

# Performance Analysis on the Demand and Supply of Basic Metal Products: Focused On Ethiopian Basic Metal Industries.

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**Abstract:** The objective of this study is to determine the demand and supply performance of the Ethiopian basic metal industries (BMIs) over the period of 2010/11 to 2016/17 and then how they balance demand and supply, so as to improve firm performance and competitiveness. The collected primary and secondary data was analyzed using fish bone diagram and correlation analysis. The basic metal product demand and supply are used as variables to evaluate the relative efficiency of basic metal industries in the country. Since the study examines the gap between demand and supply of basic metal products in country wide. In addition, the study also shows, the possible impacts of non-equilibrium demand and supply performances of basic metal products. This unbalanced demand and supply were occurred due to insufficient raw material, low production capacity, problems on management systems, poor market chain, problems on information exchange, power supply fluctuations, QMS and warehouse problems were investigated as principal causes on the deficiency of metal product supply's. Beside, the study indicates that due to the above constraints the performance and global competitiveness of basic metal industry is poor and infant. Finally the study indicates that, proper management support and people involvements, supply chain integration, implementation of quality management systems, material management system, improved manufacturing process (PPC), and proper warehouse design and systems are some solutions that suggested to improve the performance and competitiveness of basic metal industries.

**Key words:** Demand & Supply, Performance analysis, Basic metal products, impacts, Forward-thinking, Ethiopia.

## 1. Introduction

Steel and basic metal industries are key ingredients for economic growth. These industries produce an essential input for manufacturing & processing industries, building infrastructure, telecommunication and other sectors for economic development. The industries require a large number of basic metal products for the expansion and transformation of them from one stage to the next. Since over the past decade, the steel industry has experienced an unprecedented expansion in production capacity, as many developing economies entered a metal intensive stage of growth. However basic metal industries have to need to efficient and effective capacity in order to perform and stay in business success. In reality, the performance of manufacturing industries determined in resource utilization, product quality, profit margin, sale growth, delivery time, interim achievement of demand and

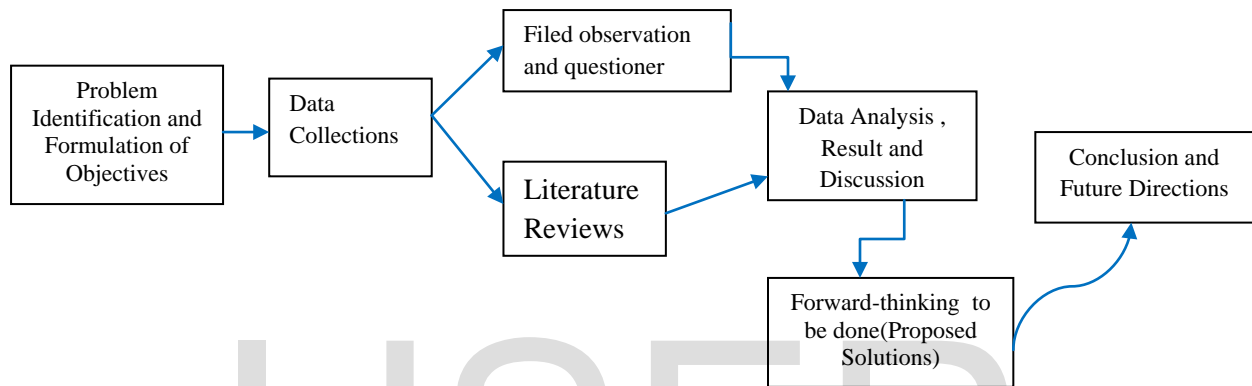
supply [1]. Even though the market shearing, performance, GTP contribution of basic metal industries are poor. Since, analysis and evaluating the efficiency of an industry is essential for the overall organizational performance and competitiveness. While, in order to compete with other manufacturing firms in international market, business organizations, it is crucial for analysis demand-supply performance of Ethiopian basic metal products. Thus, the major objectives of this study is to examine the demand and supply performance of basic metal products and develop a strategies how

they balance demand and supply to improve the competitiveness of the sector by filling the gaps. Since, it is hoped that insights gained from this study may contribute to the important, contribute for demand and supply performance impacts on manufacturing industries.

## 1.2. Research Methodology

In this study from the beginning to accomplishing result and till to reach the conclusion, the study was conducted through field observation, literature review of research articles, books, magazines, manuals, company report and electronic-sources which are discuss related to the demand supply, performance and industry performance, basic metal industry growth, opportunities, economic contribution, challenges, the performances and competitiveness in relation to product demand and supply issues. The study considered attempts to explore

the demand and supply of basic metal product trends, challenges, strategy, efficiency, performance and competitiveness were addressed. Followed by forward-thinking to be done to improve firm performances and competitiveness is done based of literature survey and case study analysis and results. In conclusion the conclusion and recommendation of the study is done. Since for analysis of the problems, the researcher mainly uses SPCS tools like Cause and effect(Fish bone diagram), and descriptive analyses are used.



**Figure.1. Research Methodology Frame work**

**2. Literature Review**

**2.1.Performance**

Due to the dynamic nature of manufacturing industries and with dynamic environment, the performance of organizations are changed drastically. But the main thing is what, how to measure performance and when to implemented performance measurements in an organizations are the critical concepts that needs to addressed. Since, performance is the ability to meet certain criteria's, the time it takes, and the path used to get there. Also performance is about how successful a business is in generating and sustaining value. For example supply chain Performance determined in terms to the extended supply chain's tricks in meeting end-customer necessities, including product availability, on-time delivery, quality, cost and affordability and all the necessary inventory and capacity in the supply chain to

deliver that performance in a responsive manner. Lets also see management performance in organization measure in terms, what extent the company to manage and coordinate each employee, team, systems, process and the whole organizations to fulfill customer requirements and meting the goal of the organizations. Let's see one advertisement about performance, "for almost forty years, meaningful innovation at Boston Scientific Rhythm Management has helped patients live healthier, longer lives. We are committed to providing performance data which are accurate, transparent and responsive to topics of contemporary clinical interest". from expiration, we observed that they are working for achieving customer requirements through management perform and product performance.

The commitment of the organizations shows management performances, where as providing performance data which are accurate, transparent were show product performances. Since, product performance is the individuality of markets that denotes the quality and existing performance records with respect to the development of news. The previous study[2] were show

that, the performance of manufacturing industries in terms of frequency of utilization, predictive value and availability of information. However performance in different ways but they have common essence to meet the organizational goal, customer expectation, competitiveness. Since, the performance of the an organization achieved through integrating supply chain for product development and modular product design[3].This means the supply chain integrated impacts for the capacity and performance of modular product design and product developments. As well process innovation, partnership quality, and uncertainty on the relationship between technology use affect and measure the performance of organizations[4].Although in this section the demand and supply performance of basic metal products were assed in line to market shearing, the coordination of the demand and supply processes, the equity of demand and supply, viewing the demand and supply processes in terms of quality , quantity and delivery time and the cost and deficiency of demand and supply efficiency in the product demand and supply processes. This important for enhanced organizational competitiveness, enhanced demand chain performance improvement, and enhanced supply chain performance and capability through organizational competences, company-established principles, demand-supply chain collaboration, and information technology support[5].Thus to enhance this performance Ethiopian basic metal industries, this study is assessed and investigate the demand and supply of basic metal products.

**2.2. Demand:** demand is an economic principle that describes a consumer's desire and willingness to pay a price for a specific good or service. In short demand refers to how many people want those goods. Since demand refers to how much (quantity) of a product or service is desired by buyers. The quantity demanded is the amount of a product people are willing to buy at a certain price; the relationship between price and quantity demanded is known as the demand relationship. However holding all other factors constant, an increase in the price of a good or service will decrease demand, and vice versa. Since demand supply analysis important to determine the current performance

and ,then develops future solutions of manufacturing industries to improve their performance and competitiveness. In his study the main drivers and influences of manufacturing product demands were analysis.

**2.3.Supply:** On the other hand supply represents how much the market can offer. Also Supply refers to the amount of goods that are available. Examples of the law of supply

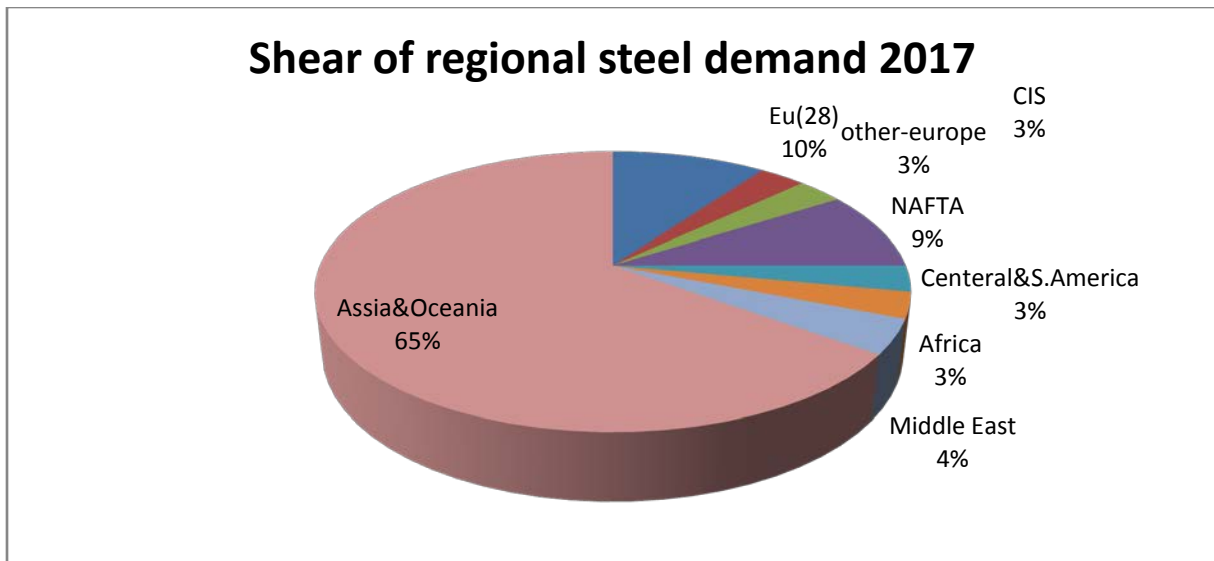
- ✳ Corn crops are very plentiful over the course of the year and there is more corn than people would normally buy. To get rid of the excess supply, farmers need to lower the price of corn and thus the price is driven down for everyone.
- ✳ There is a drought and very few strawberries are available. More people want the strawberries than there are berries available. The price of strawberries increases dramatically.
- ✳ A huge wave of new, unskilled workers come to a city and all of the workers are willing to take jobs at low wages. Because there are more workers than there are available jobs, the excess supply of workers drives wages downward.

However, Supply-and-demand is a model for understanding the determination of the price of quantity of a good sold on the market. Since demand -supply, shows and looking the relation between at two different groups buyers & sellers, and asking how they interact.

### 3. Analysis and Discussion

#### 3.1. Global Steel demand and Supply

According to the WSA report, global steel demand will increase by 0.2 percent to 1,501 million tons in 2016. Steel demand contracted by 3.0 percent in 2015. The 2017 forecast is for global steel demand to grow 0.5 percent to 1,510 million tons. According to the report Emerging and developing economies, excluding China, are “expected to accelerate to show 4.0 percent growth in 2017.



**Fig.2. The Global Steel Demand at Regional level**

Although, the above figure shows that the growth of steel demand is increase, particularly the emerging country than the developed nations. This indicates that the economic growth also shifts to this countries. As a result the competitiveness of those high steel demand(Asia and Oceania) and consumption regions have leads the steel sectors.

**3.2.The Steel demand and Supply in Ethiopia**

Urbanization and steel intensity go hand in hand. In the preliminary stages of a country’s urbanization, steel intensity increases with the need for new infrastructure for improved connectivity, efficient use of natural resources, and creation of sophisticated transport hubs.

Increased population density means taller buildings requiring more high-quality steel. Demand for machinery also increases as more of the population urbanizes to find employment industries that are steel-intensive.

**3.3.Demand & Supply Analysis of Ethiopian BMIs products**

Supply and demand plays an integral mix in a company's revenue and marketing initiatives.

Companies need to analyze supply and demand regularly to ensure their efforts are in line with the needs of their customers and with the current state of the market and industry.

As supply and demand changes, the company must adapt to change with it; otherwise, you might end up with a product surplus or could miss out on revenue by not having enough product to meet consumer demand. According to the Ethiopian GTP the annual per capital Metal consumption of the country is set to reach 34.2 kg in 2014/2015. The total steel demand is estimated to reach 3, 121,187 tons in 2014/2015 .For attaining this goal, new integrated steel industries and Mini Steel Industries have to enter the business and the existing industries also need to utilize their maximum capacity.

Currently the existing metal industries of the country use imported raw materials and the locally available scrap to produced products based on the country demand[6],[7]. However, the Ethiopian Steel demand estimates by sector/end users are indicative of Ethiopian growth from 2010/11 to 2015/16 finished steel demand. Since basic metal industry is being a heart area, steel industry tracks the overall economic growth in the long term. However steel manufacturing industries are normally upstream technologies that supply to the requirements of downstream technologies

through providing the required raw material in sufficient quantity, expected and acceptable quality.

Table.1.The Ethiopian steel demand and steel consumption analysis by end-user industry

No	Type of Product	Production Year in ton						
		Base line 2010/11	2011/12 2003E.C	2012/13	2013/14	2014/15	2015/16	2016/17
1	Reinforced bar demand in ton/ (Forecasted)	517,415	662,291	807,167	952,043	1,096,919	1,241,795	1,686432.5
	Reinforced bar Actual Supply in ton/	255,344.73	242,728.7	462,232.39	446,793.56	812,410.9	731927	1158150
	Reinforced bar Variation (Supply-demand)	-262070	-419562.3	-344934.61	-505249.44	-284508.10	-509871	-528,282.5
2	(LTZ,RHS, Al-profile) Demand	101,759	130,252	158,745	187,238	215,731	244,224	
	Supply/Production (LTZ, RHS ,Al-profile, Galvanized pipe) in ton/	75934	81837	83962	124470	105158	134920	
	Supply-demand (differences)	-25825	-48415	-74783	-62768	-110573	-109304	
3	Steel billets, wire &Nails Demand	79765	85180	126975	256963	276923	427532	
	Steel billets, wire &Nails Supply	49765	53895.6	95189.63	116963	209978	317830	
	(Supply-demand)deference's	-30,000	-312844	-31785.37	-140,000	-66945	-109702	
4	Roofing and Corrugated iron projected demand	74358	179237	187237	187237	215737	210737	
	Roofing and Corrugated iron (Supply)	53,227	139237	173916	149283	189486	195819	
	Roofing and Corrugated iron (Supply-demand)	-21131	-40000	-13321	-37954	-26251	-14918	
5	Total Projected Demand	773297	1056960	1280124	1583481	1805310	2124288	
6	Total Supply	434270	517698.3	815300	837509.56	1317032.9	1380496	
7	Supply-Demand	-339027	-539261.7	-464824	-745971.44	-488277.1	-743792	

Source:[8],[6],[9],[10]

The supply of basic metal products, in addition to local industries, basic metal products mainly supplied from following major source countries of these imports are Turkey, China, Ukraine, Taiwan, Korea, Cote d'Ivoire, Kenya, Djibouti, Sudan, Italy, Japan, Russia, Belarus, France, Germany, Spain, South Africa, UK, Egypt, Belgium, Tunisia, Australia, Netherlands, Israel, Indonesia, Portugal, Zambia, Malaysia, Pakistan, Cuba, Denmark, Austria, Poland, Finland, Brazil, Czech Republic, Singapore, Cameroon, Canada, Romania, Zimbabwe, Ghana, Botswana, and Congo[11].As We know that basic metal is being a core sector, steel industry tracks the overall economic growth in the long term. In spite of the lower contribution of industries, there is a rapid growth of economy on an average of 14.6% for more than 10 years(2005/06-20014/15)).

Due to this fact, there is a parallel intrinsic potential steel demand and Supply growth in Ethiopia, and will continue strong in the longer run. Since steel demand, being derived from other sectors like construction , mechanical and engineering, automobiles, consumer durables and infrastructure, its fortune is dependent on the growth of these user industries.

On the other hand the Ethiopian steel sector have poor raw material availability of raw materials and but have cheap labor. the Iron ore is exist in the country but still not mined[6] . Thus the Ethiopian steel industry is largely depend on metal scrap and imported materials from international markets. Though, due to large government projects, Construction and Infrastructure (increasing construction of housing and condominium), Manufacturing industries ( machinery and equipment),Tooling, spare parts, components supply for

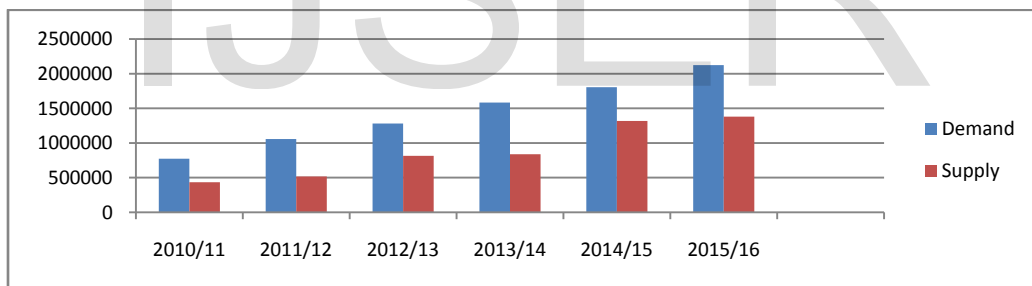
manufacturing industry, transportation (Automotive, Railway) and other sectors ,the demands of the reinforcement bar, steel structure and other basic metal products are extremely increasing from 2011/12-2015/16 in the production years[9][8][6][10]. The table above shows that within seven year the whole basic metal demand and supply increase from 25.97%to 52.19 % average 39.10%, and 12.39% to 33% average 22.69 % incremental changes are reordered respectively. Since the potential demand drivers for basic metals are highly The downstream markets for the demand drivers of basic metal product include:

- ✚ **Construction and Infrastructure** - Housing Construction, industrial sheds, structures, buildings and transmission line towers, bridges, dams, irrigation, water supply, sewage systems, industrial water, gas lines.
- ✚ **Transportation sector** - Motor Vehicle Parts, body and trailer, Automobile manufacturing plants, railway
- ✚ **Manufacturing industries** - machinery and equipment for Textile, garment and Leather, agricultural and Agro-processing, Sugar

increase year to year through product mix may change through time. Furthermore, the industries in every sector depend on steel product for their structure, spare parts, components and fabrication. The study[11] also shows that the potential demand drivers for crude steel are expected to highly increase in the next decades through product mix may change through time. Therefore, the demand sweep over a variety of markets to substitute imported raw materials in local context and with a potential to export markets in the region.

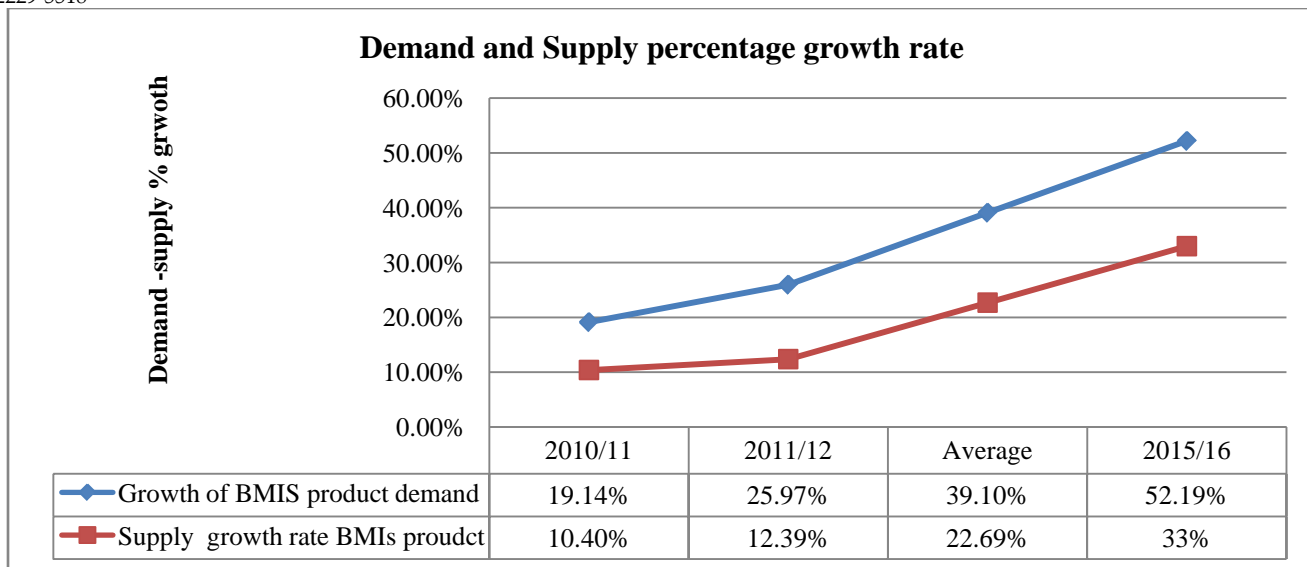
✚ **Construction; Chemical and Fertilizer, Material Handling (Cranes, Chain, Conveyor), Steel and Power plants, Pumps in irrigation and household, furniture and other capital goods equipment, parts supply for fabrication and assembly, open and hollow sections such as channels, beams, LTZ profiles, circular, rectangular and square sections,etc.**

✚ **Tooling, spare parts, components supply for manufacturing industry** such as agro-processing, Leather, Textile, Chemical, Sugar, Cement, Construction sectors .The following figure shows the projected demand and actual supply of basic metal products.



**Figure.3. The demand and Supply for basic metal products**

Based on the pervious evidences, the above figure indicates , the demands and supply for the basic metal products are extremely increased. The projected demand based on the past trend for basic metal products and supply being analyzed based on the actual data of the country consumptions. Since, the figure above provides the past and the current situation of the county basic metal demand and supply , used as an indicator for future growth and development directions and the practical situation on the ground regarding the steel local production , consumption and imports to come up with steel demand and supply projection in Ethiopia.



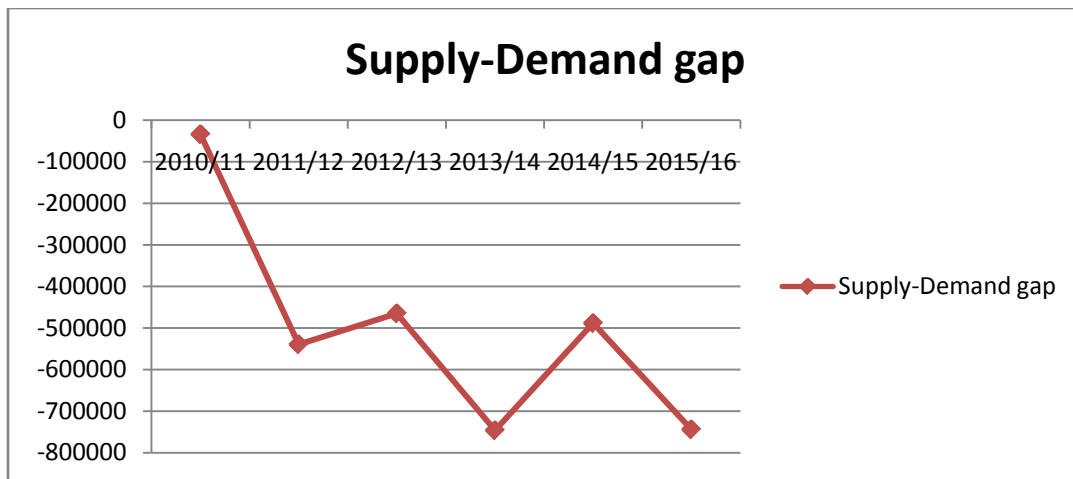
**Fig.4. Projected demand and Supply percentage growth rate**

According to the figure above the projected demand and the supply the average growth rate is 39.10 % and 22.69 % from 2011/12-2015/16 respectively. Since, when supply and demand are increase and it approaches to equal (i.e when the supply function and demand function intersect) , there is stable economic growth. At this point, the allocation of goods is at its most efficient because the amount of goods being supplied is approaches to reach exactly the same as the amount of basic metal goods being demanded. Even if both are increasing approach, it needs to work more and more to reach at equilibrium level.

**Table .2. The projected demand and supply gap**

No	Type of Product	Production Year in ton					
		Base line 2010/11	2011/12 2003E.C	2012/13	2013/14	2014/15	2015/16
1	Total Projected Demand	773297	1056960	1280124	1583481	1805310	2124288
2	Total Supply	434270	517698.3	815300	837509.56	1317032.9	1380496
	Supply-Demand	-339027	-539261.7	-464824	-745971.44	-488277.1	-743792

From table above shows the projected demand and supply gap is calculated by deducting the actual supply from the demand for each individual year. As it can be easily seen from the table, the projected demand for the basic metal products exceeded the actual supply throughout the projected years of 2011/12-2016/17. even if there is incremental change in both demand and supply but there is deficiency of supply to achieve the demands of the country metal. However according to [11][10] clearly shows that the supply and the quantity of imported products is much greater than that of local products. From this we can recognize that imports of basic metal products (like hollow sections, galvanized sheets, billets, reinforcement bars etc.) will continue to fill this gap unless and otherwise it is fully satisfied by local production capacity. The demand-supply gap of basic metal products are depicted in the following figure below



**Figure.4. The projected demand-Actual supply gap**

The above figure shows that the overall basic metal product of supply and demand balances is negative. This is due to the large shortage in raw material, inefficient metal products, poor efficiency of the industry that makes overall basic metal product supply and demand negative. However, in normal circumstances, whenever demand is higher than supply, shortages are experienced in the market and prices tend to increase. Since an increase in the price of a product will make it more costly for buyers to purchase it, and therefore less will be purchased at the higher price. But in the context of Ethiopian basic metal industry, it is not only this but the shortage of supply occurs

due to different factors and constraints. According to the previous study [9],[10],[6][11] shows that, problems raw material, power supply fluctuations, problems supply chain integration, improper management systems and poor quality management systems are seen in most Ethiopian basic metal industries. As a result of the above constraints, the Ethiopian basic metal industries are underperforming. Due to this insufficient performance, there was a shortage of basic metal products to fully fill the demand of the country. However, the country is forced to use more imported basic metal products than local as shown in the table below.

Table .3. Domestic market share of local industries by product type

No	Types of products	2011/12 2003 E.C	2012/13 2004 E.C	2013/14 2005 E.C	2014/15 2006 E.C	2015/2016 2007 E.C
1	Reinforcement bar	42%	30%	32%	55%	
2	Hallow section	49%	80%	85%	79%	
3	Nails and wires	49.06%	34.54%	35.08%	29.69%	
4	Corrugated iron sheet/EGA sheet	91%	92%	86%	76%	
5	Machinery and equipment's	96.79%	93.86%	96.52%	94.74%	
6	Vehicles	3.20%	15.42%	5.15%	34.21%	
	Average	55.27%	57.64%	56.63%	61.44%	

Source:[10],[11][10], In addition to achieving the expected basic metal product demands, local industries are engaged to produce various products and domestic market share of local industries by product type are shown in the table above.

## 4. Result and Discussion

### 4.1. Theoretical Result

Demand is defined as the quantity (or amount) of a good or service people are willing and able to buy at different prices, while supply is defined as how much of

a good or service is offered at each price. In the previous study [12] shows how demand & supply interact to control the market, buyers and sellers react in opposite ways to a change in price. Since when price increases, the willingness and ability of sellers to offer goods will increase, while the willingness and ability of buyers to purchase goods will decrease. However, the Ethiopian basic metal industry does not produce sufficient metal products



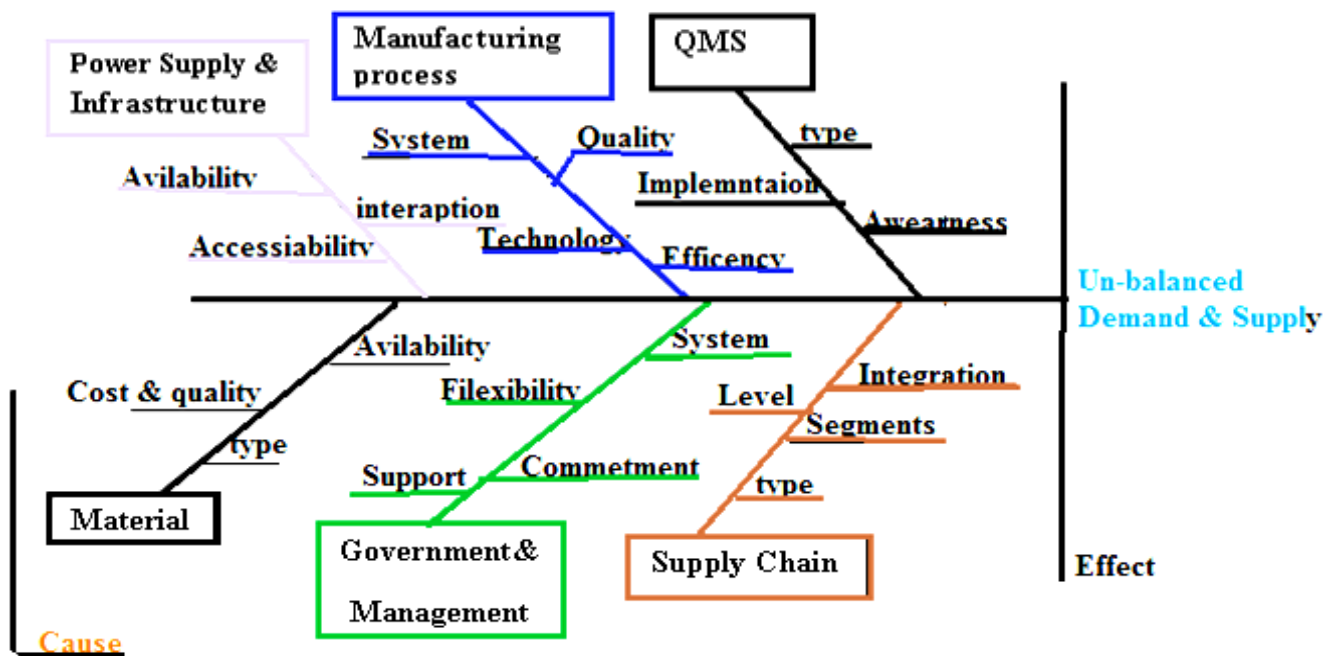
supplied to the markets. Due to insufficient production capacity in the basic metal industries , basic metal product supply shortage occurred in the country due to different factors and constraints.

Based on filed observation and literature survey data of this study indicates that insufficient raw material, power supply fluctuations, old production & manufacturing processes, information shearing, improper leader ship systems, infrastructure problems(landlocked), and poor quality management systems(TQM, Kaizen etc.) are the major constraints investigates in basic metal industries. Though due to the above factors there were unbalanced demand and supply of basic metal products occurred. Ultimately negative supply and positive demand on basic metal products were formulated in a country wide. in addition to this, due to such influences the market shearing, the performance and competitiveness of basic metal industries are still infant. Nevertheless achieving sustainability and competitive advantage of the industry, it needs to be an effort to positive balance between demand and supply of basic metal products. In this case positive balance means , we should work to the equilibrium condition of product demand and supply. Positive balances indicate that supply quantity is higher than demanded quantities while negative ones indicate

lower supply quantities than demand. In Ethiopia this negative basic metal products balances occurred as a result of lower supply quantities than higher customer demands. However, the achievement and maintaining of the balanced demand and supply condition are difficult and challenge task because factors determining supply are different from those determining demand and their effects change over time. Even though achievement of a positive balanced state is the main task for industry managers, government body ,the employers of the industries and other responsible persons, so as to attain sustainability and competitive advantage of the sector.

#### 4.2.Cause and Effect Analysis

A cause and effect diagram, often called a “fishbone” diagram, can help in come up with to identify possible causes of a problem and in sorting ideas into useful categories. Since root cause analysis is a structured team process that assists in identifying underlying factors or causes of an adverse event or near-miss. Understanding the contributing factors or causes of a system failure can help develop actions that sustain the correction between them. However , by the help of fishbone diagram, it is a visual way to look at cause and effect of demand and supply of basic metal industries.



### Figure.5. cause and effect diagram of basic metal demand-supply

The above figure indicates that the root causes of the event are the underlying process and system problems that allowed the contributing factors to culminate in a harmful event (un-balanced demand and supply of basic metal products). As this figure illustrates, there can be more than one root cause. Due to the cumulative effect of these individual root causes and problems, a single effect, i.e. unbalanced demand and supply of basic metal industry products, results.

**I. Problems on Manufacturing process:** This study reveals that one of the main causes of the negative basic metal product supply of the Ethiopian basic metal industries is because improper manufacturing processes, traditional and outdated equipments were used in most manufacturing industries. Nevertheless, applying and using a sufficient and new technology manufacturing equipment and proper utilization of those machineries are key for every optimum production performance, so as to produce the expected quality and quantity of products.

**II. Quality management Systems:** Currently, the practices of quality management systems in most of the Ethiopian basic metal industries are undertaking a very inefficient and faulty practice. As a result of this, most products are defective, poor delivery time, poor customer satisfaction, weak market share and null global competition are seen due to quality and related issues. Ultimately, there is a gap between the demand and supply of basic metal products. But proper and effective quality management practices ensure greater business success in product and service industry. Eventually, assure the equilibrium condition of product demand and supply.

**III. Problems on Materials:** The study properly indicates that, in the country, there are problems of

material quality, availability, problems of material cost, material warehouse problems, material delay for international suppliers are the main constraints, that identifies in this study. Since to ensure high performance product supplier, materials management systems are critical tasks for basic metal industries.

**IV. Problems on Government Support and Management Systems:** The basic metal products are insufficient supply to the expected demand because in addition to the above problems, the management systems and government supports are inefficient. Since, according to the previous study [13], the management's inefficiency reveals that they are suffering from hidden costs, short budget, lack of innovation, lack of employee orientation, absence of material manager, poor and lack of relationship with suppliers. Due to extreme difference between theory of management and the real situation of the Ethiopian basic metal industry management systems, the demand and supply of basic metal products are not able to keep on the right track.

**V. Problems on Supply chain systems:** The supply chain is inefficient because management is inefficient. The study indicates that there is poor information system between supplier to customer, non supply chain integrations, problems on the level of supply chain integrations, there is weak linkage within supply chain partners etc. are the common problems that have been seen in Ethiopian basic metal industries related to supply chain systems. However, the real situation and performance of basic metal product demand and supply are analyzed and investigated using descriptive analysis and fishbone diagram. Since according to the result, unbalanced demand and supply of basic metal industries need to be an effort to give solutions for the problems, so as to improve the performance and competitiveness of the firm.

### **4.3. Forward-Thinking To Be Done To Improve Firm Performances.**

There are several reasons that impact for un-balanced demand supply of basic metal products. It is very much essential for them to solve those quickly and get rid out of the hole as soon as possible. Here are some solutions that suggested to improve the performance and competitiveness of basic metal industries. Since basic metal industries should be adopt centralize material ordering system to make ensure availability and eliminating duplicity of order, maintain strong supplier's relationship to reduce costs. In addition all manufacturing industries, they should think about material warehouses systems ,work to overcome the storage of material resources, integrate basic metal industries into a supply chains, use modern industry management systems and apply improve manufacturing process and systems as well.

### **4.4. Conclusion and Recommendation**

#### **4.4.1.Conclusion**

The objective of this study is analysis the efficiency and performance of basic metal industries for the period 2010/11 to 2016/17 using SPSC and descriptive analyses methods. From field observation and literature survey data obtained that, due to problems related on manufacturing process, quality management systems, improper material utilization, poor government support and improper industry management systems, problems on supply chain integrations and related issues, the unbalanced demand and supply of basic metal products were occurred in the country. This deficiency supply of basic metal products are reduce the performance and global competitiveness of basic metal industries. Moreover, the results also provides, the solution and

forward-thinking to be done to improve firm performances and competitiveness.

#### **4.4.2.Recommendation**

Finally, it is recommended that,the Ethiopian basic metal industries should work together and adopt proper performance improvement systems (like manufacturing process, management, supply chin integration, quality, resource utilizations etc.) so as to achieve their goal and competitiveness. Since, future studies better to show the influences of performance improvement systems in line to metal product demand and supply in specific.

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