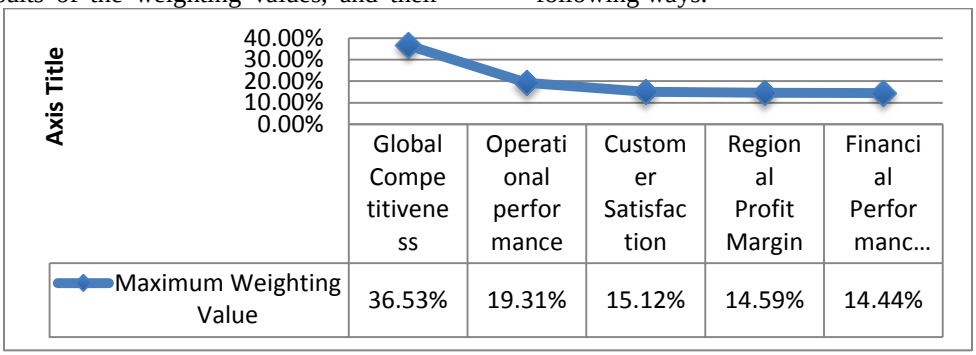

Fig. 3. The main criteria weighting on regional performances indicators

The figure (3) shows that a simple AHP hierarchy result, with a high-performance indicator of supply chain integration on region industries. The aim is to evaluate the performances industries of manufacturing industries that impact on regional economic dynamic capability through supply chain integrations. The supply chain performance indicators including operational performance, customer satisfaction, global competitiveness, regional profit margin, and financial are empirically investigated. According to this empirical result, the global competitiveness is the highest impacts of regional firm's performance, followed by operational and customer satisfaction. Thus, this empirical result clearly shows that the extent of global competitiveness, operational performance, and the customer satisfaction issue have highly influenced on the performance and competitiveness of firms within the regional supply chain process. .This means, if the regions have better global competitiveness strategy, the overall performance is better, and then the competitiveness issue needs more emphasis. Even if the regional have lower competitiveness performance in production, global market shear, manufacturing process, technology, lower customer satisfaction and GDP contribution (Kazi 2012), (David, Africa gearing up 2014). This implies that the supply chain of regional metal sectors is weak and infant. As a result, the dynamic economic contribution of basic metal sectors for the regions are weak and null. Whereas the smaller the ranking value, the lower priority that to work on supply chain integration process. In addition the weighting values of the twelve sub-criteria or factors shown the table below indicates, the comprehensive ranking values, that determined, which supply chain integration variables highly influences on the overall regional supply chain integration process. According to this result, the regional cooperation capability is very highly influenced by the change of the regional supply chain integration performances. Material capability, process product and process innovation, logistics infrastructure capability, SC information sharing, supply chain collaboration, finance, product quality and standardization regional cooperation capability, flexibility of the systems ,new product development strategies, manufacturing technology and process competitiveness and market shearing also impacts the supply chain integration of regional manufacturing industries in various extents. Since within various performance indicators, supply chain integration has a great impact on the dynamic capability of the regional economy. Thus, achieve the dynamic capability of regional economic performance integrated and improved systems are important.

Table 2
The Sensitive Analysis of Sub-criteria impacts the performance of the firm in the regions.

	The research Variables	Ranking Values
1	Regional Cooperation capability	12.38%
2	Supply chain collaboration	9.94%
3	Manufacturing technology and process competiveness	9.26%
4	Finance	9.20%
5	Flexibility of the systems	8.47%
6	Logistics infrastructure capability	8.06%
7	SC Information Sharing	8.05%
8	Product quality and standardization	7.86%
9	Process product and process innovation	7.05%
10	Market shearing	6.93%
11	Material Capability	6.52%

12	New product development strategies	6.28%

Further based on the AHP decision criteria, on their empirical values about the relative importance of each factor, and on their judgments about each variable with respect to each of the criteria, the regional cooperation capability, with a priority of 12.38%, is by far the most influential factors on supply chain integrations. Since applying the AHP investigation the impacts and the driving factors on supply chain integrations can be investigated. Ultimately, the roles of the basic metal industry supply chain integration to the dynamic capability of the regional economy are evaluated. Even though due to poor regional cooperation, fragmental supply chain collaboration, outdated manufacturing technology, non-integrated production process, financial constraints, and logistics infrastructure challenges the performances on east Africa basic metal industries are weak and poor. Due to this weak and poor performance, the regional economic contribution of the sectors is an infant. According to this analysis, the theoretical and empirical investigations are the same. For instance technology, quality, cooperation, infrastructure issue, information sharing are the main drivers and impacts of supply chain integrations. These are endorsed by both empirical and theoretical results of this study. Thus, our results are confirmed and used as an evidence for further investigations. From this result, we perceive that supply chain firms should take in to account on working more an emphasis on their efforts on the competitiveness of the firm to be competitive in their business in the global market. Laterally firms should be work together to implement more effective and efficient strategies for resolving the issue and jams of performance improvement and systems on their integrations. Therefore, managers and leaders should be considering the impacts and the levels of these drivers' factors to supply chain integrations process are essential.

3.2.2. Fuzzy TOPSIS analysis and investigations

3.2.2..1. Introduction

In this section, the existing supply chain integration practices, performance and their impacts on the regional economic contribution were studied and investigated through the fuzzy TOPSIS approaches. For the analysis purpose, we have to incorporate three Ethiopian basic metal industries as a case company. The case company which has been selected in this study is based on the long-time production practice, the representative on the sector, production verity and production size are considered. For the demonstration purpose from 21 selected industry, we have to present on the results for ETESI, ETAB and ETWSI industries. Besides, due to the popularity and simplicity in the concept of the traditional TOPSIS, is often criticized for its inability to adequately handle the inherent uncertainty and imprecision associated with the mapping of the decision-makers perception to crisp values. Though initially the fuzzy TOPSIS method was developed by Hwang and Yoon and widely used for estimating as far is a particular alternative near the ideal solution (M. Moayeri, 2015). It provides to work on selected the alternative should have the shortest distance from the positive ideal solution and the farthest distance from a negative ideal solution (Fuat Alarcin, 2014). In this methods the Fuzzy Positive Ideal Solution (FPIS), which represents a mission benefit and the Fuzzy Negative Ideal Solution (FNIS), lowering the mission of the business process. Mathematically Fuzzy TOPSIS concept follows the following concepts (Aydin M. Torkabadi, 2018) , (M. Moayeri, 2015), (Rajendra Kumar Shukla, 2014).

Step 1: Determination of linguistic terms, membership functions and the weighting of evaluation criteria investigate the linguistic variables for all criteria. Each linguistic variable is assigned a set of membership functions; determine weights of evaluation criteria and the ratings of alternatives are considered as linguistic terms. Suppose there are possible alternatives called $D=\{D_1, D_2, \ldots, Dj\}$, which are to be evaluated against M criteria, $C=\{C1, C2, \ldots, Cm\}$. The criteria weights are denoted by w_i $(i = 1, 2, m)$. The performance ratings of each decision maker D_k $(k = 1, 2, \ldots, K)$ for each alternative Dj $(j = 1, 2, \ldots, n)$ with respect to criteria Ci $(i = 1, 2, \ldots, m)$ are denoted by $R_k = x_{ijk}$ $(i = 1, 2, \ldots, m;\ j = 1, 2, \ldots, n;\ k = 1, 2, \ldots, K)$ with membership function $\mu R_k(x)$.s.

Step 2: Construct the fuzzy decision matrix. This matrix is directly associated with linguistic variables and the criteria alternatives. Assumed that the number of criteria is n and the count of projects is m, fuzzy decision matrix will be obtained with m rows and n columns as in the following matrix:

$$\begin{matrix} & c1 & c2 \ldots\ldots cn \\ \tilde{D} = & \begin{bmatrix} \tilde{x_{11}} & \tilde{x_{12}} \ldots & \tilde{x_{1n}} \\ \tilde{x_{21}} & \tilde{x_{22}} \ldots & \tilde{x_{2n}} \\ \tilde{x_{m1}} & \tilde{x_{m2}} \ldots & \tilde{x_{mn}} \end{bmatrix} \end{matrix} \qquad (3)$$

$$\tilde{x}_{ij} = \left(a_{ij}, b_{ij}, c_{ij}\right)$$

Where and

$$a_{ij} = \min\left\{a_{ij}^{k}\right\}, b_{ij} = \frac{1}{k}\sum_{k=1}^{k} b_{ij}^{k}, c_{ij} = \max\left\{c_{ij}^{k}\right\} \quad (4)$$

Where A_1, A2... Am alternatives, the parameters of the process which must be ranked according to established criteria or indicators $C_1, C_2, ..., Cn$, x_{ij} is the rating of alternative, Ai with respect to criterion C_j.

Step 3: Normalize the fuzzy decision matrix**.** The normalization of fuzzy decision matrix is accomplished using linear scale transformation. If the normalizing positive and maximum value, the factors are highly contributes at positive way and the reverse is true.

$$\tilde{R} = [\tilde{r}_{ij}]_{m\times n}, i = 1, 2, ..., m; j = 1, 2, ..., n \quad (5)$$

Where **rij** is the normalized value of xij=(a_{ij}, b_{ij}, c_{ij}) and then,

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^{+}}, \frac{b_{ij}}{c_j^{+}}, \frac{c_{ij}}{c_j^{+}}\right) \text{and } c_j^{+} = \max c_{ij} \,(\text{benefit}) \quad (6)$$

$$\tilde{r}_{ij} = \left(\frac{a_j^{-}}{a_{ij}}, \frac{a_j^{-}}{b_{ij}}, \frac{a_j^{-}}{c_{ij}}\right) \text{and } a_j^{-} = \min a_{ij} \,(\text{cost}) \quad (7)$$

Step 4: **Calculate the weighted normalized fuzzy decision matrix** (table 9& table 10)

$$\tilde{V} = \left[\tilde{v_{ij}}\right]_{n\times j}, i = 1, 2, \ldots n; j = 1, 2, \ldots J \quad \textbf{Where} \quad (8)$$

$\tilde{v_{ij}} = \tilde{x_{ij}} \times w_i$.

Step 5: Determine the fuzzy positive-ideal solution (FPIS A+) and fuzzy negative-ideal solution (FNIS A-). Value of ranges belong to the closed interval [0, 1]. FPIS and FNIS are defined as triplet (1, 1, and 1) or (0, 0, 0). Else the values determined by using the following formula:

$A^{*} = \left(\tilde{v}_1^{*}, \tilde{v}_2^{*}, \ldots, \tilde{v}_n^{*}\right)$, and $A^{-} = \left(\tilde{v}_1^{-}, \tilde{v}_2^{-}, \ldots, \tilde{v}_n^{-}\right)$ ---------- (9)

Where $\tilde{v}_j^{+} = (1,1,1)$ *and* $\tilde{v}_j^{-} = (0,0,0)$, ,j=1,2,…n.

Step 6: Calculate the distance of each alternative from FPIS and FNIS.

$$d_i^{+} = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^{*}\right)$$

, and (10)

$$d_i^{-} = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^{-}\right), i = 1, 2, \ldots, m$$

Step 7.Calculate the closeness coefficient to the ideal solution shown in table.12. The closeness coefficient CCi is defined to determine the ranking order of all alternatives. The index CCi indicates that the alternative is close to the FPIS (dj $^{+}$) and far from the FNIS(dj $^{-}$). The closeness coefficient to the ideal solution can be calculated as:

$$CC_i = \frac{d_i^{+}}{d_i^{+} + d_i^{-}} \quad (11)$$

8. Ranking the Alternatives

The ranking order of all alternatives, the ranking of alternatives is carried out based on the calculated closeness coefficients. The alternative with the highest coefficient represents the best alternative is close to FPIS and farthest from the FNIS. Thus, this positive ideal solution is a solution that maximizes the benefit criteria and minimizes cost criteria, while the negative ideal solution maximizes the cost criteria and minimizes the benefit criteria. Thus, using various supply chin integration indicator, the supply internal, customer, supplier, and the overall supply chain integration practice on the case company was investigated and prioritized. Our goal is too evaluated and investigated the practices of supply chain integration on the case companies, so as to accomplish the future supply chain integration model development and make an action to supply chain integrations for process improvements. Therefore using this procedure the results of each cased industry were found in the following sections.

Case Study-1 : **Company ETESI**

The supplier, internal company and the customer integration of the case company was studied. Based on the company supply chain practices, the overall performance and regional economic contribution of the sector were predicted

A. Supplier integration ETESI

Table 3
Supplier integration performances on the case company

Prior Area of integrations	Loading Values of Variables		
	Cumulative weights	**CCj**	**Practice in 100%**
Strategic plan for transportation and logistics system from internal supply chains.	3.0000000	0.592	40.8
Level of supplier partnerships between firms in information flows	4.333333	0.562	43.8
Level of supplier integration in design and devlopmnt	3.333333	0.583	41.7
Integrations for demand forecasting, ordering and delivery system	3.916667	0.570	43
The level of resource shearing and collaborative work capability	3.333333	0.584	41.6
Financial Resource Shearing	3.7500000	0.571	42.9
Customer support, feedback and product sustainability, after sale service support integration	3.416667	0.579	42.1
Joint demand forecasting	4.083333	0.565	43.5
Establish fast ordering system	3.2500000	0.580	42
Long-term relationship with strategic suppliers	4.416667	0.560	44
Cumulative Percentage In** Supplier Integration **Practices			42.5%

The TOPSISS result indicates in the above table (3) the ETESI has lower supplier integration practices and highly high barriers to supply chain integration. This empirical investigation shows that the supplier integration and their supply chain practices in the focal company are found as 40.8% were described as being strategic plan for transportation and logistics system from internal supply chains,43.8% of supplier partnerships between firms in information flows, 41.7% were described as a supplier integration in design and development, 43% were described as a,41.6% were described as a,42.1% were described as a customer support, feedback and product sustainability, after sale service support integration,43.5% were described as a joint demand forecasting,42% were described as a establish fast ordering system, and 44% were described as a long-term relationship with strategic suppliers integrations. The cumulative supplier chain integrations practices being accounts 42.5% on the frim. This evaluation on supplier integration process highlights that the focal organizations perhaps do not fully inserted the entire systems and it is considered as a lower ranking level and situation.

B.Internal Integration for ETESI: In the same fashion the internal firm supply chain integrations were clearly investigated and evaluated based on the data obtained from the respective body of the focal company. The internal company integration in a supply chain systems are highly and directly affected the overall performance of the supply chain systems. Currently, the ETESI have good practice in internal company integration for the success and goal achievements of the company and the sector as well. According to the table below clearly indicates that the internal firm integration variables including knowledge-based skills and manpower capability, technological capability of the machine (the newness of organization machines, variety, efficiency), cross-functional integration in new product design and development capability, warehouse management system and facility, capability of production planning and control systems, information sharing capability (real-time optimization),and online coordination and material flows are determined and evaluated. the global capabilities in product quality and flexibility, and customer support, feedback, and product sustainability, after sale service support integration accounts 44.2%, followed by technological capability of the machine (the newness of organization machines, verity, efficiency), and information sharing capability (real-time optimization capability accounts 42.9% have higher achievements relative to the other performance indicators in the firm. The ETESI Cross-functional integration in new product design and development capability and warehouse management system and facility, online coordination, and material flows, and capability of production planning and control systems lower performing practices and have accounts (40.8%) relative to the other given evaluation criteria. This means that internally these function of supply chain integrin and process are not highly practices and are not considered as a driving force for the performance improvements of the focal company.

Table 4
Internal Company Supply Chain Integration Performance

Prior Area of integrations	**Loading Values of Variables**		
	Cumulative weights	**CCj**	Internal integration practice in 100%
Knowledge Based Skills and Manpower capability	3.250	0.581	41.9
Technological Capability of the machine (the Newness of organization machines, Varity, efficiency)	3.083333	0.571	42.9
Cross-functional integration in new product design and development capability	2.583333	0.592	40.8
Global capabilities in product quality and flexibility	3.0000	0.558	44.2
Level of Real Time Access to Information for high visibility	3.00000	0.579	42.1
Capability of material handling and equipment facility	3.50000	0.579	42.1
Warehouse management system and facility	3.000000	0.592	40.8
Integrated industry and project management skills and close relationship and mutual understanding	3.333333	0.592	40.8
Capability of Production planning and control systems	2.916667	0.592	40.8
GDP contribution Capability	3.583333	0.581	41.9
Information shearing capability(real-time optimization	2.666667	0.571	42.9
Online coordination and material flows	2.833333	0.592	40.8
Customer support, feedback and product sustainability, after sale service support integration	3.166667	0.558	44.2
The Cumulative percentage of Internal Company Supply Chain Practices			***42%***

Furthermore, according to the company managing director, logistics head, production and quality manager, and purchasing manager confirmed that government intervention, the country infrastructure facility, ICT capability, power fluctuating, and the innovation systems are the challenges that hacked the performance and competitiveness of the focal company. Due to these constraints, the internal company and external supplier and customer integrations are not such extents good.

C. Customer Integrations for ETESI: The fuzzy TOPSIS analytical result investigates the significance integration levels of the selected case company within customers. The customer integrations have a higher impact on the performance improvement of manufacturing industries in supply chain systems.

Table 5
The Customer Supply Chain Integration Performance

Prior Area of integrations	**Loading Values of Variables**		
	Cumulative weights	**CCj**	**CI. practice In 100%**
Strategic plan for transportation and logistics system from internal supply chains.	4.7500	0.556	44.4
Level of internal and supplier partnerships between firms in information flows	4.916667	0.552	44.8
Integrations for demand forecasting, ordering and delivery system with internal company	4.666667	0.558	44.2
The level of resource shearing and collaborative work capability	4.083333	0.563	43.7
Customer support, feedback and product sustainability, after sale service support integration	2.666667	0.606	39.4
Joint demand forecasting	3.666667	0.571	42.9
Customer growth and the extent of customer satisfaction integration	2.75000	0.605	39.5

Establish fast ordering system	3.583333	0.571	42.9
ICT infrastructure with supply chain partners	3.416667	0.582	41.8
The Cumulative percentage of Customer Supply Chain Integration Practices			***42.62%***

D. The Cumulative Supply Chain Performance of ETESI

Under this section, using various performance indicators the general supply chain performance of in ETESI were investigated. The table below gives a clearer picture to understand the condition and practices of supply chain systems in the case company. According to this empirical investigations, ETESI in supply chain integration performance interims of closeness coefficient value accounts (0.583) raw material capability, (0.570) financial resource performance, (0.581) innovation and technology transfer facility and capability, (0.580) logistics energy and electric power infrastructure, (0.579) warehouse management system and skill manpower capability, (0.571) green manufacturing capability, (0.565) delivery speed ,flexibility ,time and quality,(0.563)leadership and management capability, and (0.581) transportation infrastructure(vehicle, road, train) have recorded. In this scenario, the higher closeness coefficient value, have lower supply chain practices. In the reverse side, the lower closeness coefficient value has good supply chain practices. Having this from the various criteria the Leadership and management capability (43.7%), delivery speed, flexibility, time and quality (43.5%), and green manufacturing capability, the financial resource performance (43%) have miserly exercise and good performing activities in the focal company. The technical and skilled manpower and warehouse management system accounts (42.1%), and innovation and technology transfer facility and capability (41.9%) have moderately practices in the company.

Table 6
The overall Supply chain Performance of ETESI

This is the performance indicators	**Loading Values of Variables**		
	Cumulative weights	**CCj**	**Individual Performance in 100%**
Raw material capability	3.083333	0.583	41.7
Financial resource performance	3.25000	0.570	43
Innovation and technology transfer facility and capability	2.583333	0.581	41.9
Logistics infrastructure	3.583333	0.580	42
Energy and electric power infrastructure	3.666667	0.606	39.4
Transportation infrastructure(vehicle, road, train)	3.083333	0.581	41.9
Leader ship and management capability	2.666667	0.563	43.7
Delivery speed ,flexibility ,time and quality	2.583333	0.565	43.5
Technical and skill man power	3.083333	0.579	42.1
Warehouse Management System and Facility	3.00000	0.579	42.1
Green manufacturing capability	3.750000	0.571	42.9
Cumulative performance percentage of the Case Company			**42.2%**

Relatively, the raw material capability (41.7%), and energy and electric power infrastructure (39.9%) are recorded in the lower performance in the company. Further, the overall performance of the case company accounts 42.2% and this is the lower performance and capability ranks if the company. The raw material, technology, infrastructure facility have the main ingredients of the capable business process. But in the case of ETESI have limited levels of integrations and have lower performance scenario in this area. These are due to weak internal functional interactions, poor resource utilization, and infrastructure problems, challenges in forging currency, higher cost of raw materials. As a result, the performance and competitiveness of the company in global supply chain systems are wreaks and poor

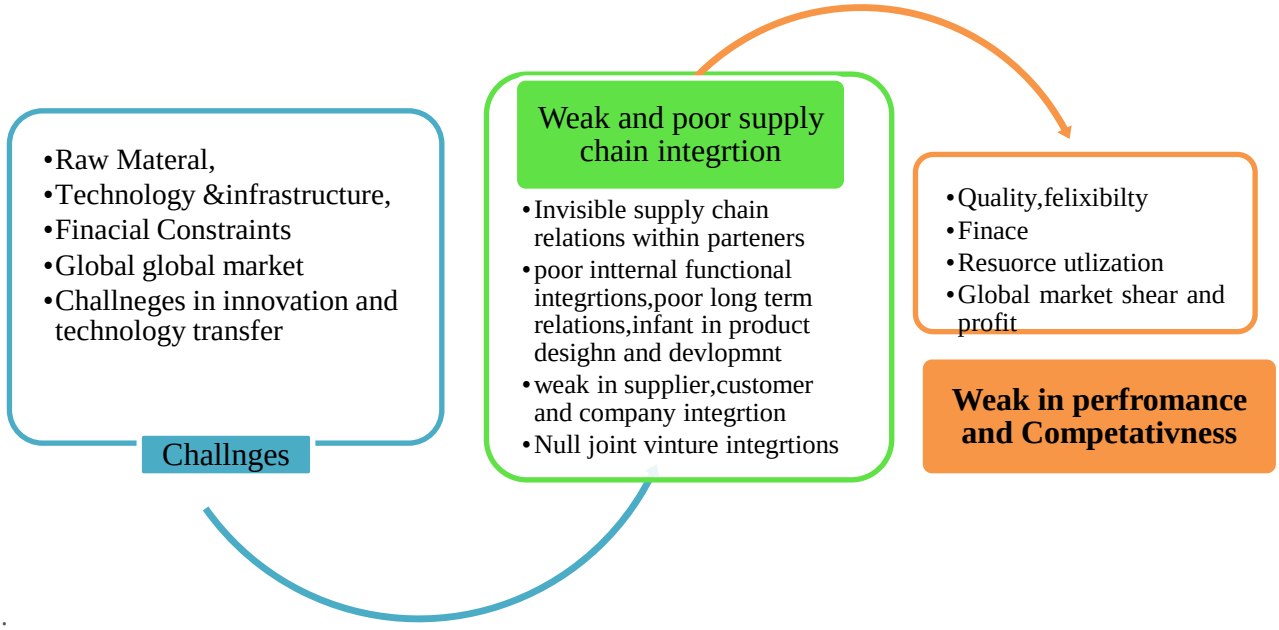

Fig.4. The supply chain performance practices of ETESI (Adopted by the Author)

Case Study-2: Company ETAB

Using empirical analysis the overall Supply chain Performance of ETAB were investigated and studied. According to this study the supply chain percentage practices and performance in the case company in raw material capability(40.9), financial resource performance(41.9), innovation and technology transfer facility and capability(39.3),logistics energy and electric power infrastructure(42.9), warehouse management system and facility(40.8), green manufacturing capability(42.9), delivery speed ,flexibility ,time and quality(39.3), leadership and management capability(39.4), technical and skill manpower(40.9), and transportation infrastructure(vehicle, road, train)(41.9) performances. Moreover, the overall performance of the case company accounts 41.12% and this is the lower capability of the firm. This lower performance capability highly hinders the competitiveness and global market shear of the sectors.

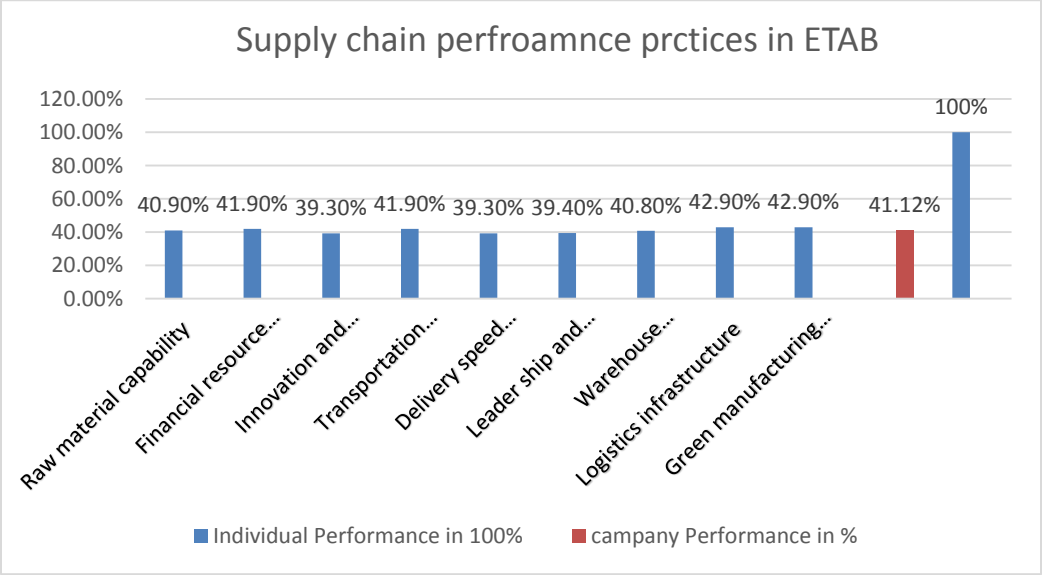

Fig. 5. the Supply Chain Practices of ETAB

Eventually, the case companies are a large manufacturer in the basic metal industry that works to the local level. The company's designs manufacture and produce a wide range of industrial components like sugar industry and agro-processing spare parts for industrial customers. Additionally, the companies to produce standard steel products including reinforcement bar, flat irons, round irons are supplied to the constriction sectors in the local markets. Commonly the industries are reluctant on external material suppliers. Even though the case company did not establish and practice the importance of internal company integration, and external supplier & customer integration. This implies that the case company did not appear to have invested seriously in technological improvement, resource integration, innovative and digitalization to the systems to their relationships with suppliers and customers. In addition internally manual production systems, improper production flows, lack of an internal information sharing system are the main challenges of the industry. This affects the performance and competitiveness of the industry highly. These are clearly elaborated in the above figure the performance and competitiveness of the company in various extents are infant and poor.

Case Study-3: Company ETWSI

The ETWSI steel industry PLC is the biggest producer of the reinforcement bar (Rebar), LTZ profiled steel, hollow sections, and sheet metals in Ethiopia. Based on the case company survey shows that mainly the industry supplied materials from international markets and distributed their products to local customers. Even if the supply chain systems on most industries are fragmental and non-integrated. The empirical survey results were presented in the table (7) below.

Table. 7
The overall Supply Chain Performance of ETWSI

This is the performance indicators	Loading Values of Variables		
	Cumulative weights	**CCj**	**Individual Performance in 100%**
Raw material capability	3.083333	0.590	41
Financial resource performance	3.9166670	0.570	43
Innovation and technology transfer facility and capability	4.2500000	0.564	43.6
Logistics infrastructure	4.0833330	0.563	43.7
Energy and electric power infrastructure	3.000000	0.592	40.8
Transportation infrastructure(vehicle, road, train)	3.2500000	0.581	41.9
Leader ship and management capability	5.0000000	0.553	44.7
Delivery speed ,flexibility ,time and quality	5.08333300	0.551	44.9
Technical and skill man power	3.9166670	0.568	43.2
Warehouse Management System and Facility	3.04166700	0.589	41.1
Green manufacturing capability	3.58333300	0.571	42.9
Cumulative performance percentage of the Case Company			**42.8%**

Eventually, the result indicates that the supply chain practices in this case company in the integrations, supplier integration accounts (44.1%), and internal company integration (43.992%) followed by customer integration (43.54%) practices. As we found that in each type of supply chain integration's supply chain practices in the case company is low and weak. Due to this weak integration, the performance and competitiveness of the company in global supply chain systems are wreaks and poor. This is also supported by the empirical evidence given in the above table and this gives a clearer picture to understand the condition, supply chain performances in the case company.

3.2.2..2. Looking on the case studies findings and discussion

Based on this empirical analysis in the selected industries, the supplier, internal company and the customer relation and supply chain practices of each case companies were studied. According to the empirical investigation results, the supplier, internal company and the customer value integrations of the three case companies are an infant and weak. Particularly, the supplier integration practices in strategic plan for transportation and logistics system from internal supply chain, level of supplier partnerships between firms in information flows, level of supplier integration in design and development, integrations for demand forecasting, ordering and delivery system, the level of resource sharing and collaborative work capability, financial resource sharing, customer support, feedback and product

sustainability, after sale service support integration, joint demand forecasting, establish fast delivering system and long-term relationship with strategic suppliers in all case companies ETABM, ETESI, ETWSI are not properly implemented and integrated. Further, in this study in supply chain integration resource sharing, technological performance, transportation infrastructure, leadership, and management capability were investigated in this study.

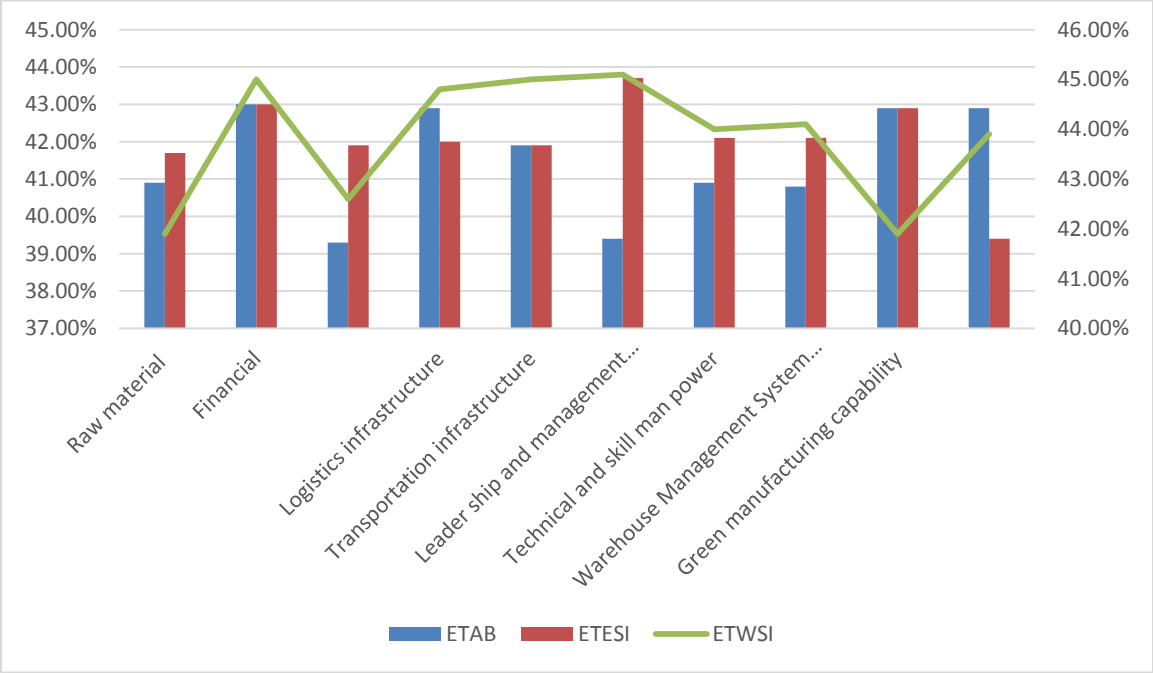

Fig. 6. The percentage supply chain practices of the case companies

Moreover, this fuzzy TOPSIS investigation in figure (6) shows that, the percentage capability of the case companies in warehouse management system, logistics infrastructure, energy, and electric power infrastructure, delivery speed, flexibility, time and quality, green manufacturing also studied in the internal company integration levels. Thus, due to the fragmental and weak integration in the internal company, supplier and customer process, negatively affects the overall supply chain integration performance of the companies.

3.3. Mind map analysis and discussion

Normally this mind mapping analysis provides to investigate the main challenges of supply chain integration in a way that, the intended accomplishment of regional metal goals can divide into smaller, goal, and objectives to various level and extents. Since, if the performance is good the various sub-goal and discrete objectives have highly contributed, the high accomplishing results and goals. On the reverse viewpoint, if the overall performance of the regional basic metal industry is weak and poor, the various sub-criteria can hinder the decline of each seat or individual objectives. The cumulative effect of individual objectives results in the overall performance and major goals of regional supply chain integrations. Having this information in this information, in this section we, have to evaluate and investigate the performance condition of regional metal industry supply chain integrations. Base on the literature survey and empirical analysis of the main challenges and the performance analysis of the regional basic metal industry supply chain integration practices are drawn in the following sections.

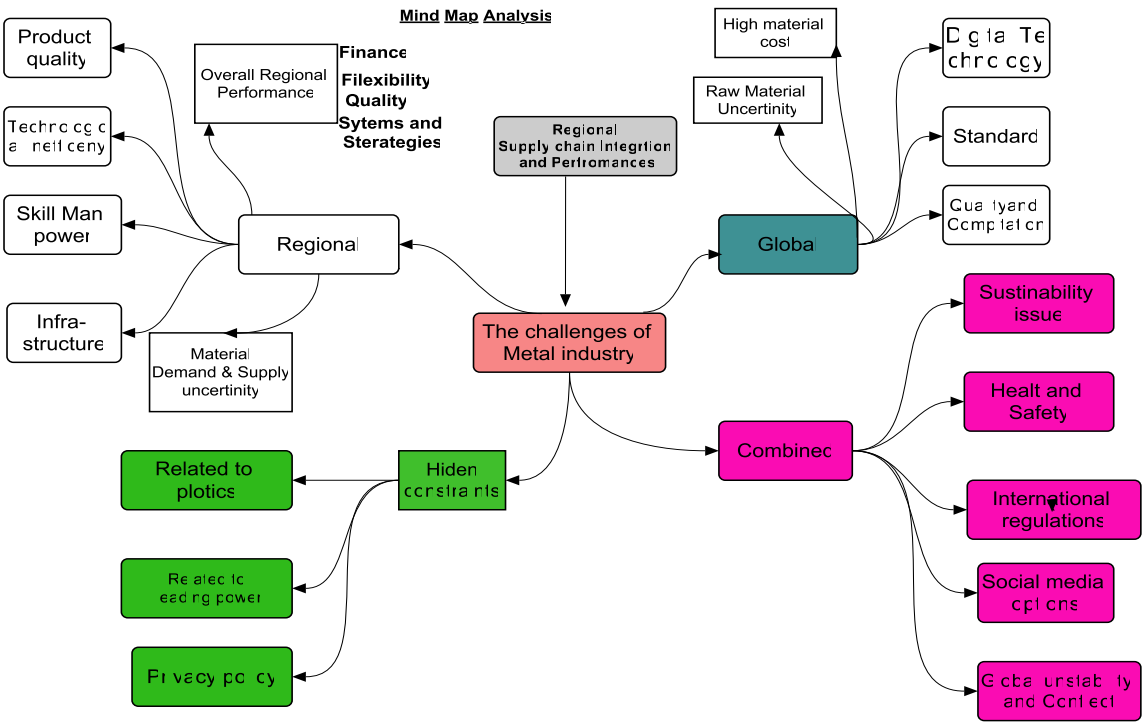

Fig.7. The main challenges of regional metal industry

The figure shows the entire challenges and constricts of regional basic metal industries that, hinder their performance and competitiveness in the regional and global markets. This mind map analysis contains four major and various sub-issues that contribute to the decline of sector performances. The constraints that found from the region that is a regional challenge, global challenge, invisible or hidden challenges and the combined effect that challenges that generated from both regional and global factors are the major constraints on the basic metal industries' performance and combativeness. Due to their weak regional performance, digital technology, quality, free-market competition, raw material uncertainty, standardization and higher are the nicks of a basic metal industry that generated by global scenario. Besides, poor infrastructure, weak financial performance, problems in product quality, technological inefficiency and problems in skill manpower are the challenges that born inside the regions. This regional challenges highly impact on the performance and competitiveness of regional metal industries. Meanwhile, suitability, standard, health safety, implementation of international rule and regulations are found at the challenges of both regional and global effects. These challenges have a significant negative impact on the dynamic economic contribution and competitiveness of the sectors.

4. Conclusion, Implications, and Future Research Suggestion

This study was investigated the practices, performances, main concepts challenges, potentials of supply chain systems in Africa regions. Particularly, the study examines, issue and how manufacturing industries integrated into East Africa region was assessed. Globally supply chain systems advance from manual to digital and from competition to cooperation and collaboration supply chain systems. Whereas, according to the result regionally there were traditional, manual and infant supply chain systems. But globally, within these revolutions, a many progress and achievements were found in general. Furthermore, this performance analysis shows that there has been much development in steel and basic metal industry in East Africa, but still, it has been facing numerous challenges. Regionally, there were fragmental and weak supply chain systems. This, fragment supply chain system results in poor productivity, a challenged in infrastructure facility, and poor financial performances. As a result, the Eastern African manufacturers produce a relatively narrow range of products, often suffer from low productivity, and generally use few people and little capital. Moreover, the case the study shows that regional manufacturing sector can be suffered by poor logistics infrastructure, limited access to finance, problems in electricity, transport infrastructure, technological capability, insufficient raw material, poor resource use, and information communication technology networks problems are the major constraints of the sectors(Dametew & Ebinger, 2017),(Iizuka, M., Mawoko, P., Gault, 2015),(Bienen & Ciuriak, 2015). Due to this fragmental and non-integrated supply chain systems, the regional economic dynamic contribution of the sector is weak and poor. Though to tackle the problem, centres better

to improve the transportation facility to linkage among all raw material suppliers to production centres, sources of raw materials to the supplier, manufactures to the markets and provides to enhance sector competitiveness. From many performance improvement strategies, integrated supply chain strategies can have a great impact on the dynamic ability of the manufacturing industry on regional integrations. Furthermore, these investigations are provided to a spark to leaders, managers, and engineers to strategic decisions making and system developments on firm performances. Furthermore, this study will give to literature because it presents the general view of the regional supply chain and supply chain integrations and benefits to researchers who need to conduct research in these concepts. This is due to the complexity of metal industries it does not incorporate experimental investigations from a large number of case industries. Since further experimental investigations are essential to carte dynamic and compressive strategies to the regions. As future work, the development of a more rigorous statistical analysis, as well as other conducting tests and validation processes in different industrial systems, are planned.

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