Addis Ababa University

School of Graduate Studies

Faculty of Technology

Mechanical Engineering Department

Small Scale Metalworking Industries Cluster

(Case Study on Towns of Oromia Special Zone)

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Declaration

I hereby declare that the work which is being presented in this thesis entitled "Small Scale Metalworking Industries Cluster" is original work of my own, has not been presented for a degree of any other university and all the resource of materials used for this thesis have been accordingly acknowledged.

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This is to certify that the above declaration made by the candidate is correct to the best of my knowledge.

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1. Ministry of Trade and Industry
2. Ministry of Education
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4. United Nations Industrial Development Organization
5. Oromia Transport, Trade and Industry Bureau
6. Oromia Investment Office
7. Oromia Technical and Vocational Education and Training Agency
8. Special Zone of Oromia Administrations and Town Administrations

Abstract

This paper deals with clustering of small scale metalworking industries in Oromia Special Zone (OSZ). Clustering is a group of small firms operating in a defined geographic location, producing similar products, cooperating and competing with one another, learning from each other in order to overcome internal problems, setting common strategies to overcome external challenges, and reaching distance market through developed networks. In order to attain benefits of cluster, industries are identified along with problems facing them by in depth interviews, discussions and questionnaires. These results are supported by literatures published and unpublished. The paper also addresses the background of OSZ with respect to industries. The industries are identified by the selective methodology with their performances based on number of workers, capital and value additions. Each location of industries is marked by Geographical Positions System and located the projections on Archi-Geographic Information System software in the world geographical positions. The industries are evaluated whether the naturally are following or not with their actual trends. The exact geographical location of a cluster for industries identified is placed by using gravity location systems on Microsoft Excel solver tool. By methods of model development for the cluster the model is developed and hence the growth paths of a cluster by evaluating value chain and stakeholders of industries that had direct or indirect linkages with industries for continuous growth of cluster. Besides, the internal processes are modeled using basic processes. With the specified principles of clustering, Ethiopian clusters are evaluated and argued in relation to infrastructure, technology, skilled manpower, information and e-commerce. The gap left by cluster- based strategies is filled by policy recommendations. The overall data and inputs are analyzed in relation to cluster performances are summarized in a meaningful manner. Trade-offs between clustering and scaling up in fast transferring of technology in Ethiopia is also discussed. The whole results and findings are tied under summary of the major findings. Finally, the paper ends with conclusions and suggesting the possible solutions to the problem for the gaps remained void in the paper.

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Lists of Abbreviations/Acronyms

BDS	Business Development Service
CDP	Cluster Development Programme
CEO	Chief Executive Officer
FDI	Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
FeMSEDA	Federal Micro and Small Enterprises Development Agency
GDP	Gross Domestic Product
GIS	Geographical Information System
GPS	Geographical Positioning Systems
ICT	Information Communication Technology
ISIC	International Standard Industrial Classification
MFIs	Micro Finance institutions
MoST	Ministry of Science and Technology
MoTI	Ministry of Trade and Industry
MSEs	Micro and Small Enterprises
NGOs	Non-Governmental Organizations
OSZ	Oromia Special Zone
PIC	Productivity improvement center
QSA	Quality and Standards Authority
R&D	Research and Development
RHS	Rectangular Hollow Section
SOEs	State Owned Enterprises
SSIs	Small Scale industries
SSMIs	Small Scale Metalworking Industries
TVET	Technical and Vocational Education and Training
UNIDO	United Nations Industrial Development Organization

Chapter One

Background of the Study

1.1. Introduction

Economic development can not be imagined without some kind of industrialization. The only way the objective of reducing poverty in long run can be achieved by and a semblance of social tranquility can be maintained is by generating well paying jobs for the fast increasing army of unemployed youth that is occupying the urban space [10]. The benefits of civilization which we enjoy today are essentially due to the improved quality of products available to us. The improvement in quality of goods can be achieved with proper design that takes in consideration the functional requirements as well as its manufacturing aspects at economical cost.

Manufacturing is one of the economic sectors that add value to country's Gross Domestic Product (GDP). It is defined here according to International Standard Industrial Classification (ISIC) as the physical or chemical transformation of materials or components into new products, whether the work is performed by power -driven machines or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold at wholesale or retail. The assembly of the component parts of manufactured products is also considered as manufacturing activities. [12]. Manufacturing firms in this paper focuses on value addition of metal and metal products. These firms will add values by casting, forming, fabrication and material removal processes.

In Ethiopia, manufacturing industries are categorized under micro, small, medium and large scales based on the capital investment and number of employees. Small Scale manufacturing industries (registered and unregistered) are mainly engaged in the manufacture of food, fabricated metal, furniture and clothing [12]. These sub-sectors constitute more than 85 % of the small-scale manufacturing industries. This study deals with only small scale metalworking industries whose capitals are less or equals to Birr 1000,000, number of workers ranges up to 50 and use power -driven machines and cottage/handicraft manufacturing establishments performing their activities by hand (i.e., using non -power driven machines), but is not

considering those using high technology equipments and machineries according to Ethiopian context set by ministry of trade and industry and central statistical agency collaboratively.

Not only Ethiopia had such policy but also different countries set the scale margin for industries. For example, Australia, Germany, Indonesia, Sweden, and Mexico classify the small scale enterprises based on the minimum number of workers engaged as 100, 500, 100, 200 and 15 respectively [40]. The report also showed that India use the small scale enterprises based on the capital registered which is at least 10 million rupees. Most countries use both capital and number of workers as in the case of Ethiopia, such as Malaysia Japan, etc.

In Ethiopia small-scale manufacturing activity engages, on average, 17 persons per establishment, including the owner [45]. The average annual wage per employee is Birr 1,914 ($239). The average operating surplus per industry is Birr 18,934 ($2,368), which shows that income generated by small manufacturing activities is much greater than that generated by medium and large scales of manufacturing. The average capital per informal sector activity during the survey period was found to be Birr 3,528 ($441), while the average capital per small-scale manufacturing industry was Birr 38,354 ($4,794), which is still better than informal sector in generating revenue. But we can not deny the importance of large industrial and other enterprises for the growth of the Ethiopian economy, there is ample evidence to suggest that the labor absorptive capacity of the small business sector is high, the average capital cost per job created is usually lower than in big business, and its role in technical and other innovative activities is vital for many of the challenges facing Ethiopia.

According to the results of the study mentioned above, the whole labor force engaged in informal sector activities and small-scale manufacturing industries is more than eight times (739,898 persons) that of the medium- and large-scale manufacturing industries (90,213 persons). So, small scale industry can be equally competitive in the fast changing global economy provided it exploits economies of scale and scope while locating itself in clusters along with making technological progress endogenous.

Cluster can be defined collectively as" a group of small firms operating in a defined geographic location, producing similar products, cooperating and competing with one another, learning from each other in order to overcome internal problems, setting common strategies to overcome external challenges, and reaching distance market through developed networks" [30]. It can also be defined as sectoral and geographical concentration of micro, small & medium enterprises with interconnected production system leading to firm/unit level specialization and developing local suppliers of material inputs and human resources [20]. Availability of local market/intermediaries for the produce of the cluster is also a general characteristic of a cluster.

Clustering in this study can be sensed of both geographical and technological cooperation. The forms of co-operation between agents within the cluster in terms of sharing of resources, information, technical expertise and knowledge helped to reduce transaction costs. This in turn can strengthen the competitiveness as well as facilitating learning and technical innovation. Furthermore, the problem of many small enterprises is not their size, but being isolated. This is because small enterprises individually have little capacity to respond to competitive pressure and to generate factors for expansion.

The benefits of locating in a cluster are related to the availability of skilled labor and intermediate goods suppliers, and also to the easy transmission and discussion of new ideas. Clustering can also help small scale enterprises to mobilize human and financial resources. The idea of clustering has commenced nearly by some individuals and organizations and did not cover all sectors in small scale scope in Ethiopia. Therefore this thesis will start giving lights in the field of clustering metalworking industries in the newly established Finfinne Special Zone of Oromia mainly in the urban section. In these towns, industries are separately functioning their role through isolation and in the traditional methods of competition. Clustering in this zone will foster the creation of pool of skilled workforce and play a key role for the cross-national boundaries supply chain.

1.2. Statement of the Problem

In most developing countries, Small Scale Industries face a wide range of constraints and they are often unable to address the problems they face on their own - even in effectively functioning market economies. The constraints relate amongst others to: the legal and regulatory environments; access to markets; finance; business information; business premises (at affordable rent); the acquisition of skills and managerial expertise; access to appropriate technology; access to quality business infrastructure and, in some cases, discriminatory regulatory practices [16]. It is also argued that the constraints faced by small scale industries in developing countries are not only accentuated with ineffective policy design, but also by market failures in the region [30].

It is clearly known that Ethiopia is not well known by its competent manufacturing industries. Different reports showed that manufacturing industries in Ethiopia adds little value on the nation's development compared to other sectors [10]. In Ethiopia specifically, Small Scale Industries have been confronted by many of these problems. The major obstacles experienced by small scale manufacturing industries were the irregular and erratic supply of raw materials and a shortage of suitable working premises [12]. The lack of working premises was also found to present difficulties for the small sector operators who, faced with insufficient capital, were often impeded from the start.

Oromia as a part of Ethiopian region that has better facility and access for industries than other regions, manufacturing industries adds only 5% to regional GDP [8]. Besides, most industries are concentrated around periphery of Addis Ababa and Eastern Shoa and in smaller extent West Arsi and Arsi zones. At the same time metalworking industries in Oromia adds only 15% share of manufacturing industries. Most of metal working industries in the region comprises of small scale industries [29]. Having much of these industries, they add little value to the region. To solve such an intense problems, industrial clustering will be a cure through designing a value chain, technological learning and innovation, accessing them to intermediate customers and suppliers and creating subcontracting for the medium and large industries as the same time can be transformed in to medium scale and in rare cases to large scale industries.

1.3. Objectives of the Study

To solve the above problem, the following objectives are set:

General Objective

The general objective of the study is to develop cluster of small scale metalworking industries to create market chains, promote technological learning and innovation and set frameworks for clustering.

Specific Objectives

The specific objectives of the study are:

1. To identify and categorize small scale metalworking industries.
2. To evaluate current performances of small scale manufacturing industries
3. To set frame work for clustering of small scale metalworking industries

1.4. Significance of the Study

The thesis has a significant impact on supply chain of metalworking industry in the selected site of the region through promotion and development of small scale enterprises (SSEs). It has also implications for establishing linkages between formal and informal SSEs and for elimination of smallness of dispersed SSEs. Generally, the following results are obtained from the project:

- Lowered unit cost of infrastructure for industries
- Leads to a creation of skills and is a source of informational economies
- The costs of monitoring and promotion are lowered
- Low transaction costs and easy transmission and discussion of new ideas for industries
- Potential for technology upgradation and export promotion increases and foster economic exchange quickly

The above results will benefit the country as the selected region is the potential sources of resources since clustering creates good cross-country supply chains. The region will also be

benefited from this thesis as clustering creates technology transfer, technology learning and technology innovation that make the region competent in the achievement of skilled manpower, good completion environment and attractive investment promotion that leads it to be the region of investment. This thesis benefits the immediate suppliers, communities around, and customers as clustering makes industries accessible around the same areas. Finally, the thesis help the region in creating industrial districts and helps also other researchers giving information about industrial clusters of small scale metalworking industries.

1.5. Scope of the Study

The study covered clustering of small sale metalworking industries in oromia special zones. It covered about 70 industries MSEs and private industries in Sebeta, Sululta, Burayu, Laga Tafo. Dukem and Gelan. The study identifies, cluster and put frameworks for clustering.

1.6. Limitation of the Study

The study covered almost all SSMIs in OSZ. However while conducting the interview and distributing questionnaire, they feel as I come from government bodies to collect taxes and register them for licenses and hence some of them lack to give true data. Besides most of SSMIs are working indoor workshops and is difficult to get permission for contact. The other limitation of the study is since industries are located far from one another it is difficult to get transportation and also there is a financial constraints to cover all towns' industries repeatedly.

1.7. Research Methodology

To meet the objectives, the following methods will be used:

1. **Literature Survey:** a survey of theoretical background for manufacturing industries and levels of manufacturing industries, metalworking industries, industrial clustering, small scale industries role and advantages, industrial districts and framework of clustering from electronic documents, journals, and books. Other data have referred from related research studies, existing statistical data, and others. The sources of these surveys are from Addis Ababa libraries, Ministry of Trade and Industry library, Federal Micro and Small Enterprises Development Agency library, Oromia Trade and Industry Bureau (Finfinnee), Oromia Micro and Small Enterprises Development Agency (Finfinnee) and Finfinne Special Zone's Trade and Industry Office and Micro and Small enterprises Development offices.
2. **Data Collection from primary sources:** Data are collected from primary sources by visiting sample areas of the region (the sample areas are selected for high concentration of metalworking industries and suitability of getting the required data). The areas visited were towns Finfinnee Special Zone (Dukam, Sebata, Gelan, Sululta, Bureayu and Laga-Tafo-Laga Dadhi). These areas are visited each at least one time per week.
3. **Consultation:** Proper consulting to the manufacturing, Small Scale and metal industry experts and an advisor.
4. **Interviews:** Interviews are made with different organizations that directly or indirectly working with small scale metalworking industries.
5. **Questionnaires:** Preparing questionnaires regarding the performance and category of the manufacturing industries to different sectors and organizations. It also included preparing questionnaires to all selected sites regarding the size and complexity of small scale industries. This helped to identify metalworking industries and analyzes for clustering them. These questionnaires are distributed to individuals of the stakeholders of small scale metalworking industries such as owners, workers, dwellers and government bodies.
6. **Data Synthesis and Analysing:** The recorded data are synthesized and analysed to view results.
7. **Results and Discussions:** The results are derived from the analysis and further discussed.

1.8. Organization of the Study

The whole study is organized in to six chapters. The first chapter covered introduction to the study. The second chapter discussed the literature review of clustering from source documents published or unpublished. This part covered the overall relations of clustering in manufacturing in the successful countries implementing clustering. The third chapter covered the overall background of the organization under study. The fourth chapter included identification and cluster analysis of metalworking industries in the selected towns through reviewing the industries towards clustering approach. The fifth chapter contained summary of major findings. The sixth chapter covered the overall clustering views with regard to Ethiopian context and evaluation of the existed clusters performance with the current policy towards technology transfer. Then the study ended with conclusions and recommendations.

Chapter Two

Literature Review

2.1. Overview of Manufacturing

An industry has a wide variety of definitions and acronyms. Industries consists of enterprises and organizations that produce and/or supply goods/or services [22]. Industries can be classified as primary, secondary, and territiary. Primary industries are those that cultivate and exploit natural resources, such as agriculture, livestock, petroleum, mining, forestry, etc. Secondary industries convert the out put of primary industries in to products such as apparel, basic metals, computers, paper, etc. Territiary industries constitute the service sector of the economy such as banking, education, financial centre, insurance, real estate, etc. Basically the secondary industries constitute what we call manufacturing industries.

In Ethiopia, the classification of industries has made by different organizations and economists. Industries are classified as manufacturing, service and trade [25]. This category did not position primary industries. Ethiopian Economists Association classify industry sandwiched in the economic sectors as agriculture sector, industry sector and service sector in which industry sector indicates traditional meaning for manufacturing industry [10]. This classification is also supported by economic progress report of governmental and non-governmental organization as whole sale, retail, service, industry, and agriculture in which manufacturing has synonymous meaning with industry. Manufacturing industries came into being with the occurrence of technological and socio-economic transformations in the Western countries in the 18^{th}-19^{th} century. This was widely known as industrial revolution. It began in Britain and replaced the labor intensive textile production with mechanization and use of fuels.

Manufacturing industries are broadly categorized into engineering, construction, electronics, chemical, energy, textile, food and beverage, metalworking, plastic, transport and telecommunication industries. Even though manufacturing in this study entails production of discrete-items (metalworking) with their finishing operations, there are process industries categorized under manufacturing that are presented by chemicals and plastics, petroleum

products, food processing, soaps, steel and cement which is beyond the scope of this study. The attention of this study is on the metalworking fabricator in which the firms fabricate and assemble final products. Before detail looking of metalworking cluster, let manufacturing in Ethiopia and the selected sites will be discussed.

2.2. Manufacturing in Ethiopia

Ethiopia has ranked 158th from 162 countries in per capital income basis and 47% of its population is living in absolute poverty [44].According to the research, manufacturing sector contribution to GDP is about 10%, most contribution is from agriculture. But agricultural sector is growing at 1.6% and population is growing at about 3%. This can show that it is difficult to rely only on agriculture to cope with fast growing demography. This can signify the importance of the value of manufacturing industries on GDP. It is also reported that Foreign Direct Investment (FDI) approved projects the manufacturing and processing sector accounted for the highest share, 46.57%, followed by trade, hotels and tourism 40.7%; and agriculture and mining 12.7% [17]. In spite of the enormous importance of the Micro and Small Enterprises (MSEs) sector to the national economy with regards to job creation and poverty alleviation, Ethiopia has done little to develop them to make the sectors competitive in the domestic market and in the export [9].

2.2.1. Small Scale Manufacturing Industries in Ethiopia

Small Scale manufacturing industries (registered and unregistered or licensed or non- licensed) are mainly engaged in the manufacture of food, fabricated metal, furniture and clothing [12]. These sub-sectors constitute more than 85% of the small-scale manufacturing industries. The small scale manufacturing industrial group constitutes 46.6% of the number of persons engaged, 29.1% of the gross value of production and 30.9% of the value added. The other important manufacturing industrial groups in this respect were manufacture of furniture (14.0%), manufacture of wearing apparel (10.1%), manufacture of fabricated metal products (10.1%) and manufacture of food products (7.4%). These industrial groups together contributed 41.7, 43.7, 59.4 and 56.0% of the total number of establishments, number of persons engaged, gross value of production and value added in that order, in the reference period. It is also reported that the percentage share of imported raw materials cost to that of total raw materials cost was about 40

percent for all manufacturing industrial groups combined and 19% of the total industrial cost for the whole Small Scale Manufacturing Industrial groups combined was allocated for energy.

The Small Scale Manufacturing Survey also shows that there were 31,863 small-scale manufacturing industries (of which, 62.8% were in urban areas) engaging 97,782 persons (91.3% male, and 8.7% female [11]. After three years, this number increased to 39027 and contributes 99.9%, 95.65%, 29.75% and 34% to number of establishments, number of employees, and gross value of production and value added respectively to the country [12]. This census is nationwide and includes grain mill services too and the category of small scale has an interception with micro enterprises in the number of employees. Hence it has got a prominent figure for the number of employments and production output that helps the country benefited from unemployment risk and meeting demands of the local and exports. The survey report also digests that the female involvement is more in small scale than medium and large scale manufacturing. Small businesses and enterprises operated by women entrepreneurs contribute significantly to the national economy in terms of job creation and the alleviation of poverty, but are provided with little or no policy related support from the Ethiopian Ministry of Trade and Industry [10].

The Ethiopian government recognizes the significance of this sector and shows its dedication to promote the MSEs development by the Issuance of National Micro and Small Enterprises Strategy in 1997 and the Establishment of the Federal Micro and Small Enterprises Development Agency. Ethiopia's industrial development strategy issued in 2003 also singled out the promotion of MSEs development as one of the important instruments to create productive and dynamic private sector. Currently MSEs has got emphasis as they will be the centre of technology development. The promotion of this sector is justified on the grounds that enhancing growth with equity, creating long-term jobs, providing the basis for medium and large enterprise and promoting exports etc. The strategy puts a means to support the MSEs such as, infrastructure, financial facilities, supply of raw materials, and training [16].

Federal Micro and Small Enterprises Development Agencies (FeMSDA) act on MSEs up on the following objectives:

- To create job opportunity for the unemployed and increase their income by expanding and supporting small enterprises in order to reduce poverty
- To identify the problems of the existing and newly created small enterprise and provide them various supports to enable the flourishement, development, and strengthening of the small scale enterprises for further job creation.
- To create and expand new enterprises by organizing them in cooperative and providing various supports in order to create new job opportunities and reduce poverty.

2.2.2. Small Scale Metalworking Industries

Metalworking began during the Neolithic in Mesopotamia and other areas around the Mediterranean. It is either spread to, or developed independently in, regions of Europe and Asia. Gold is the first metal to be hammered in to shape. Copper was the first metal to be extracted and casted. Then Iron started to be smelted and mined from its ore. The ancient Romans had what might be called factories to produce weapons, scrolls, pottery and other products of the time from metals by handcraft. Then after, England began to manufacture machines, equipments and tools, and furniture from metals. United States takes over manufacture after several inland inventions of metal products. The most western countries share shines the present form of application of metals including Japan and in some height China.

In Ethiopia, even though there is no clear evidence on the emergence of metalworking. However, writers argue that during 1400s copper metal beads are made in northern Ethiopia. Since then Emperor Tewdros II (1855-1868) employed European and Turks to train soldiers. During the same regime some metal technologies through protestant missionaries. These missionaries employed Ethiopian citizens in a manufacturing of ornaments parallel to making and maintenance of weapons and artilleries During 1960s copper metal beads are manufactured and exported to North America.

Metalworking is the value adding activities on metals by forming (forging, rolling, drawing, extrusion, and sheet metal operation), casting (Sand, precision investment, plaster mould, permanent mould, die and centrifugal castings), fabrication (welding, brazing, soldering, and temporary joining material), material removal (turning, drilling, shaping & planning, milling, grinding, broaching and sawing) and finishing operations.

Metal is used to manufacture such items as jet and rocket engines, where the materials must withstand tremendous heat. It is used to make mammoth earth movers, where toughness is necessity. Metal is used to make things of beauty such as jewelry, tableware, furniture, and works of art. The fuel that powers nuclear power plants and ocean going vessels is a metal. It needs only a few grams to generate enough power to propel a submarine or aircraft carrier around the world. Still another combination of metals has unique ability to convert sunlight to electrical energy. A thin layer of metal only a micromillimeter thick makes it possess for a computer to make split-second computations. In metalworking, metals are used to make products such as sheets, bars, rods, tubes, angle, channel, square, hexagon &octagon and LTZ profiles that in turn are the basic raw materials for metalworking in one way or other. The probable products of metalworking industries are metal cans, tin wire, hand tools, cutlery, general hardware, non electric heating apparatus, fabricated structural metal products, metal forgings, metal stamping, etc.

It has been pointed out that manufacturing industries contribute to about 10% to GDP. From this metal products manufacturing contribute 10.1% and 59.4% in number of persons engaged and value addition respectively [12]. According to the Central Statistics Agency (CSA) [12] report, among 129,592 persons engaged in small scale metalworking industries, 48% are permanent paid, 39.7% unpaid proprietors, 6.6% active partners, 3.4% family workers and 2.3% others. It is also addressed that 82.5% of workers are literate and 82% male category are literate. Only 5.8% male ad 9% of female are attained higher than grade 12 in the industries. Even though there is no clear research done on separate Oromia Region, there are large numbers of all scales of manufacturing near the periphery of the capital Addis Ababa due to its own reasons as better infrastructure. The availability of well-developed infrastructure will reduce the cost of doing business for foreign investors and enable them to maximize the rate of return on investment [23].

Therefore the sites are expected to attract more FDI. But these industries add only 11% to the region's GDP, from this small scale shares only about 15% [8].

This thesis focuses on small scale metalworking industries in the periphery towns of Addis Ababa and is included the newly established zone called Finfinne Special Zone of Oromia under the administration of Oromia Region. Since the zone is newly established, there are no enough data for the presence and performance of the industries. But Oromia Trade, Industry and Transport Bureau had the data for the number of micro and small scale manufacturing industries and the capital they own for the registered private industries in the 2000 E.C. and summarized in the table below.

Table 2.2. Number of Establishments of SSMI in selected towns

S. No.	Town	No. of establishments	Remark
1	Burayu	105	
2	Dukem	47	
3	Gelan	14	
4	Laga Tafo	-	Not assessed
5	Sebeta	25	
6	Sululta	-	Not assessed
Total		191	

The data from the bureau shows also that for overall region, manufacturing establishments and value addition for the year 2000 E.C. shares 10.5% and 22% respectively. The report did not categorize the metalworking industries separately. According to research made by Dandena [8] these industries faced a wide variety of problems. Some of the problems faced are:

- ✓ Poor market access
- ✓ Lack of information and advice
- ✓ Lack of premises and land
- ✓ Shortage of raw materials
- ✓ Lack of suitability to new technology
- ✓ Problems regarding government rules and regulations and
- ✓ Difficulty in controlling

Looking in to the abve problems, the Ethiopian government must make actions to promote and strengthen MSEs. MSEs promoting and strengthening can be by:

1. Outsourcing f public services to MSE sector
2. Considering clustering
3. Considering business incubators
4. Creating networking and
5. Organizing a big meetings/conferences with MSEs

Dandena [8] also cited that metalworking industries are worrying for the shortage of raw materials and cost of import of them, lack of demand/market, and information. Therefore, the above problems will get solution if industries are clustered together.

2.3. Why Cluster Based Approach?

- ✓ Internal competition: Improvement in all spheres of activity
- ✓ Geographical proximity helps in mutual sharing of resources, information, etc.
- ✓ Attention of buyers and suppliers
- ✓ Development related business development services
- ✓ Helps in infrastructure development
- ✓ Economies of scale are achieved
- ✓ Larger Impact: Institutional support easier
- ✓ Cost of intervention gets distributed over more beneficiaries
- ✓ Dynamic and flexible
- ✓ Bottom-up approach, operated by beneficiaries
- ✓ Process centric rather than firm centric
- ✓ Objective-oriented and not target-oriented

2.4. Conceptual Framework of Cluster Development

Clustering could be called competition – cooperating in order to be more competitive and successful. Michael Poster define cluster as "geographical concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standard agencies, trade associations) in a particular field that compete and also cooperate." We are familiar with such clusters as Silicon Valley, a region similar in size to greater Wellington, just south of San Francisco that has become home to over 7,000 high tech companies. We all know Hollywood, the corner of Los Angles that is the world's entertainment capital. These clusters provide an environment that enables specialized local firms to develop the competitiveness to service large, often global markets, and extends globally to many industries.

Industrial clustering broadly signifies any form of industrial organization featuring a spatial concentration of numerous firms belonging to a similar industrial branch or *fi*[1]*lière* [2]. Often, the majority of firms in industrial clusters are small or medium-scale operations, although this does not mean that large firms can be ignored. Indeed, in some clusters large firms, although few in number, may have a very significant role [19]. The clustering concept implies much more than a simple physical agglomeration of homogeneous firms operating independently of course.

Firms in industrial clusters tend to specialize in carrying out particular processes or stages in the production and distribution channel. For example, in a metal window making cluster, some firms may process and supply sheet metal, angle iron and LTZ profiles, and others may cut and bend the profiles. Even some firms may drill and furnish hinges and keys, the next may carry out the detailed joinery and assembly of window, while a different group of firms may be responsible for surface finishing and final marketing. This vertical disintegration of production may well be complemented by horizontal specialization. Thus, among the sheet metal, angle iron and LTZ profiles suppliers may be firms which specialize in making window frames; and among the assembling firms may be those dedicated to making just hinges. In addition to this horizontal and vertical specialization, one may also find heterogeneous other firms providing inputs and

[1] The concept of a *filière* can best be understood as a channel of production and distribution, incorporating all the economic and technically interrelated operations, which feed goods directly or indirectly toward a similar end market.

services which contribute to the cluster's operation as a whole: financial services, trading agents, toolmakers and suppliers.

Consequently, firms in clusters are almost by definition enmeshed in more or less complex networks of inter-firm relationships. The degree of firm-level specialization and density of inter-firm relations found in any particular industrial cluster represent a general quality which we can call the cluster's "depth" [34]. This depth is closely related to the existence of increasing returns to scale and other positive localization benefits for the firms involved. In other word, directly or indirectly, it appears to generate competitive advantages and economic benefits for the firms involved – enabling in some cases, small firms to overcome the disadvantages associated with their modest scale of operations.

2.4.1. Clustering Dynamics

Clusters are dynamic. They evolve as a consequence of local and external linkages. A key process of change within clusters comes about through local upgrading. This results in enhanced human capital and improved technological capacities for firms and enhanced capabilities for workers and small producers. Dynamic Clustering raises the competitiveness of firms, improves their ability to appropriate a larger share of value added, and advances their position within global value chains through distinct forms of upgrading—product, process and function.

It is only through a systematic pattern of upgrading, often aided through national innovation and learning systems that clusters are able to compete in global markets on the basis of the high[2] road to growth [31]. This requires a stronger explanation of why the high road to growth (as opposed to increasing competition on wage costs) might have a more positive impact on poverty reduction in the medium to long-term. But upgrading not only relies on local and external linkages, it also has consequences for such linkages. That is to say, the process of upgrading is often determined by the nature of governance of ties within the cluster, as well as ties between cluster actors and external players within the value chains in which clusters are inserted. Global

[2] The high road involves investing in the flexibility to shift production between different products quickly and cheaply by having skilled workforces and multipurpose machines while low road involves relying on low-cost, short-term labour and minimal capital investment.

lead firms can exercise significant power in determining the actions of local firms, and thus the autonomy of clustered firms to engage in tasks that enhance their technical and resource capacities. Moreover, external ties can over time erode local linkages and weaken cluster governance. This implies that clusters have to be seen in the context of dynamic trajectories- where certain types of producers and workers gain and others lose.

2.4.2. Theory of Flexible Specialization

The analytical approach most frequently associated with clustering is the theory of flexible specialization (FS). FS theory posits that industrial organization is experiencing a paradigmatic shift from "inflexible" Fordist mass-production to a more flexible mode involving increasing disintegration and specialization at the firm-level. As consumer markets fragment and demand more differentiated products, and as new technology provides the means to inject such variety into production, so the basis of competition is shifting from "price" alone, to characteristics such as high product quality and reliability, the ability to deliver promptly and in small batches [2].

Flexible specialization creates challenges and opportunities for both large-scale and small-scale producers according to its protagonists. Large firms need to decentralize internally, move to cellular layouts, trim inventories and create more co-operative relations with their suppliers and sub-contractors. Small firms need to capitalize on their ability to meet small order sizes and short delivery schedules by intensifying specialization in the context of strong inter-firm networks and hence the relevance to industrial clusters.

In summary, flexible specialization offers a coherent set of arguments for the potential advantages of industrial clustering for small firms. These derive from the collective capability – given the right kind of inter-relations – to be very responsive to an increasingly differentiated and changing market.

Nevertheless, FS theories have little to say about the processes by which dynamic gains are achieved. Continuous improvement in products and processes is seen to flow from a change in management practice and production organization, without too much analysis of the nature of technological and organizational change, or the resources that generate it.

2.5. Cluster Processes

Clustering sets into motion a range of potential benefits that can directly affect developing countries through external economies, joint action and social capital [26]. Even though the research put emphasis how clustering benefits from poverty alleviation, it can give good insights about clustering. Other writers call the combined advantages firms experience as a result of external economies and gains from joint action "collective efficiency" which is one of the dimension of dynamic cluster which is discussed in the previous section.

External economies

Agglomeration benefits may not only raise efficiency, they may also make it possible for smaller firms to access markets through a division of labor. Economies of scale and scope can allow individual small firms to survive by specializing in specific tasks within the production process and by accessing specialist skills and services and inputs from within the cluster. Similarly, external economies that arise from agglomeration can result in a significant lowering of costs in accessing inputs, labor and information. Again, this can help small firms to survive and grow in ways that would be infeasible if they operated in isolation. Knowledge spill-overs found in clusters may also make it feasible for small firms to acquire new know-how, new products and new production techniques that could not be obtained through markets. Clustering can thus enhance the individual capacities of small firms to access markets, and acquire skills, knowledge, credit and information.

Joint action

Clustering can also promote collective capacity. In addition to the direct economic benefits that passively accrue to small firms by virtue of their location within the cluster, there are significant gains from active local collaboration that clustering can set into motion. Local cooperation, both between individual firms and through cluster institutions can strengthen the ability of clustered actors to compete in markets, by sharing costs and by engaging in joint tasks such shared marketing and distribution. Moreover, such forms of joint action can help clustered firms confront external threats and challenges and face vulnerabilities.

These external challenges are pronounced as local clusters engage in global markets. Globalization, namely the increasingly rapid flows of capital, goods, peoples, and ideas across borders, can help bring local actors into global markets and enhance their income earning opportunities. Globalization can also potentially increase the vulnerability of local actors to sudden changes in global demand, in trading rules and in financial stability. Thus, with globalization there is also greater instability and vulnerability. Clusters can help MSEs reduce their exposure to exogenous shocks and risks. Local institutions such as business associations and collective service centres can help clustered firms acquire the skills, the technical abilities to reduce their vulnerability to the exigencies of globalization, thereby enhancing the well-being of workers and producers.

Social capital

Local initiatives and local collaboration are themselves often strengthened by local social capital. Clusters tend to have a strong presence of social capital, which can take the form of shared norms and/or common identities. This can, potentially, help reduce vulnerability, help flows of knowledge within the cluster, provide the basis to strengthen local institutions, and help firms upgrade. We need to consider how social capital works to do this, and in particular how it may mitigate against poverty. But there is a caveat. Social capital can also serve to raise local competition as much as it helps local cooperation. Divisions within communities can reduce local cooperation and serve to worsen poverty impacts. Also we need to note the differentiated ways in which social capital works for different types of firms (large versus small) and workers (men versus women, or high versus low castes). Finally, it is important to recall that social capital is not static. Its forms, and how it works, can change over time. In particular, it is affected by economic changes (and growth) within the cluster.

2.6. Taxonomy of Clusters

Different writers and researchers classify industrial clusters differently. First, Amin [3] makes a strong case for distinguishing at least three types of cluster.

Craft-based, artisanal or *traditional-sector* industrial clusters engaged in the manufacture of footwear, garment-making, furniture, and metalworking. The successful cases in this category illustrate the salience of co-operation, product specialization and informal social and institutional arrangements.*High-tech complexes* (such as Silicon Valley). These demonstrate the need for huge R&D budgets, vast reserves of venture capital and excellence in technology-intensive products. Clusters based on the presence of *large-firms* (such as the engineering sector in Baden-Württemberg) show up the importance of regional institutional support via high-quality training, education, R&D and communications infrastructure.

Second, a distinction between two types of industrial cluster is drawn on different lines by Pedersen [31]. He distinguishes between diversified industrial clusters and subcontractor clusters. The former are based on vertical specialization of individual enterprises and vertical diversity of the cluster as a whole. Competitive gains tend to be derived from enterprise collaboration both within and outside the cluster. The latter are based on a narrow vertical and horizontal specialization, in which most of the enterprises are dependent on and linked as subcontractors to one or more large-scale enterprises. Competitive gains tend to be based on reduced transaction costs from dealing with a large enterprise. However the large enterprise(s) may also appropriate most of the benefits.

Third, the relationship between clusters and their markets forms other important criteria for disaggregating. Humphrey [19] distinguishes different prospects for clusters as 'commodity chains'. Producer-driven commodity chains are characteristic of capital- and technology-intensive industries. Production in these chains is dominated by large-scale manufacturers who co-ordinate backward and forward linkages: organizing supply chains and defining the final product. Buyer-driven commodity chains on the other hand are characteristic of labour-intensive consumer goods industries. In this case large retailers, marketers and trading companies play the main role in setting up decentralized production networks. Humphrey's point is that the development of any cluster will depend on its position within and interaction with other elements

in the commodity chain, just as much as on its internal structure and relationship. These three authors illustrate some of the variety of perspectives that can be adopted in categorizing industrial clusters. Alternative dimensions could be historical or social criteria for example, or the nature of production processes being undertaken.

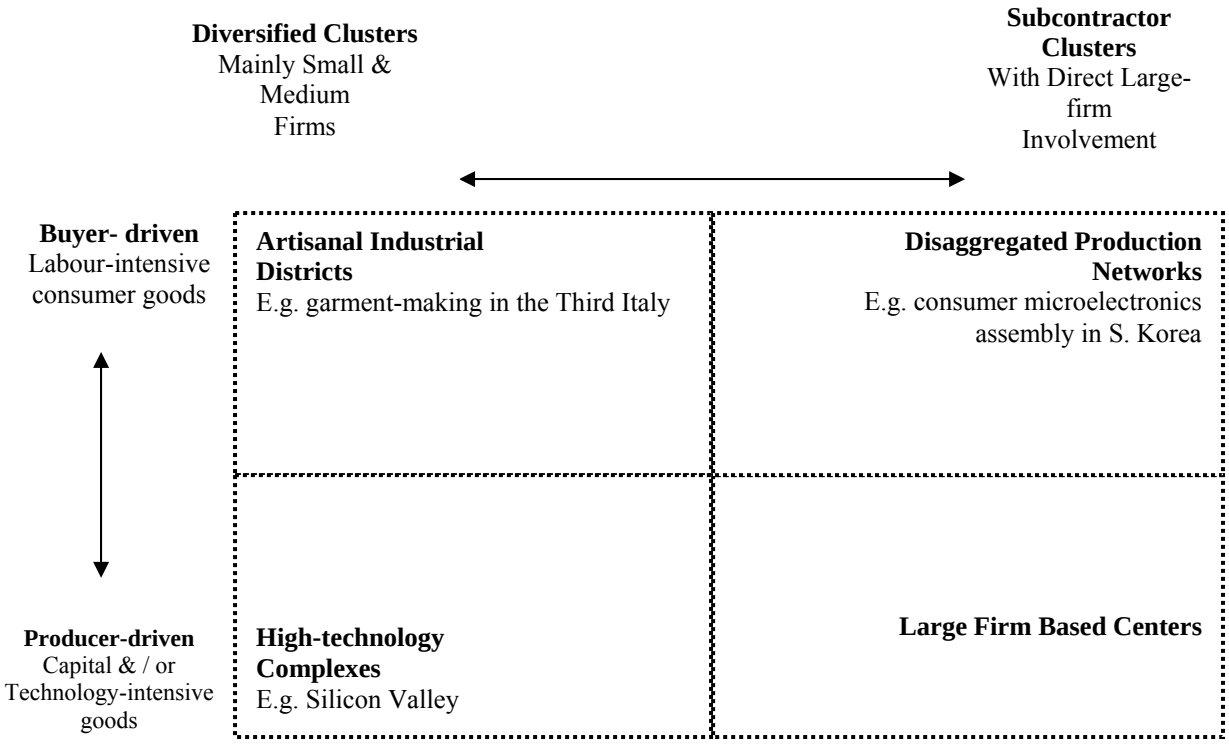


Figure 2.6. Taxonomy of clusters-Slightly adapted from [2]

Other taxonomy of cluster is may be National, Regional and commercial clusters [7].

National Clusters are groups of companies and organizations who collaboratively addressing development issues for the cluster. Typically they address policy, infrastructure and scale related issues. *Regional Clusters* are the classic Michael Porter-type clusters, based on the premise that an industry will increasingly prosper in a specialized, networked environment. The focus is on building a supportive environment for the cluster participants, and extending the linkages between participating firms, their suppliers and related and supporting organizations. These regional clusters do not have a membership basis, with stakeholders including firms, and educational organizations. *Commercial Clusters* are consortiums of companies who have chosen to collaborate in a number of areas. They are membership based, with the fee structure often supporting a dedicated support person.

In the context of Ethiopia, the classification of clusters may suit artisanal, labor intensive and buyer driven commodity chain type. Identifying all the cases above will help to identify clusters to build. This new taxonomy is useful for identifying which empirical experiences are most likely to be relevant to Ethiopia, if two general assumptions are accepted. First, developing economies are better endowed with labor than capital or technology resources and their industries or prospective industries tend to be part of buyer-driven commodity chains. Second, industrial development that draws on local resources and does not require the presence of large-scale international firms or international capital may be particularly important Oromia Special Zone. On this basis the most relevant cluster experiences will be those that fall in the top-left quadrant of the matrix in figure 2.6.

Many countries practiced and record convincible results on building clustering and some of the model countries will be discussed. Most literatures found out the regions that already practiced and benefited from clustering in short periods are Latin America and Asia [2, 26, 33].

2.7. Best Practices in Clustering

2.7.1. Mexican Footwear Manufacturing in Leon & Guadalajara

The leather and footwear industry in Mexico employs approximately 140,000 people and accounts for 2 – 3% of GDP. More than half of the entire sector is concentrated in the vicinity of Leon, and nearly a quarter in Guadalajara (22%). Unlike other important sectors in Mexico, the leather and footwear industry is overwhelmingly locally owned. In Mexico, there were about 1700 shoe enterprises in the Leon cluster and 1200 in the Guadalajara cluster [42]. Leon is dominated by the footwear industry: it generates 70% of the city's GDP and 40% of its employment. Footwear manufacturers employ 70,000 people, mostly in small or medium sized firm.

Guadalajara is home to several industries traditionally characterized by small firm organization. Footwear manufacturing employs 25,000. However, the statistical picture in Guadalajara is skewed by 49% of employment (& 42% of value-added) is with small firms with less than 100 employees. A further 26% (33%) is with medium-sized firms with less than 250 employees [2].

For many years, the footwear market in Mexico was completely protected by import-quotas and cushioned by excess domestic demand. Traditionally, the Mexican clusters lacked the kind of intense inter-firm linkages and collaboration. Thus, in Mexico, trade liberalization had a significant effect on the footwear cluster of Guadalajara, a cluster that employed 25,000 persons in over 1,000, 20 predominantly small, enterprises. Reductions in import tariffs led to a sharp rise in footwear imports, especially from China, severely threatening small domestic producers. Thus, in Guadalajara alone-which accounts for some 27 per cent of Mexican shoe production, memberships of the local footwear trade association fell from 500 to 315 as many firms closed down [39].

2.7.2. Indian Agra Footwear and Ludhiana Metalworking Industries Cluster

Agra, had around 5000 footwear enterprises in 1990-1991, even though the number decreased to around 2375 in 1996 [42]. It is also found that the shoe cluster of Agra employed 60,000 workers in some 5,000, mostly informal small scale units [26].

Ludhiana produces 95% of India's woollen hosiery; 85% of its sewing machine parts; 60% of its bicycles and their parts, and accounts for over half of Punjab's exports. They continue to account for some 80% of jobs – a proportion that shows no sign of declining, although small firms' share of output is. Strikingly, small firms also maintained a 60 – 70 % share of Punjab's exports, which grew at a rate of 23% during the 1980s. Small firms are the backbone of Ludhiana's regional economy, even in sectors which tend to be characterized by large and integrated firms in other parts of India. They have also proved remarkable vibrant and resilient in the face of several political and economic shocks to the region since Indian independence.

2.7.3. Brazilian Sinos Valley Footwear Cluster

The Sinos Valley footwear cluster consisted of about 500 shoe manufacturers and about 700 subcontractors [42]. In Sinos Valley south of Brazil, external influence induced by market led the shoe cluster's production organization to upgrade from 1960s to the present date in three different forms. In the 1960s, the production system in the cluster changed from import substituting craft production to Fordist mass production. In the 1970s, the production shifted to

quality and export oriented system. In recent times, the cluster has moved to high flexibly specialized form of production organization with more emphases on high quality standard [42].

2.7.4. Ghanan Kumasi Auto-Parts and Suame Metal Products and Vehicle Repair Clusters

Ghana auto-parts and vehicle repair clusters, for example, reported over 5,000 workshops employing some 40,000 persons engaged in metalworking, the manufacture of auto-parts and in vehicle repair. The cluster had grown, but remained on the borderline of the informal economy with extensive "use of cheap family and apprentice labor" [37].

The Suame cluster has some of the most matured micro- and small-scale enterprises in Africa [1]. It was reported that Suame cluster had approximately 9000 engineering enterprises manufacturing metal products and vehicle repair (4000 on metal products and 5000 on vehicle repair). Although Adeya's [1] study provided valuable information on the enterprise in the cluster, it was however, very modest about the number of enterprises in the Suame cluster in the sense that, it did not consider the trading enterprises. The research shows that trading enterprises are major actors that play full complementary role in the sale and supply of engineering materials, tools and spare parts to the metal workers and vehicle repairers.

2.7.5. Kenyan Vehicle Repair and Metalworking Cluster

Employment-generating vehicle repair and metalworking clusters are also cited that from various Kenyan locations, where micro-enterprises (employing on average two persons), many of which are informal (*ju*[3]*a kali*) units, use simple technologies to produce a range of goods for local markets [37]. Currently about 2500 small firms are operating in a metalworking cluster employing about 6500 workers.

[3]Literally "hot sun" in Kiswahili and refers to self-employed artisans working outdoors in makeshift workshops for lack of covered premises

2.7.6. Ethiopian Footwear, Handloom and metalworking and Woodworking Clusters

According to researchers, Ethiopia practiced industrial clustering in footwear, handlooms, garments, and currently are exercising on metalworking and woodworking (coordinated by UNIDO) industrial cluster. Except metalworking and woodworking cluster started at Mekelle (capital of Tigrai Region), all are experienced in Addis Ababa (capital of Ethiopia). The most successful cluster is footwear industry [41].

Merkato Leather Footwear Cluster

The leather footwear sub-sector accounts for 72 percent of all leather and leather products enterprises in Ethiopia, and is dominated by the MSEs. Merkato (Addis Ababa) leather footwear cluster, which has at least 600 registered and un-registered enterprises producing more than 6 million pairs of shoes annually, accounts for over two-thirds of all micro and small-scale footwear manufacturers in the country. In the early 2000s, China-made shoes flooded into the Ethiopian market plunging the local footwear industry into a slump. Remarkably, however, the industry soon resumed vigorous growth not only taking the market back and but even finding its way into the international market. Some factories are exporting shoes in bulk to Italy and other developed countries as well as neighboring African countries.

Gullele Handloom Cluster

Ethiopia has a long and traditional history and competence in production of delicate and intricately designed hand woven fabrics on traditional looms. The estimated number of handlooms in the country is to the tune of 290,000 and more than 60 percent are located in rural areas. . For example in the capital city, Addis Ababa, the total number of wavers is estimated to be 60,000 while 20,000 of them are found clustered in a district called *Gullele*[4] found in the northern part of the city. Women in the cluster are estimated to be 39% while men constitute the remaining 61% [21]. This cluster of handlooms , the biggest in the country, produces fabrics for traditional Ethiopian dresses, bed sheets and curtains for domestic market. However, some

[4] Gullele is one of the sub-city in Addis Ababa city Administration found at North and North-West of the city

private entrepreneurs working with groups of weavers on sub contracting basis are producing and exporting a variety of high value added home furnishings, although in limited quantity.

Metalworking and Woodworking Cluster

These clusters are found in Mekalle. It is sponsored and financed by UNIDO. Theses clusters are found naturally in a vertical integration of products and processes. The clusters study has not yet completed and benefits to the country as the whole will not exactly determined.However from the partial report, Mekelle metal and wood enterprises cluster, with at least 600 micro and small enterprises, accounts for 50 percent of all metal and wood enterprises in the Tigray region. The major products include a wide range of metal and wooden products: household utensils, office and household furniture, construction materials like window grills and agriculture equipment.

Addis Ababa Ready-made Garments Cluster

Addis Ababa ready-made garments cluster, with 43 small and medium scale enterprises and an estimated sewing capacity of 5000 machines, is the only such cluster in Ethiopia. The major products include basic T-shirts, sports wear, uniforms, gents' suits, etc largely for domestic market. Private sector enterprises, which account for 38 out of 43, have come up only during the last decade. This cluster has been an important source of employment for women.

2.8. Clustering: Environmental Context

In previous sections clustering concepts and practices are discussed in detail. Now, one of the clustering advantages- shared environmental benefits will be discussed. Clustering provides economic benefits by applying shared waste treatment facilities. Effects of clustering on environments are:

1. Impacts on the driving forces for environmental degradations: - application of shared waste treatment facilities at the cluster level is a holistic approach to control environmental impacts from the industrial sector, particularly MSEs, which tend to have a scattered distribution pattern. Hence, environmental performance of industrial factories in the cluster can be improved as a whole.
2. Impacts on the environment and socio-economic conditions: - improving the environmental performance of MSEs through cluster development will contribute to a better environment. Moreover, it will also enhance social and economic development simultaneously. Development of an industrial cluster provides "multiplier effects" in the socio-economic systems, particularly at the local level, including business activities in trading and service sectors, the flow of labor into the area, and urbanization as a result of socio-economic growth.

In other word consider the metalworking industries distributed in all over towns of OSZ that disturbs the citizens producing noisy operations in unsafe workshops. Hence this can also calls industries to be clustered.

Chapter Three

General Background Information of Oromia Special Zone

3.1. Overview of Oromia Special Zone

Oromia Special Zone (OSZ) is located at an average radius of about 40 kms from centre of Addis Ababa. It is newly founded zone by 'caffee Oromiyaa' by proclamation number 132/2000 on 08/12/2000. Its population size taken by 1999 census is about 980,734 in which urban dwellers constitute about 702,593. Its population density is about 163.39 per square kilometers.

It contains 6 rural woredas and 8 town administrations such as Sululuta, Burayu, Sebeta, Dukem, Gelan, Laga Tafo and Holota. The engagements of investment in this zone are manufacturing, trade and services. Most of the manufacturing sectors are operating in towns. Currently there are about 1853 total investments in the zone from this about 683 (36.9%) investments are from manufacturing sector. This sector contributes employment absorption of about 320,828 employees which is about 86% of all sectors. The geographical location of the zone is as the following figures.

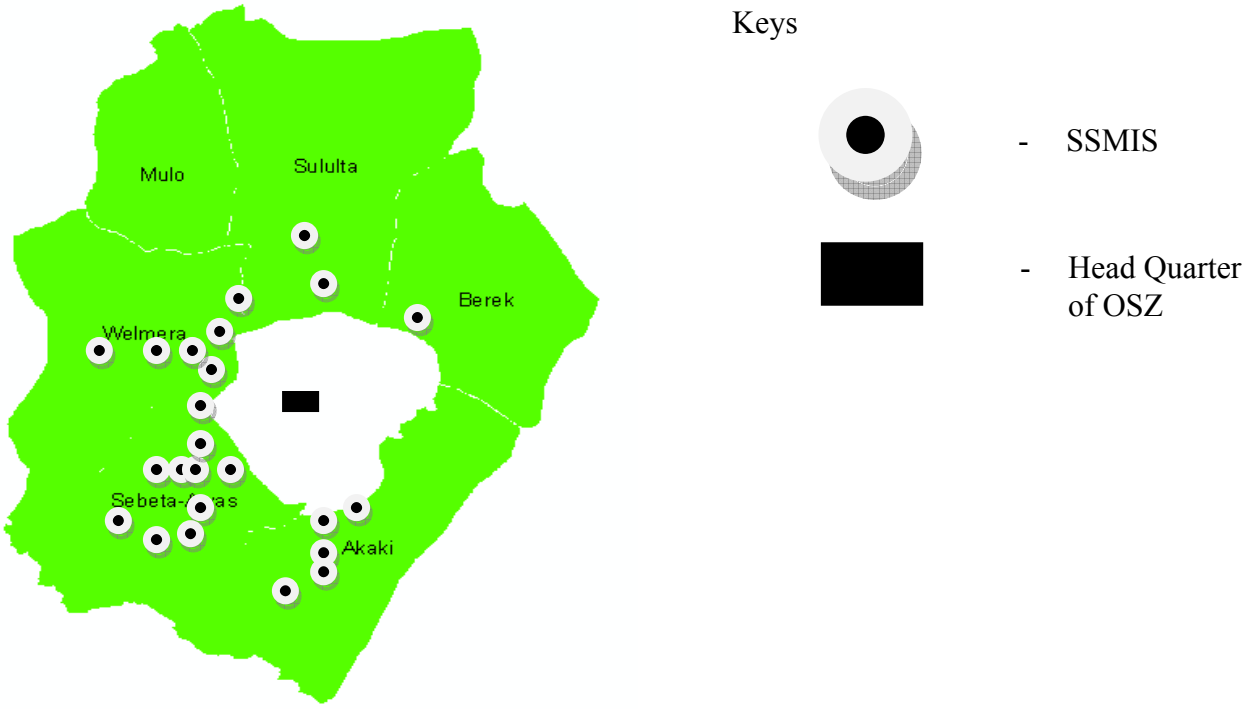
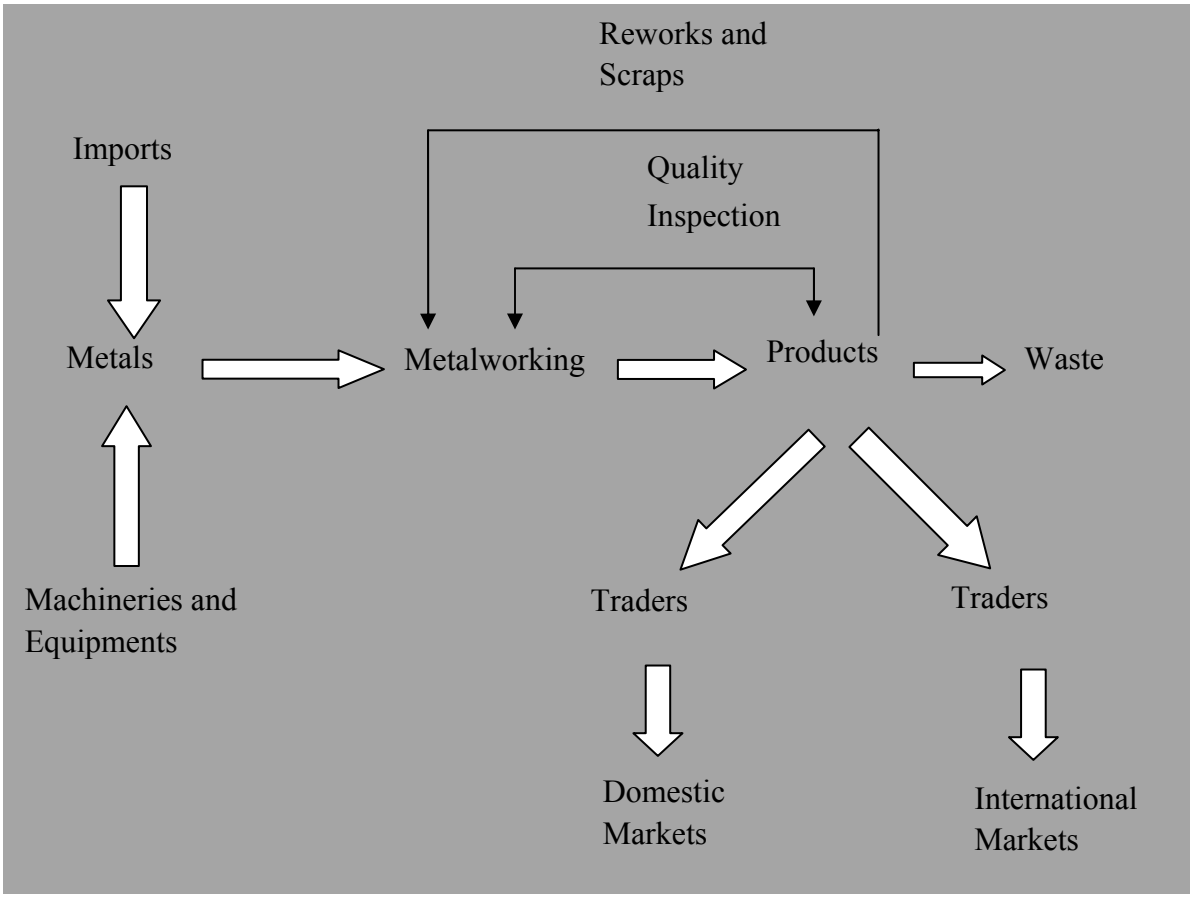


Figure 3.1. Location of OSZ

3.2. Proposed Flow Chart of Metalworking Industries Cluster

The proposed flow process chart for the cluster is shown in the figure. From figure 3.2, it is clearly stated that the metals (raw materials locally available and imported) will be processed by machineries and equipments in the metalworking industries cluster. The finished products are inspected and if the reworks and scraps are recorded, they return to the series of clusters and if products are free from defects, traders will sell either to local or global markets.



aFigure 3.2. Flow Process Chart for SSMIs

Chapter Four

Cluster Analysis of Small Scale Metalworking Industries

4.1. Identification of Small Scale Metalworking Industries

As tried to be introduced in the introduction part, the scope of these industries is on the basis of engagement of the number of employees temporary or permanent. Based on Ministry of Trade and Industry (MoTI) and FeMSEDA, the maximum number of employees in small scale category is about 50. Hence this study limits the minimum number of employees to be three because most metalworking industries operate by the defined number. Based on the scale identified, the industries engage in the value addition of metals to capital or consumer goods are identified. Besides, the current number of employees and capital, annual sales and industry establishment years are included. The industries identified are also licensed, organized, private none licensed and dispersed. The study excludes the industries that were organized years before and now are getting weakened and scattered. In addition, no one was able to identify the industries which are newly established and follow the already established industries but this paper did.

Even though no organized and recorded data were available from Oromia Special Zone Administration, the industries along their performances are identified through frequent site observation (visit), interviews and questionnaires are arranged in the Appendix A. It is clearly seen from the Appendix A that industries from Sululta and Laga-Tafo had immature in establishment and record low capital and number of employment. Relatively good performances are observed from Sebeta, Burayu, and Dukem, even though Gelan had a considerable small scale metal industries that are nearer to medium and large manufacturing companies. From Appendix A, the following consecutive analyses are done.

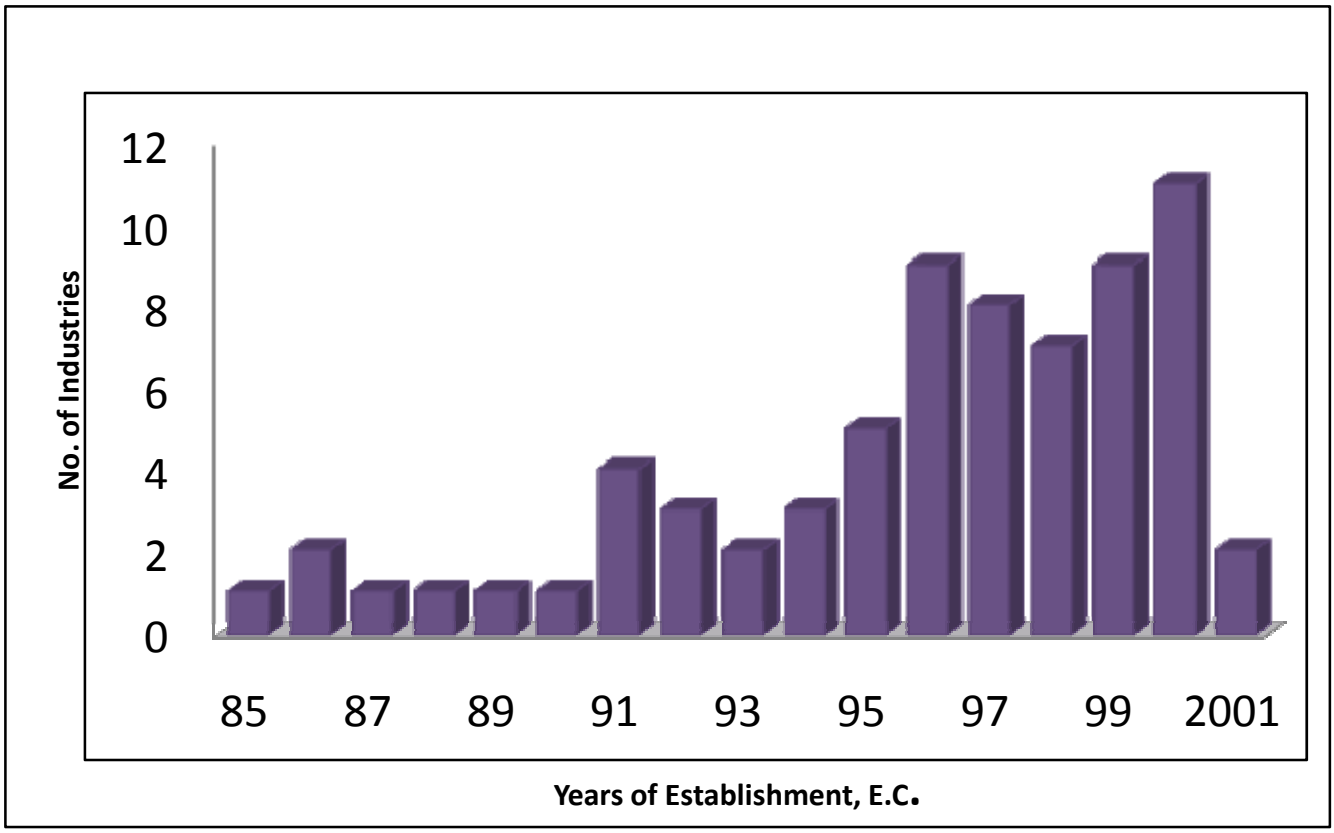


Figure 4.1. No. of Industries vs Age

As you can see s from the above figure, most industries established are not matured and their establishments are going to increase from 1991 onwards. This may show good trends towards attracting new entries. From 19985 to 1990, the establishments are insignificant that may point out the era of changing MSE policy for credits and organization by FeMSDA and MoTI. Another reason behind is that the organized industries under MSE are scattered and completely close down the businesses. It is also a headache for new comers due to the same reason if they are not properly advised and followed by respective authorities.

From Appendix A, it can be inferred that most industries organized under MSE are getting decreasing in size, capacity, and number of employees. But the capitals owned by the remaining member of the groups are getting increasing, because of faulty hiring of members and opportunistic accumulation of capitals by managing members that may not be attractive towards working together cooperatively. In contrary, private industries performances are getting increased from year to year. It is already mentioned that Ethiopian MSEs reduce unemployment and adds insignificant values to GDP [25]. This idea can be validated practically with in the case

considered the number of workers employed including the owners in small scale metalworking industries in towns of Oromia Special Zone are about 662, which is insignificant when compared to other MSEs sectors employment absorption.

4.2. Trends in Clustering

Even though most industries identified are dispersed, some trends towards clustering are observed in Sebeta, Burayu and Dukem industries named as group 1, group 2, group 3, and group 4 contains 11, 7, 5 and 6 independent small industries respectively that work together through sharing resources. For example, industries named as group1 in Sebeta contains 11 separate industries placed in the same geographic area producing the same or differentiated products employee about 64 workers currently and increased their capital to 1.2 million Birr since engagement. This group is typical also in forming vertical disintegration and horizontal specialization of processes and hence is appetite for calling for clustering. The same is true with the remaining groups of industries.

The total average annual profits of metalworking industries in the selected towns is about 3.78 million Birr. But this amount will not represent the indicating figure because some industries did not give accurate profit data as they fear taxes and totally unwillingness and irresponsibleness. There are about 70 small scale metalworking industries in the zone with all of them clearly observed. Based on the identification survey, 70 questionnaires (see appendix F) are distributed to industries (1 for each) and 64 industries are responding to direct questionnaire and the rest are covered by in depth interview with workers, managers and owners. Based on the responses of questionnaire (about 92 % response) which is supported by series of interviews and observations, and performance observation (Appendix A), some trends toward clustering will be discussed in the following consecutive sections.

4.2.1. Problems Facing Industries

From the questionnaire survey and in-depth interview with industries, the problems identified are summarized in the table below.

Table 4.2. Problems of SSMI

Problems	No. of Responses	Percentage of Responses	Cumulative Percentage
Poor Demand	18	18/64=28.1	28.1
Lack of Premises	16	16/64=25	53.1
Lack of information and Advice	10	10/64=15.6	68.7
Lack of skilled workforce	8	8/64=12.5	81.2
Shortage of Raw materials	6	6/64=9.4	90.6
Others	6	6/64=9.4	100
Total	64	100	

From the table above, it seems that problems had an equal effort in influencing industries. But the most prominent problems are poor demand, lack of premises, lack of information and advice and lack of skilled manpower which constitute about 82 % of the problem. From the table, lack of premises and land shares almost equal weights of problems with demand orientation in industries. These problems will call clustering approach for the solution. The problems can be easily understood by the following figure.

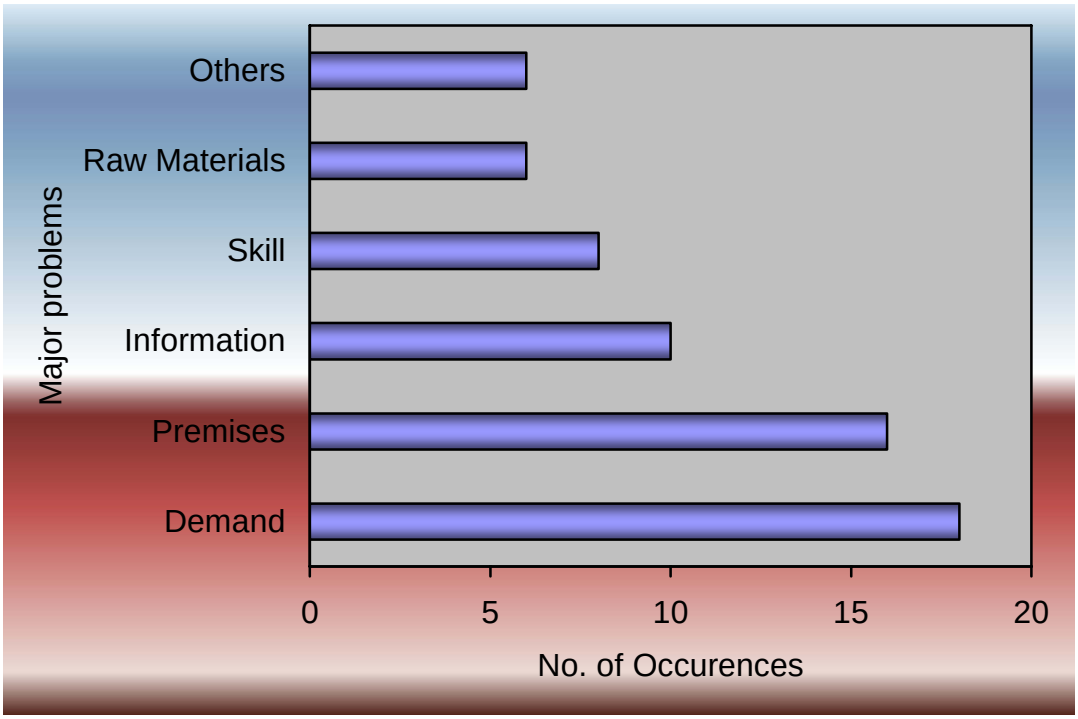
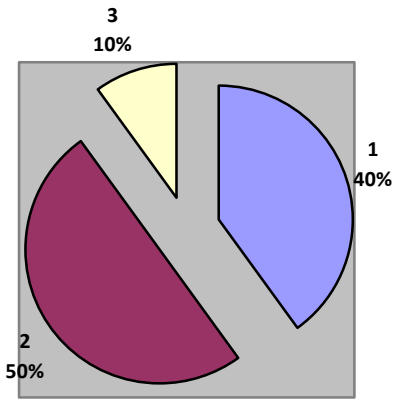


Figure 4.2. Major Problems of SSMIs

4.2.2. Workshop Area and Size

No one tried to respond the exact area of their workshop. But from the questionnaire survey and consecutive interviews, the following results are attained and summarized in the table below.



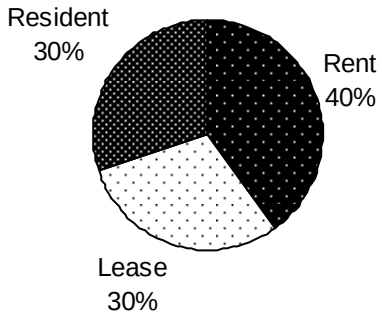


Figure 4.2 a) Number of Workshops, Figure 4.2 b) Nature of Workshops

About 50% respond that the number of workshops per industries are 2, 40% respond 1 and the rest are operating in 3 workshops. Hence most industries are working in unsafe, unfavourable and narrow workshops that will not attract workers. The number of workers in a workshop varies greatly for all industries ranging from 2 to 16. Imagine 16 workers in a single confined workshop. Regarding the premises, about 40% of industries respond workshops are rent, 30% report premises from government, and the rest uses self private residents and family residents. Most industries in rent point that they are facing challenges from the owners' restriction to energy, time and the like. They also report while they are starting to produce effectively, they are forced to leave the house. The owners also are not willing to renew the contract agreement for the rented workshop.

4.2.3. Education and Training

Education and Training is a backbone for any sector development. The same is true for the metalworking industries. From in depth interview made with respective industries, about 40% respond that training is given once organized by Trade and Industry Bureau. The rest responded negatively. From the trained workers, only 30% are trained with related to their jobs, the rest are taken organization and entrepreneurships.

From the total responses by industries, 10% are not educated at all, 10% attended high school, 15% attended 10+1, 25% attended 10+2, 25% attended 10+3 diploma, 15% attended college diploma and none of the attended university degree or above. From the clue, most of the workers are TVET graduates of certificate and diploma. From the questionnaire, the qualifications of the owners are also responded. From the survey, about 30% have no qualifications, 25% are diploma graduates, 40% TVET graduates, and about 5% are holding university degree.

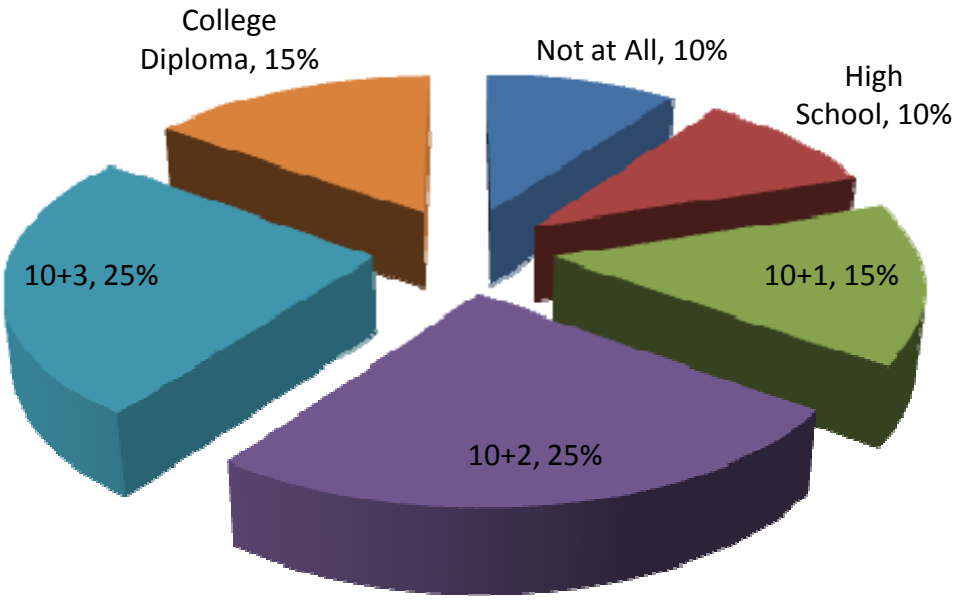


Figure 4.2.c. Qualifications of Workers in SSMIs

Most owners (about55%) were engaged in similar industries before establishing, 15% were working in garages, 10% were working in large industries, and the rest are TVET graduates and cooperatives. From finance point of view, the sources of initial capitals were personal deposits, MFI and banks, family and share in order of decreasing percentages.

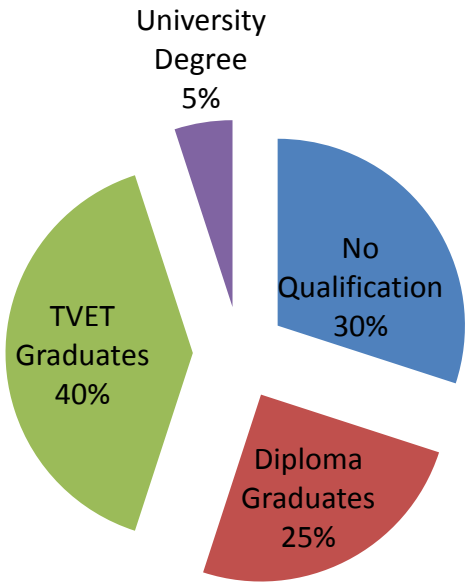


Figure 4.2d. Qualification of Owners

4.2.4. Sources of Skills of Workers

From the 70 distributed questionnaires to owners/managers 60 responded fully and summarized in the table below.

Table 4.2a: Sources of skills of workers

Sources of Skills	Frequency	Percentage
TVET colleges	23	38.3
Brought on job	14	23.4
On job training	10	16.7
Previous employment	8	13.3
Self learning	5	8.3
Total	60	100

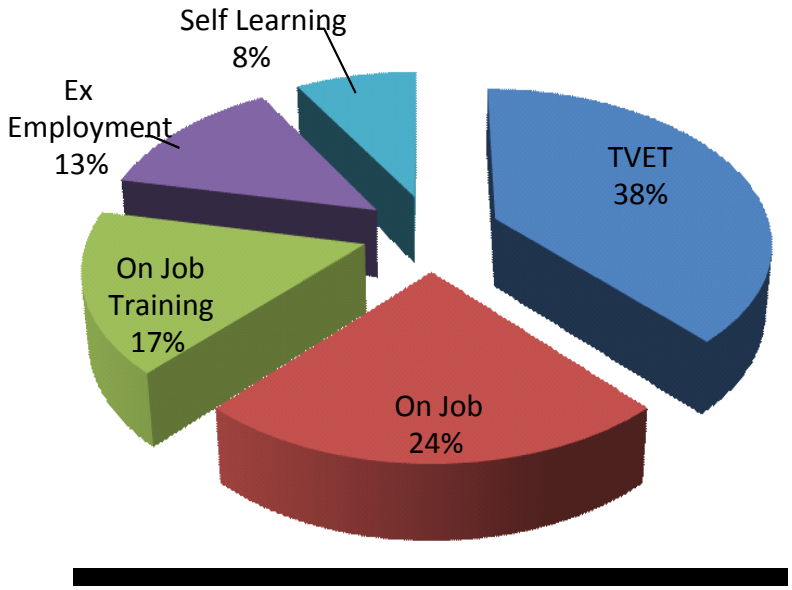


Figure 4.2e. Sources of Skills for Workers

From the above table, most workers acquired skills from formal training and on job training by themselves. So there is less opportunities for workers to learn from each other.

4.2.5. Innovations

It is clearly stated in literature that innovations include adaptations, modifications and enhancements to products and processes. It is also seen that innovators are creator of technology and adopters are user of technology. In this paper, it is tried to identify the innovators versus imitators. Some of the imitation activities are part of innovations if it included modifications. From the in depth interviews and questionnaires, the following results are obtained. Most of the industries responded that they are using the machineries and processes as purchased abroad. In this regard they can be classified under adopters. However, some industries tried to modify most of their processes and are classified under innovators. Some are existing copying the technology and use it. These can be imitators. Examples are welding machines transformers and cutting machines and in two industries moulding machines are copied. None of them are creating new technologies, i.e., machineries and processes.

In other dimension innovators can be adaptations to technology. But adaptations are beyond imitations. The kinds of adaptations undertaken mainly involve cost cutting process improvements and low cost replication of imported machineries. Most industries covered under this study operate with the same work procedures, methods and machineries. However, some are producing new products that they were not producing earlier years. The main problems that hinder them from producing new products are the low demand and lack of skilled manpower.

4.2.6. Knowledge Acquisition

This is attained through knowledge feedback and a flow of knowledge generated as a result of internal activities within the firm and external inputs- a flow of generated by externally-originated activities such as searching and absorbing information from outside the firm. From the industries even though are not naturally grouped, some grouped industries show a positive response from knowledge feedback and none of them respond to external inputs. This shows knowledge acquisition with industries is low. It is clear that from Ethiopia's view point, the first knowledge acquisition will be external inputs that others can imitate or adopt it. Sources of external inputs are foreign buyers, technological institutions, capital goods suppliers and trade journals. Universities in most countries are the main source of knowledge acquisition externally.

In Ethiopia, currently there is a promising act on relating education and training with industries, reported low in interactions working with industries. Even firms will not exchange knowledge and information. In general, information feedback is limited and secrecy is paramount. In the questionnaire survey only 20% of entrepreneurs cited other local metalworking industries are sources of information for innovation. Most industries do not usually allow other entrepreneurs to visit their workshops. Knowledge acquisition from external linkages is limited due to capacity constraints.

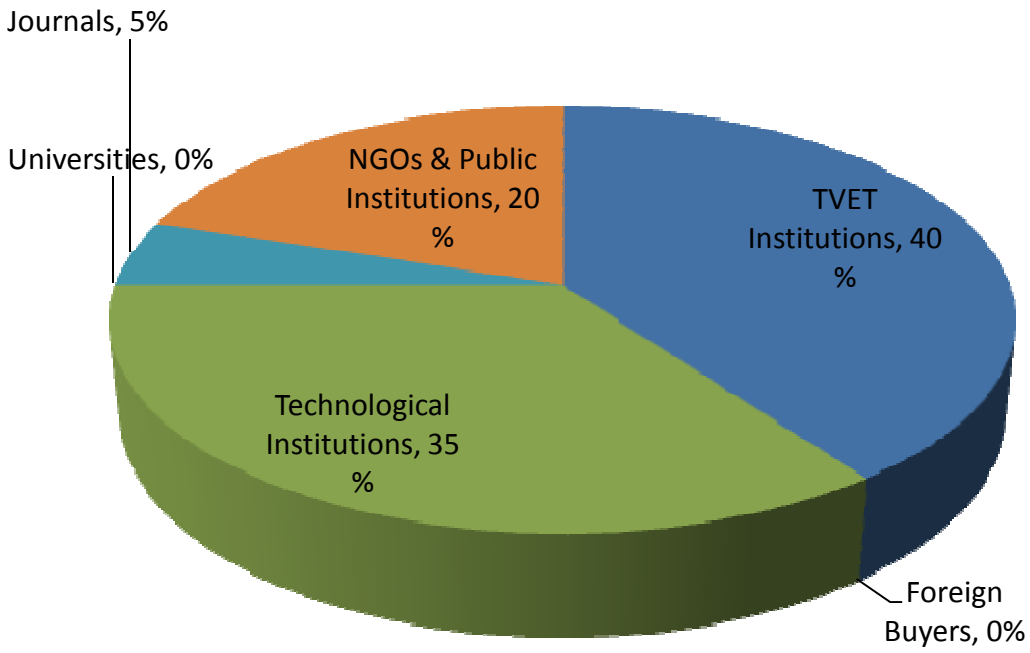


Figure 4.2f. Knowledge Acquisition for Workers

4.2.7. Value Chain Analysis

Value chain can show firms from conception of product to disposal of scraps or waste. In each processes, upgrading one of the steps can increase the competitive capability of firms. Generally, the following firms can signify simple value analysis model.

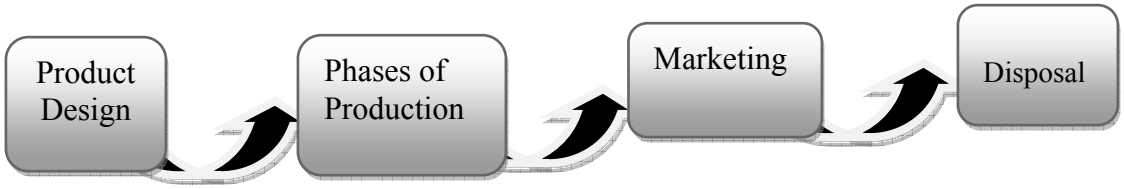


Figure 4.2g. Simple Value Chain of SSMIs

This simple illustration of value chain can represent the current position of small scale industries. However, it will be complex if industries are strengthened. From the figure above, conception of product is done by imitations or adaptations with defined phases of production and products delivered to the final consumers through marketing and finally dispose or recycle consumptions.

From the focus of industries under study, the industries' raw materials, processes, distribution channel, supplies, consumers and possible waste from their respective industries are clearly formulated and set under Appendix B. From the Appendix B, about 67% of the industries are engaged in welding and assembling, and about 8.6% industries are engaged in combinations of the manufacturing processes determined. Also, from the Appendix, it can show that most of the suppliers of raw materials are local shops and retailers. From the purchasing point of view, only industries grouped show positive trends towards purchasing metals together to enjoy economy of scale. But these industries also purchase from local suppliers that has a risk of extra cost at the place and shortage of raw materials when retailers are out of stock.

It can be dealt also that most customers of industries are local markets. This restriction will not provoke industries to more production quantity and innovation.

As can be seen from the table above, most raw materials are common or found in the same industry. Hence they can be benefited if they purchase together. The customers of most industries are local markets and sometimes from Addis Ababa. With this scope how we can think the firms export performance with out meeting and attracting local customers?

Other point in this table is that indirectly wastes of the industries are consumed by others and exactly by nowadays no scrap of metals. It is an asset!

The final implication from the table may be, imagine casting is finished by machining is welded or assembled together and the scraps from one will be an input for others if they are placed together and communicate. This can call clustering. The links between industries will be one of the methods of identifying efficiency of clusters through backward and forward linkages of industries as well as inter-firm linkages as the following figure depicts.

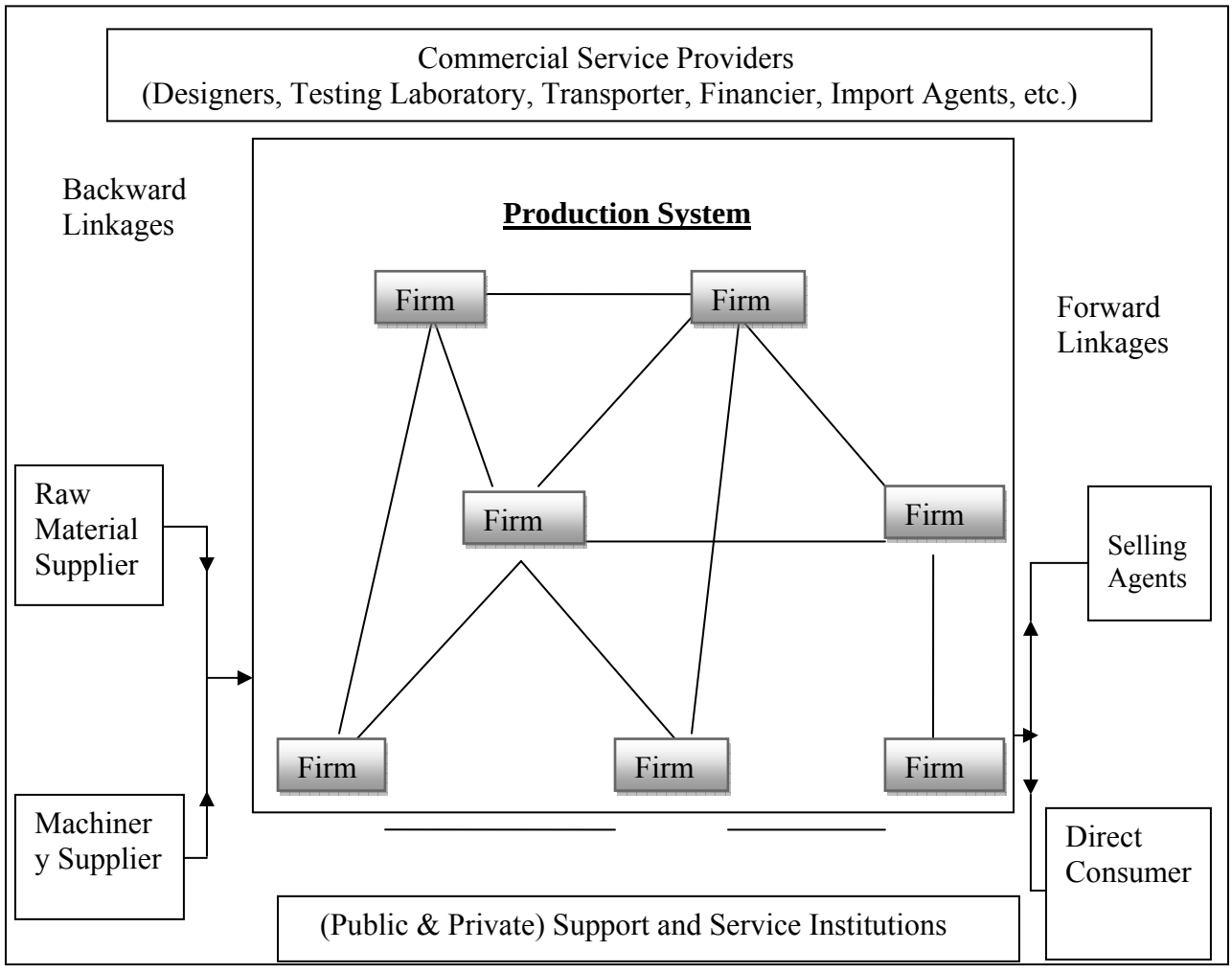


Figure 4.2h. Firms Backward and Forward Linkages

4.2.8. Identifying Machineries, Equipments and their Busy Times

Most machines and equipments are common for most industries. The following table shows the industries with their machines and equipments as well as the busy (operating) times.

Table 4.2b. Machineries with their busy Times

No. of Industries	Machineries/Equipments	Ave. Busy Hours/day	Core processes
47	Welding, Shearing , Drilling , Grinding , and Soldering Machines	3	Welding and Assembling
6	Grinding, Milling, Lathe, Drilling and Boring, and Tool cutting machines	2.5	Machining
5	Moulding, Furnaces, Finishing machines, and Moulds	1.5	Casting
4	Bending, Forging, Crimping, and Seaming machines	2	Forming
8	Combination of above	6	Combined

From the above table, one can clearly observed that most machines are sitting idle in majority of industries in a scattered manner. Therefore, these idle times will be minimized if the dispersed industries are clustered. There is relatively less idle times in industries using their manufacturing processes by combining.

4.2.9. Complements and Integrations of processes

As clusters are sets of complementary firms, public, public, private and semipublic research and development institutions, which are interconnected by labor market and technological/or input – out put link [30].As per this definition complementary means a segregation of products/processes to the clusters. Based on the open-end interviews with owners and workers, it is found that woodworking is complemented with metalworking industries. Half of the metalworking industries contain woodworking workshops with metalworking.

Another event in clustering is vertical integration in which firms tend to specialize in carrying out specific processes or stages in production and distribution channel [2]. For example in the case of casting one firm may specialize in pattern making and others in moulding, still other firm in casting the product and the last firm may finish the product by machining and sell the products. This process is called vertical disintegration of production. This process may well be complemented by horizontal specialization in which metal suppliers may be firms which specialize in making cope and drag or patterns and among machining, firms specialize in making patterns. The firms are functionally interconnected vertically as well as horizontal. The relations such as sharing resources, information on technology and marketing will be horizontal linkages which are seen in industries closer to each other.

The relation made by group of industries to react for subcontracting, exports, and mutual purchasing and marketing is vertical linkages. From the case under study, none of them report subcontracting besides some small scale industries are located in large industries, as the case in industries located in Dukem, Sebeta and Gelan. No industries are able to export their products nor able to form joint venture for protecting global markets.

Not only homogeneous firms will be located together but also heterogeneous firms that provide inputs and services contributing to the cluster operation as a whole will be included in the chain of clusters [7]. Heterogeneous firms that contribute inputs to the metalworking industries are raw material suppliers, component suppliers, tool makers, etc. Services contributions to the clusters are financial services, banks, government agencies and advisors and traders. These components will make the cluster complete. The complete cycle are referred as stake holders of metalworking cluster. In the stake holders share, various governmental and non governmental institutions also

operate within the cluster. Among these, the ones operating at the macro level are Ministry of trade and Industry, Ministry of labor and social affairs, Ministry of capacity building and the Federal micro and small enterprises development agency. Various NGO's, skill development centers and public institutions also work in the cluster by facilitating the potential benefits of the cluster and advocating a better policy environment to promote the local BDS market. Figure below clearly shows the marketing and institutional relationships between various stakeholders within the cluster.

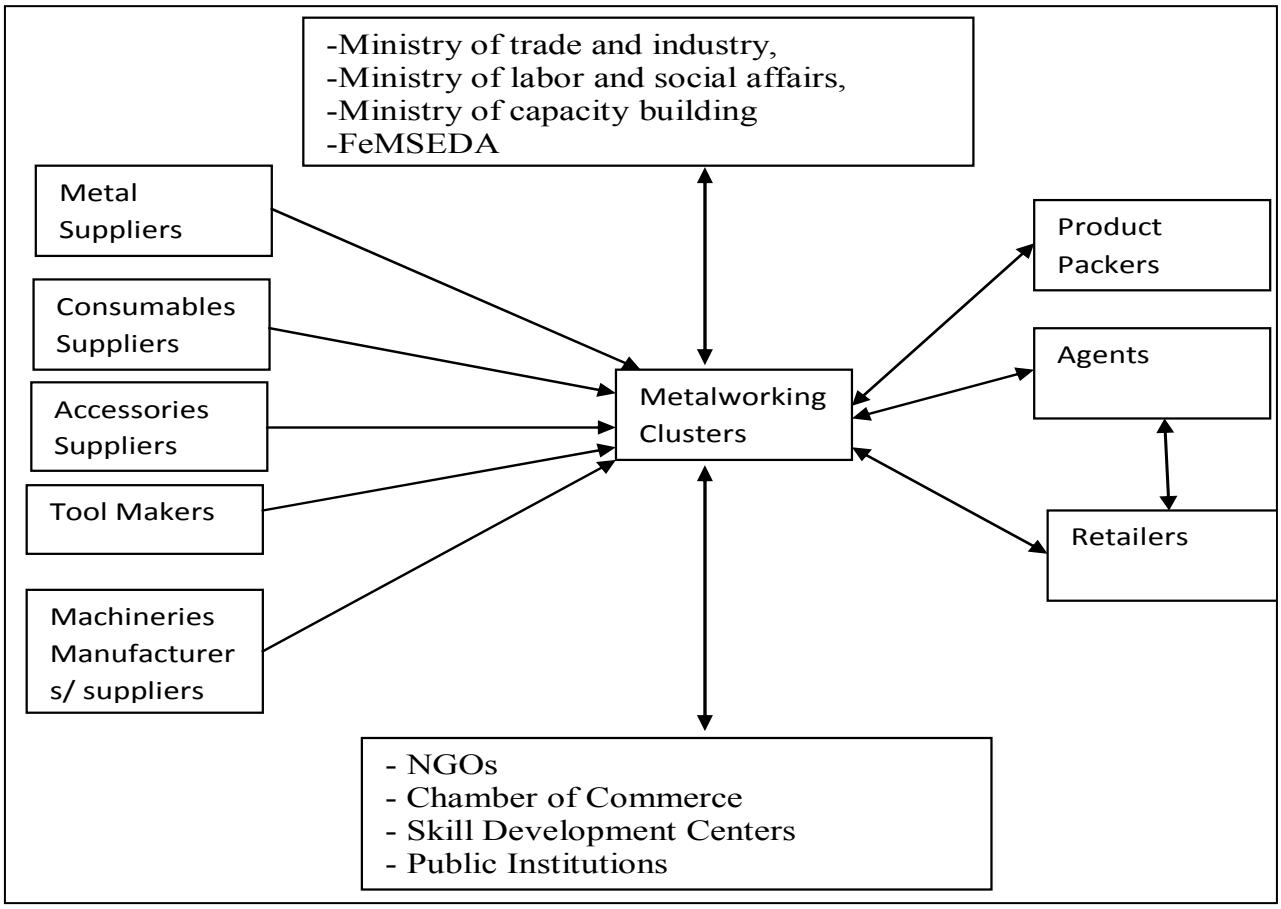


Figure 4.2i. Stakeholders of SSMI Cluster

4.2.10. Infrastructure for Cluster

It is already known that infrastructure is the basis for any nations' developmental activities. Considering Ethiopia as a developing country, the zone under study has relatively better infrastructures. This may be an input for the benefits of competitive advantage gained by upgrading of the supply chain. The majority of towns are benefited through better road construction, since most of the high way from the capital city crosses all of them. Most towns had telecommunication services, water supply services, electric power services and transportation services. Hence it will not face an intense infrastructure problem relatively in clustering with in the zone.

4.2.11. R & D and Product Development

R & D and Product Development are the basic inputs for clustering for innovation. According to the survey on industries (Appendix A), about 96.7% are not using R & D. But about half of them tried to develop products for markets. Therefore, with out R & D, how industries are struggled for innovation? This study answers for it, i.e. through clustering.

4.2.12. Information Technology

Information Technology (IT) is the tool through which informations and feedbacks on markets and technology are transferred. This put framework for cluster operation. In Ethiopia only 20% of the people are exercising or using computers. Marketing through e-commerce is common in global economy. Some medium and large manufacturing companies are using IT to facilitate communication but small scale metalworking industries. Most workers do know the advantages of IT, but short of applying it to the work place due to capacity and know-how constraints. But if industries are located together, IT will be easily applied that call clustering too.

4.2.13. Mode of Transportation

Transportation is one component in the value chain of industries. In the metalworking industries, since they are limited to retailers' shops locally, transportation costs will not be serious. But all retail shops will not contain all varieties of metals and components. In this case huge transportation costs will be incurred as the case in industries in Sululuta and Laga Tafo, in which transportation costs about half of their indirect costs.

4.2.14. Supporting Institutions for Industries

There are many arguments and researches that MSEs are not formally supported and motivated by institutions. It is clear that third parties are important in order to support the transactions. Furthermore, the quality of service rendered by the third party should be dynamic and in line with the growth path of industries. The supporting institutions in small scale industries in Ethiopia are FeMSEDA, UNIDO, MoTI, etc which are discussed in the stakeholder part. But in this case the supports of those institutions are evaluated towards preparing bazaars, show rooms and exhibitions.

FeMSEDA has an annual exhibition plan. But exhibitions are prepared for limited number of industries. So, there is less probability that most of industries are involved in exhibitions.
Bazaars are frequently prepared by trade associations irrespective of the participation of metalworking industries in the zone. Show rooms are important for displaying technology and products for marketing. However, neither institution nor industries themselves are trying to prepare show rooms. The above elements are the methods to markets development for industries. In the way industries are currently engaged, it may be difficult to do so. But what do you think if industries are placed closer to each other? Is it difficult to prepare common show rooms, bazaars and exhibitions? This calls for clustering.

4.2.15. Age Identification

During the survey of industries (Appendix A), the number of establishments and their ages are summarized in the following table.

Table 4.2c. Age Identification for SSMI

Age Group	0-2	3-5	6-8	9-11	12-14	>14	Total
Category	1	2	3	4	5	6	
No. of Industries	21	25	9	8	5	2	70
Percentage	30	35.7	12.9	11.4	7.1	2.9	100
Cumulative Percentage	30	65.7	78.6	90	97.1	100	

From the above table which is also supported by figure 4.2j, about 78.6% of the number of establishments lie in the age ranges of the first three and can show the immaturity of the industries. The reason behind this is as seen from the data from respective towns; the organized MSEs members withdraw and loose coordination and control of government bodies over industries. Hence industries need to support from government, NGOs and other institutions.

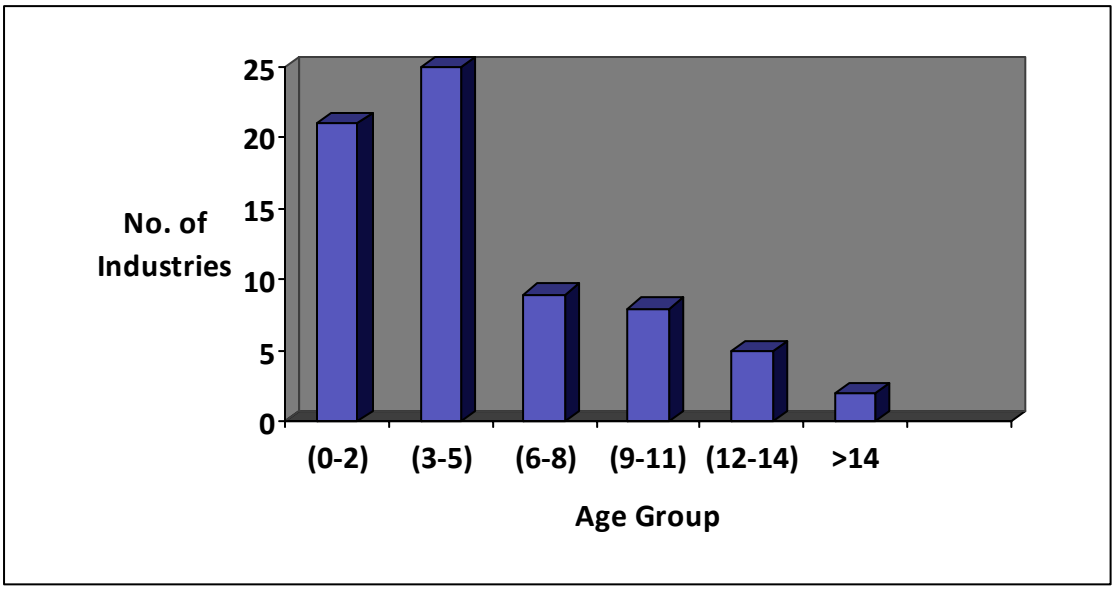


Figure 4.2j. Ages of Industries

4.3. Locating the Clusters

Many definitions and arguments are made in theoretical frameworks of clustering. However, all definitions with the exception of Schmitz's approach described real economic scenarios in industrialized countries. Adoption of definition depends on the environmental context in which the subject is applied. This paper adopts Schmitz's definition because geographic proximity appears to be important for Ethiopian MSEs clusters. This is because institutions governing economic exchanges are very weak in Ethiopia.

Physical infrastructures such as roads and telecommunication are not developed. Furthermore, face-to-face business transactions are much valued because of opportunistic behaviours are common in Ethiopian market. Defined location is important for Ethiopian clusters because the location serve as advertisement strategy for the SSEs in the cluster. Given the locations of each metalworking industries, the gravity model is used to locate clusters for industries. This is a geographical location that put industries closer to each other benefitted from agglomeration. Gravity model is assumed to locate industries at an optimum facility cost [38].

Since the towns under study lie on the periphery of Addis Ababa- the potential markets for the country, the interactions of value chains of the towns are directly linked with Addis Ababa also. Hence the reference plane for those industries are taken from the Addis Ababa (centre) on the geographic location representing two dimensions namely horizontal (latitude) and vertical positions (longitude) ignoring altitude and measured as (471084, 998192) meters. The positions of each industries, and air and track distances from Addis Ababa are set Appendix C.

Hence using the gravity positioning model, i.e,

$$(X, Y) = \sqrt{\{n_1[(X_A-X_1)^2 + (Y_A-Y_1]^2 + n_2[(X_A-X_2)^2 + (Y_A-Y_2)^2] + \ldots + n_n[(X_A-X_{70})^2 + (Y_A-Y_{70})^2]\}}$$

Where,

(X, Y)= the location of the cluster

n_1, n_2 and $n_{n=}$ weights of industries (the number of members in the groups)

(X_A, Y_A) = Position of the Reference, Addis Ababa = (471084, 998192) and

(X_1, Y_1), (X_2, Y_2) and (X_{70}, Y_{70}) = Coordinate Positions of Industries

Using Microsoft excel solver the optimum location for a cluster is (469934, 999458) which is in the Addis Ababa region. This is because of the locations of industries are on the radius of the references. Hence since industries in Laga Tafo and Sululta currently performs less and are also not supported by large industries, they are ignores in this calculation. Then the optimum location of a cluster is (468865, 985726) which is approximately the location between Sebeta and Dukem. Hence even though the calculation showed us some solution, the optimum location of cluster will be near to Dukem, because of its infrastructures and there will be a decrease of transportation and transaction costs for a cluster due to the presence of importing and exporting line pass nearer it and possibility of subcontracting from large manufacturing industries. By using the point data of the industries, the location of industries are drawn as the following figure.

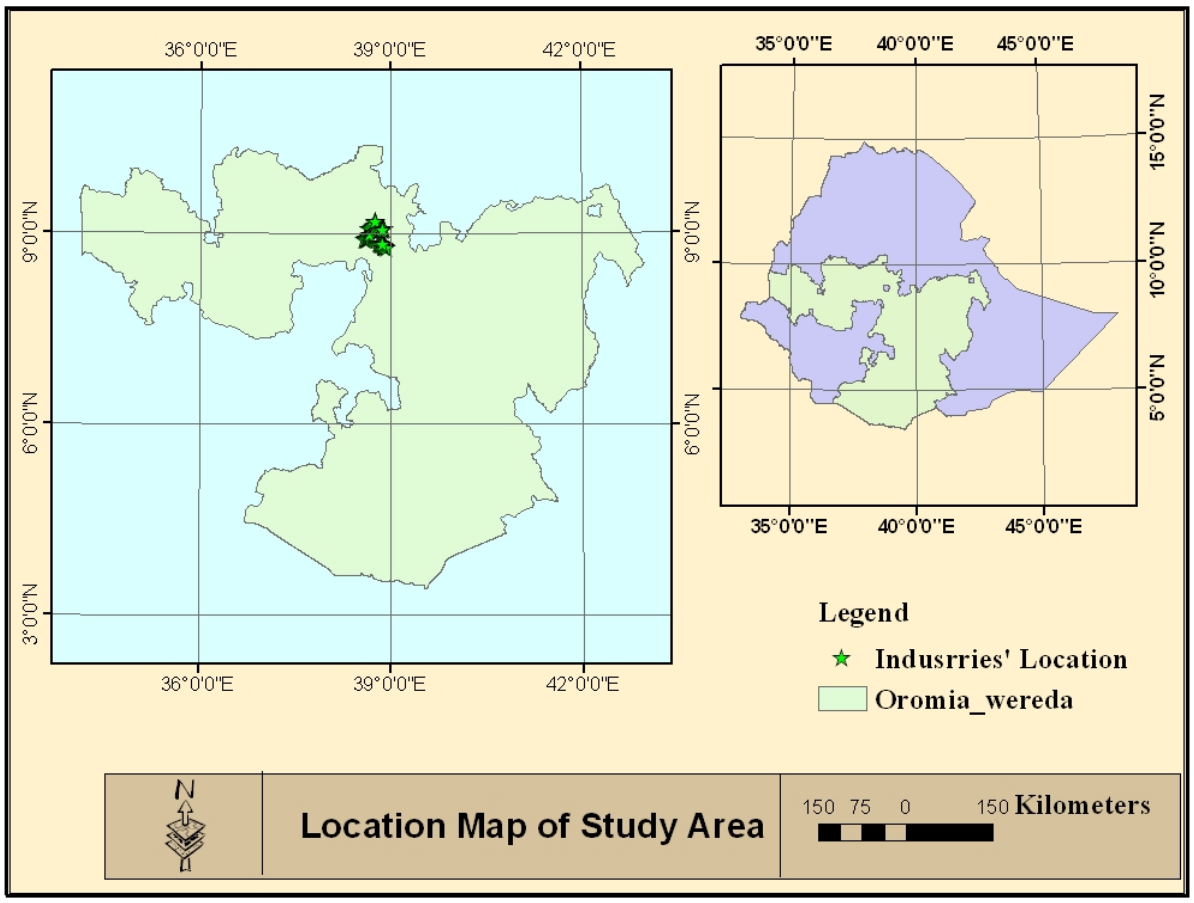


Figure 4.3. Locations of SSMIs in OSZ

4.4. Metalworking Cluster Frameworks (Growth Paths)

Different cluster models are implemented in different countries. However, most developing countries like Taiwan and Indonesia used the following models successfully. They used model development processes into three distinct phases: (1) initiation, (2) quantity expansion, and (3) qualitative improvement (see Table 6 for a summary of the endogenous model of industrial development). Besides UNIDO used anonymous guidelines, principles and cluster development processes (see Appendix E for the revised CDP that UNIDO is exercising in Developing Countries) to develop clusters in developing countries

If the production method is simple but it is not easy to sell the products, as in the case of the garment industry, it is likely to be merchants who establish the new enterprises. They would do so often in the suburbs of large cities or villages not too far away from large cities, taking advantage of their experience in commercial activities in other industries. If the production method is complicated, engineers tend to be the new entrepreneurs. Metalworking industries are grouped under the second category in which the production methods are somewhat complicated. To solve this complexity, the model plant is selected to graduate knowledgeable and skilled entrepreneurs.

Before the developing the framework model for the whole cluster, let the internal flow of production set to decrease complexity. In the figure 4.4, it is clearly set that to reduce the amount of wastes and scraps and use resources in common; the arrangements are optimized by observing the actual processes in several workshops and industries. As can be seen from the figure, all processes are designed to use the scraps being a waste through sharing equipments and skilled manpower. The whole procedures can be inferred easily from the figure 4.4. Once they succeed in the production of new products, often after long trial and error processes, a swarm of imitators appears.

The imitators are often spin-offs, i.e., those who have worked for the founding enterprises and initiated own enterprises by imitating production methods and products. Since most enterprises produce the same (or almost the same) low-quality products using the same low-quality materials and parts, anonymous market transactions develop, which, in turn, reduces the entry barriers for new firms. Indeed, new firms can easily procure all the required materials and parts and sell their

products through merchants, and recruit workers with desired skills from inside the cluster, while investing in a few indispensable equipments. Because of the low income of consumers, there is strong demand for low-quality products in the domestic markets, which is clear advantage of initiating new business in developing countries. As a matter of fact, the founders of new industry earn huge profits owing to the large demand for their low-quality products. This attracts entry of new enterprises.

The active entry results in geographical concentration of enterprises, which, in turn, attracts traders, part-suppliers, skilled workers, and engineers to the industrial cluster. In this way, an industrial cluster is expanded. Note that up to this point, productivity growth is modest or could even be negative, as imitation does not improve the production efficiency, even though the quantity of production registers impressive growth [2, 41]. Typically enterprises at this stage are very small and use labor-intensive production methods.

Active entry increases the supply of products to markets sharply, thereby reducing output prices and, hence, the profitability of producing low-quality products. This triggers new competition centered on product improvement. At this stage, innovative entrepreneurs begin employing a larger number of engineers and also designers to improve their products and often start developing long-term subcontracts with specific part-suppliers to acquire firm-specific and high-quality parts. But the improvement of product quality alone does not ensure high profits for innovative enterprises; in order to differentiate their new high-quality products from low quality products produced by the majority of other enterprises, these entrepreneurs must establish a reputation as high-quality producers and develop own marketing channels using own marketing agents and managing own retail shops, in order to sell their products directly to consumers and users of their products. If they are successful, they tend to absorb those enterprises that fail to innovate and let these enterprises to produce products with the same brand names of successful enterprises. Many enterprises which cannot catch up with innovative enterprises have to exit the industry.

The size of successful enterprises grows and many of them begin exports. Another important point we would like to emphasize here is that the industrial cluster sets the stage for the innovation towards the quality improvement by attracting a pool of human resources useful for

improving the product quality and improving the marketing efficiency of improved products. Innovation is nothing but a new combination of the existing resources, including engineers, designers, parts-suppliers, and merchants [2].

To realize such innovation potential, high-quality entrepreneurial ability is found to be indispensable. In other words, successful entrepreneurs at this stage are highly educated almost without exception, unlike founders of the industry who are often uneducated but endowed with skills and ambitions. The verifications of models above work in existing clusters. But with industries need to be clustered, the cluster formation phase will be added. In the actual cases where metalworking industries are dispersed, this phase plays a role in clustering geographically. From the above general models of industrial cluster, specific cluster model will be developed for metalworking industries with not forgetting the actors and stakeholders of clusters.

Through forming the model plant where design, production, research and development and distribution have undergone in cooperation of Universities, MoTI, MoST, FeMSEDA as government agent; SOEs and TVETs as the source of workforce; MFIs as the source of finance; FDIs as the source of foreign technologies, etc. As these all perform efficiently with the desired goal, some of the engineers/merchants/entrepreneurs started to be graduated from the technology centre as be initiated by the above actors. As these further works in the firms some are starting to innovate their products or processes hence the starting of quantity expansion due to the demand of low quality products produced by majority of the firms. As the products are produced in a large volume, foreign companies will put interests towards purchasing the products that forces the firms to switch from quantity expansion to quality improvement. At this stage some firms start to export their products outside and the other keeps innovation i.e., multifaceted-innovations and still the other firms will grow to medium and large metalworking industries. The detail model of the above frameworks for metalworking industries in general are revealed in the figure 4.4a.

Table 4.4. Growth Phases for SSMIs

Phase	Prior experience of managers	Education	Innovation, imitation, and productivity growth	Institutions
Cluster Formation	Social and Public managers	High	None	Government institutions used as facilitators and local politicians and UNIDO as interventions
Initiation	Merchants/Engineers	Low	Imitate foreign technology directly or indirectly	Internal production of parts, components, and final products
Quantity Expansion	Spin-offs and entry from various fields	Mixed	Imitate imitated technology; stagnant productivity; and declining profitability	Market transactions; division of labor; and formation of industrial cluster
Quality Improvement	Second-generation of founders and newcomers with new ideas	Very High	Multi-faceted innovations; exit of many enterprises; and increasing productivity	Reputation and brand names; direct sales; sub-contracts or vertical integration; and emergence of large enterprises

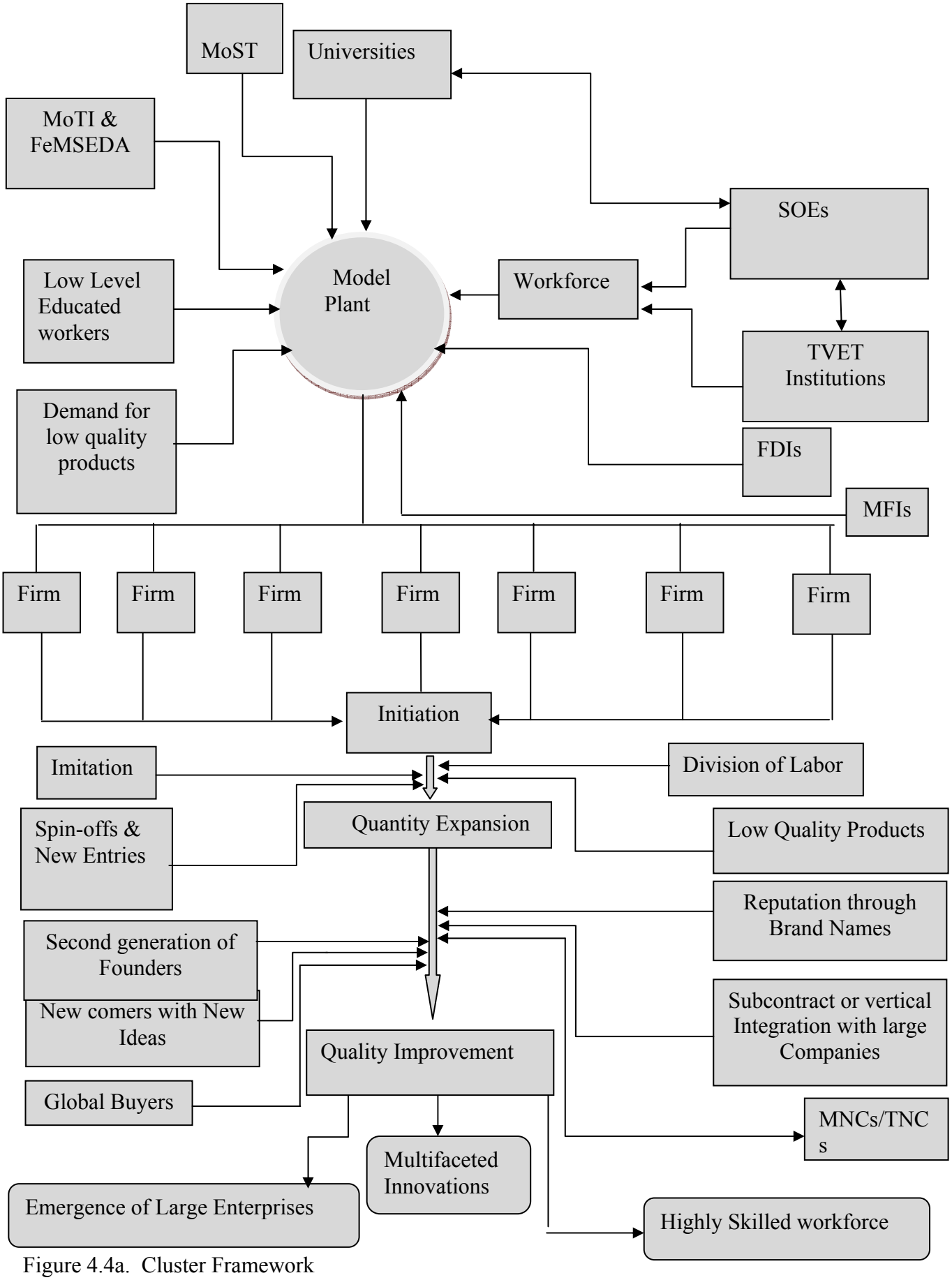


Figure 4.4a. Cluster Framework

4.5. Metalworking Cluster Intervention Strategies

After cluster is set for the stated region, further cluster existence will be decided by identifying the clear future interactions of the firms with their actors. Most clusters' intervention strategies are formulated by UNIDO in collaboration with Ministry of Trade and Industry. But with regard to metalworking industries, UNIDO started intervening at Mekalle metalworking and woodworking cluster. With this sector specific cluster, clear strategies are not outlined and released by UNIDO officially. However, with its exposure and experience in other clusters, the following rules and guidance strategies are formulated.

1. *Creation of new and strengthening existing networks and enable them take joint initiative: -*
   - Creation and capacity building for specialized networks
   - Creation and capacity building for BDS facilitators providers
   - Creation of raw material sourcing and common marketing consortia
   - Strengthening of existing networks
2. *Establish Linkages between industries/cooperatives with*
   - Input suppliers,
   - Components and accessories suppliers,
   - Designers,
   - Tool makers
   - Training institutes,
   - Exporters and trading houses/ niche retailers in the form of sub contracting
3. *Improving quality and productivity though;*
   - Working in separate clean premise
   - Improved components and accessories
   - Standardizing manufacturing processes
   - Sourcing good quality raw materials collectively and
   - Skill up grading trainings on production, precision, design, and quality
4. *Women empowerment: Through Skill and Basic trainings*
5. *Product diversification and new product development that suit high end domestic and niche retailers in targeted export markets*

6. *Marketing support through: -*
    - Publicity and advertisement on Catalogues, brochures, leaflets, Newspapers and magazines
    - Buyer seller meet arrangements and participation in international and national trade fairs
    - Tailor made trainings to enable weavers improve their marketing and management know how
    - Link them with trading houses and specialist retailers
    - Establish information center and common show rooms at good locations in the zone
    - Brand development and image building tasks reflecting rich traditional skills and designs like
7. *Building capacity of metalworking related BDS and training providing institutes and Orient the BDS providers to deliver tailor made/problem solving services to the machine operators and other players in the metalworking cluster, include:*

FeMSEDA (training and Technology departments), Productivity improvement center (PIC), Enterprise Ethiopia (EE),Quality and Standards Authority of Ethiopia (QSAE), Designers operating in the cluster, Private components and accessories manufacturers, etc

8. *Finance related support:* - Through Established sound business partnership with Micro Finance Institutions (MFI) and other financial institutes so that the industries and other players in the cluster access to credit and finance smoothened and tailor made training on simple financial management and record keeping.

The interventions also include formation of cluster working groups comprised of core firms, suppliers of raw materials and inputs, buyers and support institutions.

In general, the financial and business development services tried to facilitate and enable independent industries by undertaking joint activities to solve their common problems and improve their business through:

- Collective marketing of products
- Common labels, catalogues and other market promotions
- Collective purchasing of raw materials
- Sharing of common facilities such as equipments and machineries, etc.
- Access to technical skills and management training

- Group lending programs, etc.

Such facilitative innervations are not without challenges though. The main problem faced is the low level of trust. It may take years to build social capital required for joint activities. The lack of trustworthiness beyond the family of kin level is generally recognized as the main problem in establishing and expanding small businesses in Africa [1]. In the cluster, the low level of trust often results in lack of group cohesion that would hinder social networks to develop among industries. The financial and opportunity costs of becoming a member will be fair enough to attract industries outside of cluster.

4.6. Industrial Clusters: Ethiopian Context

In this part through comparing the successful clusters of Africa, let some events and analysis of the existing performances of clusters and policy discussions are discussed. African Clusters who are successful at developing clusters are put under Appendix D. From Appendix D, even though African clusters are not mature enough, they tried to enter in the global games in different sectors. Beyond this they are effective in employment creations. The typical cluster in Africa in successfully winning over Chinese influence is Ethiopian Addis Ababa Footwear industry.

Clustering concepts are not new phenomena for Ethiopia. There are evidences in the past half century and even in nowadays. Clustering in generic definition is grouping similar objects, peoples, entities together for some identified and unidentified common share of infrastructures, attitude and jobs. Naturally, animals grouped to protect their enemies. Bees live and work together. Ants cross rivers through connecting each other. People march together to struggle for their rights. These all are happened naturally. But clustering can be created. For example, during Dergue regime, shelters are built through clustering for common sharing of infrastructure. In the same years, people of the same locations are grouped together for farming and trading as an association. Currently, there is an incidence for clustering as designing industrial districts for towns, building condominiums, identifying regions based on geography, culture and languages, etc. Flower cut industries show a tremendous cut off export cost because of share exports of the products by cargo air planes. Even though these incidents are seen in general conditions, less attention is given to develop small scale metalworking industries through clustering.

It is obvious that in order to reduce poverty and achieve equitable and sustainable development, we have to develop industries that provide enlarged employment opportunities for the poor [41]. So far Tetusi observed the case for developing countries found in Brazil, Chile, India, South Africa and Kenya in which most clusters are running for innovation and exports. But the country gave attention on manufacturing, rather agricultural and construction industries. Besides the capacity constraints, government can make citizens to involve in manufacturing through creating and supporting clusters of sectors of manufacturing industries. Before detail critics and observation of clustering in Ethiopia, let the successful countries from clustering are discussed.

Japanese, China, and Taiwan during their miraculous growth periods (approximately about 10% economic growth rate) depends on developing manufacturing industries. Industrial development for the three countries comes from successful imitation and assimilation of foreign technologies, particularly from western countries, the formation of geographically dense industrial clusters and the advent of multifaceted innovations in industries. The three ingredients are influenced directly or indirectly by clusters. It is reported that Japanese clusters during 1970's contribute about 60% of total GDP to the country. It is also referred that Chinese and Taiwan clusters contribute about enormous figure to their GDP. China and Taiwan clusters are the regular learning of enterprise managers from Japan. These clusters are nowadays started to change their systems from quantity expansion.

The other countries benefitted from export of clustering are India, Brazil and Mexico which contribute about 40%, 30% and 25% to GDP respectively. These countries are reported for the graduation of their clusters to quality improvements and innovation.

The third category that clustering affects the overall growth is clusters found in Sub-Saharan countries such as Ghana, Kenya and Ethiopia. In these countries, clusters are found in the initiation phases (formation phase). Some clusters are exercising on fully quantity expansion phase. The countries are not known by their industrial. However, clusters in Kenya and Ghana contribute about 10% and 15% respectively in adding value to GDP. Even though there is lack of clear contribution of clusters to GDP, Ethiopian industries show a promising trend towards clustering.

As it is believed that the footwear industry in Addis Ababa is exceptionally successful in Africa [42]. It is believed that this is a case worth investigating since it is expected to provide insight into the key to successful industrial development. Such a development pattern appears surprisingly similar to the experience of successful cluster-based industrial development in China, Taiwan, and Japan, as discussed before. It is agreed with Snobe's idea that the ethnicity is the main cause for the success of footwear clusters as the same ethnic groups form strong link towards marketing channels and collaboration in between firms by trusting each other as a family manner. But it will not agreed with Snobe that the other dimensions of success of clusters are educated entrepreneurs. If he assumed that the majority of entrepreneurs are from the same ethnic groups, how he conclude educated entrepreneurs perform more than others? This is not true because only the specified ethnicity will not be educated alone or he will not put guides towards other educated peoples other than the specified nation.

Secondly, let the highlight the other sectors which are clustered in Ethiopia, which is Gullele handloom cluster. Based on Abdella [21], clusters that comprises of almost the same ethnic group that have migrated from the southern part of the country, contains the whole value chain of the handloom sector starting from raw material sourcing until the final consumers at the end of the marketing channel are reached which support Snobe's idea. Hence it can said that since Ethiopian cultures are difficult to work together cooperating-competing each other, on the beginning of clusters the basis of culture, religion and ethnicity must be implemented and cluster based policies for industrial development has to be followed.

4.6.1. Cluster-Based Policies

Writers argue that cluster-based policies are useful for regional and national economic development [2, 3, 5, 37]. In an industrial cluster, the government, universities, and firms must form a complementary network to facilitate continuous industrial growth, upgrading, and restructuring. An industrial cluster establishes a regional competitive advantage that allows itself to absorb technologies, create new technologies, diffuse knowledge, and retain skilled workers. National endowments create industrial districts, but afterwards the governments should take some policy efforts to transform an industrial district into an industrial cluster. Benefits of industrial clustering apply to both high-tech and traditional industries and there is no reason why

MSEs cannot benefit from industrial Clustering. However, one must keep in mind that there is no one-size-fits-all industrial-based policy. Different countries used different cluster policies. However, in Ethiopian contexts the following cluster entities will be discussed according to the order of relevance.

1. Infrastructure

It is possible for a government to drive industrial agglomeration through regulatory or policy measures, or through the establishment of industrial parks in the early stage. As the case the industrial districts for Ethiopia is in Akaki-Kality Sub-City. These strategies may include financial funding to promote incubator best practice, promoting venture capital industry, reducing market-entry barriers by simplifying regulatory and tax schemes, and pursuing international technology cooperation.

Infrastructure items, such as electricity, water, telecommunications, suitable land, living environment and one stop services by the government are all important to pull potential firms and human skills together. Since Ethiopia lacks own resources to embark on a full-blown infrastructure development, it may be useful for it to concentrate efforts in a small region to attract investments, including foreign capital. After a cluster emerges in the region, then the area can be gradually expanded to include adjacent regions such as in Oromia Special Zone. This gradual expansion of clustering will give nations in equity distributions of economies as writers strongly criticized that clustering will create inequity which can be solved by the gradual formations of clusters parallel with developing infrastructures.

2. Sources of Technologies

Geographic location may provide another useful set of boundaries within which to organize innovation. Geography may provide a platform upon which knowledge may be effectively organized. It can be argued that innovation is an important element in the operation of an industrial cluster as repeatedly discussed in the analysis part. Without the capability to innovate, an industrial cluster will soon be on the decline and firms will begin to disperse and relocate to other regions. This capability has to be owned by the firms themselves; public institutions can help, but they cannot replace private efforts.

A cluster may be developed initially by borrowing foreign technologies, but eventually the sustainability of the cluster has to depend on indigenous technologies. These technologies are not seen in Ethiopia even though some illusions are starting as in imitation policies at TVET institutions which will be discussed in detail in the next part. Without the indigenous technologies, a cluster can only be an enclave at best. In other words, foreign investment is not enough to create a sustainable industrial cluster. The government has to make sure that indigenous technologies can be accumulated along with the formation of an industrial cluster.

3. Human Resource Development

Human resources are an indispensable ingredient in the formation of an industrial cluster. Although part of human resources can be obtained from abroad, the availability of locally-sourced human resources is crucial to the operations of a cluster.

Therefore, investment in human resources is an absolute necessity for our country to develop clusters. There is no evidence that training institutions such as universities have to be located near a cluster, but geographical proximity does appear to be useful in terms of facilitating knowledge diffusion. In selective discussions with managers of industries distance between industries and universities will not the matter for participation in Ethiopia. Most people criticize the failure of universities to be linked with industries that can call other researchers to come out with the reason behind. Public institutions devoted to industry-specific training of human resources also prove to be useful in accelerating skill formation in preparation for cluster development.

4. Cross-border linkage

Growth is also a very important element in an industrial cluster. Growth leads to an increase in the number of firms and it drives horizontal differentiation of products. Without significant growth in market demand, a cluster will never emerge. Therefore, a linkage to a growing market is essential to the formation of a cluster. For most developing countries like Ethiopia, the major growing markets are often in developed countries, and therefore the ability to export to these markets is critical to the success of an industrial cluster. In this regard, foreign direct investments as well as liberal trade are useful in bringing about the linkage to such export markets. In

addition to foreign investment, domestic firms have to be a part of the export drive, making their own linkage to the major markets. Personal connections, such as returning engineers from the major markets, sometimes also help.

5. Facilitation of E-commerce

In the adoption of e-commerce, there are many weaknesses confronted by Ethiopian MSEs. These general barriers to adoption of the Internet are well-known: lack of skilled employees, lack of ease in using technology adapted to MSEs, and also a lack of an awareness of the potential benefits for them. Being more followers than leaders, MSEs seem to need support from public institutions in performing e-business. A series of projects toward e-commerce for MSEs should be launched.

In addition to providing MSEs with information relevant to e-commerce, the government can work with large dominant enterprises to provide technical service, human resource training, and incentives as well as setting up systems to encourage active participation by MSEs. Policy makers need to ensure high quality broadband infrastructures for economic development. The policy of ICT infrastructure cannot be isolated from other business development policies, and especially from cluster-based policies in targeted sectors.

6. Division of labor within an industrial cluster

It is discussed in the literature that vertical disintegration is a norm in industrial clusters. Vertical disintegration allows small-scale specialized suppliers to reap the benefits of economies of scale – an important driving force for agglomeration. There is no apparent effective policy to prompt vertical disintegration in industry. Vertical disintegration is a result of competition and the need to cut production costs through subcontracting and out-sourcing. The only meaningful policy in this regard is to ensure that competitive forces are at work in an industry. In this regards, the government should not attempt to protect incumbent firms or create a situation that brews a monopoly. Even if domestic firms have a dominant position in the global market, it is still useful to make them contestable.

7. Entry of new firms

The prevalence of subcontracting and out-sourcing arrangements in an industrial cluster not only allows specialized suppliers to emerge, but also reduces the cost of entry. As the entry barrier is lowered, more firms will compete in the industry, which drives the dynamic process of clustering. It has been shown that entry barriers are lower in industries that are more geographically concentrated. Therefore, industrial clustering is also useful in promoting competition and incubating MSEs. The government can adopt some proactive policies to attract specialized suppliers in a cluster if such suppliers are absent due to location-specific entry barriers. Any missing links in the production chain tends to limit the development of an industrial cluster, which further impedes potential firms' market entry. The above cases are the logics behind Ethiopia toward adopting cluster-based policies for the small scale metalworking industries. But with the present strategy of Ethiopia, let me discuss it under policy discussions.

4.6.2. Policy Discussions

The above discussions are the general framework for cluster based policies in the country. In this section specific policy issues are discussed. The study have tried to cluster SSM industries and showed how clustering is important in MSEs development in Ethiopia. In the earlier topics some theoretical and analytical arguments about industrial clustering. The result of the findings however indicates that there are no effective institutions supporting the cluster development in Ethiopia in general and in OSZ in particular. There is need for partnership building between state, institutions and the private sectors for MSEs development. Such relationship plays an important role in economic development generally, especially in infrastructure and in capacity building discussed above.

Furthermore, incentives should be made in order to motivate the growth of Ethiopian MSEs clusters. Opening new markets opportunities and dismantling some trade barriers that affects MSEs development negatively is imperative in current wave of globalization of the world economy. In this context, policies should be directed on overall production efficiency of the MSEs. This will in turn lowers costs at the same time increases the purchasing power of the consumers, when the prices are reduced. Besides reducing costs, increasing the efficiency will

also position the SSEs in the cluster to compete effectively in an open economy. The efficiency gained in local market will project them as well towards an export oriented production system and possibly help to integrate them effectively into the global economy.

Policy objective for the support of technical education and training is imperative in the Ethiopia generally. The dynamism of any cluster depends on the availability of skilled workers. This is because the growth of MSEs is not only induced by the technological innovation but also by the quality of skilled workers within the enterprise. In this context, besides providing technical training for middle level manpower, TVET scheme should be expanded to cover the grassroots level. This will help to strengthen the effectiveness of the lower skilled workers in the country. Currently, Ethiopia had a policy of innovation and production of skilled manpower in TVET institutions in which students are trained on copying and imitating the technology purchased from abroad. It is an interesting strategy if it is properly implemented and is further discussed in the technology transfer section.

Moreover, MSEs upgrading requires enormous funding which includes research funding, implementing technical agreements, outsourcing, purchase of needed equipment and capacity building. These require multilateral intervention and bilateral cooperation strategies. Multilateral intervention suggests the intervention of international multilateral finance institutions and industrial development organization such as UNIDO in funding and supporting the development of core industry that will stimulate MSEs upgrading through value chain in the region. Bilateral intervention is directed to Ethiopian economic policy objectives that will tend to exploit opportunities to encourage Ethiopian MSEs to engage effectively in joint venture activities with foreign MSEs. In addition, incentives that tend to stimulate foreign direct investment in Ethiopia need to be pursued. Such incentives include the stability of macroeconomic variables and none-discrimination in investment opportunities [17].

Chambers of commerce, Trade and Industry Minister and FeMSEDA seem to be very weak in offering MSEs essential services such as information on the current market and issues related to industrial development. This is not only as a result of poor financing of the organization, but also due to non-effective recognition of their role in private sector development by the government [16]. The role of government institutions named above in MSE development should move from

supportive role to a functional one that will involve integration of economic actors into interactive learning. Furthermore, in order to restore confidence in the country economic transactions, effective legal institution is important because contract relations can only be maintained and opportunistic behaviors can as well be reduced when the laws governing economic transactions are effective and stable.

4.7. Technology Transfer: Clustering Vs Scaling up Best practices in MSEs

Nations will not think development without industrialization. Industrialization is brought by building technological capabilities. It is difficult to limit development to increasing the resources available to society, but perhaps more importantly; it is about expanding people's capabilities to do valued activities with those resources. Doing valued activities very often involves using technology in some form, and therefore the mastery of technologies forms an important subset of the human capabilities vital to development.

Technology therefore, in a broad sense is the science and art of getting things done through the application of skills and knowledge [32]. Most authors who focus on technological issues recognize that the concept implies a subtle mix of know-how, techniques and tools. Technology is vested in people – their knowledge, skills and routines – just as much as in the machines they use. Machines and tools are only the physical manifestations of a particular technology or technologies. Indeed, mere access to the physical elements of a technology – even if accompanied by instructions for their use, and time to build up experience in using them – does not automatically lead to adaptation of that technology. For adapting technology is not just developing the capability to use a given technology efficiently. It implies the (technological) capability to use knowledge about physical processes underlying that technology in order to assimilate, adapt and / or create novel elements, in response to changing needs [37]. To do the above tasks effective transfer of knowledge must be undergone.

Knowledge transfer is also an increasingly popular term in the technology capability as writers attempt to highlight the human aspect of knowledge management. This natural transfer, or unstructured exchanges and informal exchanges, are vital to a firm's success. It is of great significance for an organization to be able to capture and use the knowledge inside managers' heads. The crucial factor in determining a company's competitive advantage is its ability to

convert tacit knowledge into explicit knowledge through organizational learning. Detail study of knowledge transfer is the scope of this paper, however it is tried to relate technology capability with knowledge transfer and rest of the topics are clearly set by Richard [36]. After the creation of capable institutions and effective knowledge transfer, it is very easy to transfer the whole technology to the nations.

Technology transfer is defined in the Work Regulations of the United Nations, as the transfer of systematic knowledge for the manufacture of a product or provision of service [46]. It has been defined in many other ways. According to Morisset [23], it is the movement of science and technology from one group to another, such movement involving their use. The more general inclusive definition of Technology transfer is given by National Association of Ethiopian Architects and Engineers [27] as:

"*Technology transfer is the transmission of systems of knowledge, skill, experience and organization, produced &/ or used in one place for a given purpose, for application in another place &/ or purpose"*

4.7.1. Vertical Technology Transfer

It is the flow of technology from one stage of research and development process to another. This includes the adaptation of the whole elements of technology to the country on the current situation. It is also called domestic transfer because technologies are created and adapted in the home country through creating links with the firms.

Why does the adaptation of technology matter for economic development for nations? In a market-orientated economy, economic development is based on firms' success at achieving and maintaining competitiveness. One general way to do this is by consistently performing specific activities better or differently than competitors do. In many sectors, the new competition is based not just on price, but on innovation and continuous improvement in products. The need to perform activities differently and better means firms continuously need to choose, use and master technology which is novel (new to the user, if not the world).

4.7.2. Horizontal Technology Transfer

It constitutes the movement of technology from one culture of system and methods for application in a different culture and location. It is the adoption of technology to the home country and using it. This system is also called international transfer because the technology is directly imported from outside to the host countries. To begin with, the successful adoption of technology involves more than merely the purchase of machinery and the learning of operating procedures. It is not a case of simply plug-and-play. In part, this is because of the tacit nature of much technological knowledge: making it difficult or very costly to effectively communicate the full range of skills and knowledge required to execute complex tasks. This means that firms cannot shift effortlessly along the production function, nor operate any particular technique immediately at optimal efficiency.

4.7.3. Modes of Technology Transfer

Although National Association of Architects and Engineers [27] argued that the most common channels of technology transfer are FDI and licensing for the suppliers in particular and other general channels of technology transfer are turnkey, patent right, purchase of technology embodied and services, education and training and journals and seminars. It is also named factors that hinders for the proper transfer of technology transfer as obstacles to Technology Transfer. These factors are weak infrastructure, cultural differences, attitudinal diversities and communicational gaps even though he lacks to predict the level of its significance for the developing countries like Ethiopia except the scarcity and unrealization of information. However, Richard [8] summarized the channels of technology transfer in to acquisition of technology, education and training and technical assistance. Other writer Zheng [46] stated that mode (mechanism) of technology transfer as of active and passive. The former represents the transfer of both knowledge and skills assisted by the provider of technology through training. The latter represents the transfer of technology only by knowledge through publications, presentations in a report, manuals, etc.

Basically technology will be transferred through clustering even though Ethiopia is practicing technology transfer through scaling up of the best practices in MSEs in collaboration and

integration with TVET institutions, Microfinance Institutions and government bodies. In the following topic the two methods will be compared and contrasted as a policy. Before commenting on policy, clues about technology and technology transfer will be given.

In this study the problems of MSEs in OSZ are discussed in detail. However, in broader sense Girmay [18] clearly addresses the problems of MSEs in Addis Ababa. He strongly criticizes the major problem of MSEs are regarding the lack of clear policies and strategies in which this idea will get the solution while comparing the appropriate policies between clustering and MSEs scaling up. This is because clear national policy and strategy must be created before individual operations are performed. Before comparing both policies, let me put the summarized problems of MSEs by different authors in decreasing upshot. These are:

- Lack of Clear and Consistent National Policy and Strategy to Enhance the development of MSEs
- Lack of Access to Capital and Credit
- Lack of Premises and Land
- Lack of Skilled Workforce
- Lack of Entrepreneurial, Managerial and Other Skills
- Lack of information about Separate Supportive Organization
- Socio-cultural Constraints

Even though most of the above problems are discussed in detail and the remedies are set by Girmay [18], the central idea here is to conclude whether the above problems are solved by Clustering Approach or through the current strategy Ethiopia is holding i.e. Capacity Building and Urban Development strategy through to effectively transfer technology and adapt it.

It is already known that Ethiopian economic policy is based on agriculture led strategy. Based on the current strategy, the centre for the transfer of agricultural technologies are higher institutions, i.e., Agricultural Engineering Institutes and Colleges parallel to teaching learning activities. These perform technology transfer through creating links with farmers, MSEs under supervision of political leaders. Technology transfer is performed by selecting unit technology, through clear understanding the selected technology and modifying. The selected and modified technology is designed and the prototype will be produced by professional and experienced engineers

(mechanical and industrial) with involvement of competent TVET technicians. According to the strategy, the first task of technology transfer is achieving patent through continuous improvement of the prototype. The second activity is producing the sample prototype by the fabricators (MSEs). After the sample technology is produced, it will be assured for quality and produced in the large volume depending on the level of demand. Besides, model farmers and agricultural research centers are selected, trained and share their experience to other parties. As these selected units reach the required level of performance, the experiences are transferred to other units in large extent as the best practices or scaling up.

Ethiopia frequently reports that this process is effective as it brought a progressive average growth rate of about 11%. As Ethiopia become successful in agricultural policy, now the practices are extended to the urban development by the strategy called Capacity Building and Urban Development Strategy. The objective of this strategy is give with quick continuous development to urban citizens as Agricultural Policy benefited individual farmers in increasing income and improving living standards Hence Capacity Building and Urban Development Strategy will strengthen the continuous significant annual economic growth brought by 85% population.

The second sector that needs technology transfer is industrial. It is named as industrial technology transfer in which the same transfer process is applied as that of agricultural technology transfer. However, the institutions responsible for performing transfer are institutions under Science and Technology Department i.e. Industrial Development Institutes and Basic Metals Industries research centre.

The fast growing of nations is recorded by the first expanding industrialization [36]. This can be done by giving Urban Development policies since fast diffusion of technology and better infrastructures are present in urban than rural in most of developing countries as supported by [41]. By policy, however Ethiopian manufacturing sector is not completely forgotten. Manufacturing firms whether small or large are getting increasing from year to year in value addition and number of employees [10]. Ethiopia in its core policy (Agriculture) need technology to support the agriculture and the main industries use inputs from agriculture and expand industrialization called expanding Agro-Industries.

Ethiopia seeks these policies to suit large percentage of population and enjoy large input resources from agriculture to expand agro-industries. According to Ethiopia's strategy, these agro-industries need equipments and tools that in turn initiate the expansion and growth of manufacturing.. As most countries developed quickly by industrialization, Ethiopia seeks to strengthen urban development to come with industrialization first by owing capable manufacturing firms that produces agricultural equipments and machineries that bear agro-industries. These industries will be a cause for mechanized extensive farming in which fewer numbers of farmers created supply a large amount of agricultural inputs for agro-industries as the case in developed nations. Besides some farmers will be employed in a mechanized extensive farming while the rest will search the jobs in urban in already created jobs.

The above clue will call for the importance industrialization through manufacturing. Industrial development will be through proper transferring of technology and adaptation of the technologies to the citizens as the difficulties of invention of new technologies rather promoting policies to foreign direct investments. Even though the creation of foreign investments basically stated by Andrew [4] as:
"a new product is first manufactured in the home country for the home market. When the home market is saturated, the product is exported to other countries. At later stages, when the new product reaches maturity and loses its uniqueness, competition from similar rival products becomes more intense. At this stage producers would then look for lower cost foreign locations. This theory shows how market seeking and cost reduction motives of companies lead to FDI" in most countries.

In Ethiopia however, there is less probability for the foreign investments as there is not enough local manufacturing firms that calls FDI. Additionally United Nations Office of the Special Adviser on Africa [43] found in majority of African countries, only 10 per cent of major contracts are awarded to domestic firms even though 90 per cent of total registered engineering firms are local. According to the report, for small scale enterprises, FDI represents access to markets, access to expertise and most of all access to technology.

According to Getinet [17] most of the advantages of FDI lie in importing technology for Ethiopia Multinational Companies and Transnational Companies (TNCs) may establish foreign

subsidiaries to take advantage of its lower labor costs or its large market size. This idea will overlap with the need of technology and skilled workforce for the home country. The above idea whether attracting FDI or strengthening local manufacturers it calls for the proper adaptation of technology.

For firms in Ethiopia therefore, while technology transfer may be necessary, they are not sufficient. Besides, the government should concentrate on human resource development and institutional capacity building to facilitate the absorption of imported technologies. This means channeling more aid schemes promoting yesterday's technologies through formation of industrial clusters of different sectors as the main policy as the effective adoption and mastery of a technology requires the acquisition of knowledge about a set of procedures, understanding of why the procedures work and skill in putting them to use [36].

In the above consecutive sections the theoretical background of technology transfer with all of its relationships with technology and development has been discussed. It is also mentioned that the current strategy of Ethiopia towards technology transfer and address the process of technology transfer in both agricultural and industrial technologies. Finally the issues on the general policies relating global ideas and experiences have been commented.

It is repeatedly discussed in literature that the ultimate advantage of clustering is the transfer of knowledge and technology to the nations. It is also mentioned in the literature part that most of the Latin America and Asian countries had a policy towards industrial development through industrial clustering. Basically technology can be transferred through clustering, university industry linkages and FDI. The FDI as stated above is encouraging in Ethiopia. But the university-industry linkages are found at the infant stage in which there is lack of coordination among industries, higher education institutions and governmental and non- governmental organizations [28]. According to the report, the causes of the inability to cope with fast changing of technology advancements are higher education institutions' curriculum, lack of government policy towards technology transfer and immaturity of industries non stimuli for innovations.

Even though some encouraging actions are taken to solve the problems, my aim here is to compare and contrast clustering and scaling up strategies for technology transfer. I start from the premises given by Rosenberg [38] that the fastest and suitable mode of technology transfer if

clustering. He also cited that geography, culture, economy, business, people and government are the dimensions exceptionally fulfilled in clustering to transfer technology. In the literature it is frequently mentioned that technology transfer needs capacitated institutions for the effective transfer of technology. Currently several reports pinpoint that MSEs are performing weaker even for existence. In actual observation it is found those of dissolved and trying to be dissolved due to market failures. Furthermore, currently no institution is able to capture the knowledge and technological flows. For example, the government considers, Basic Metal Institute for undergoing transferring of technology. But this institution is not capable of handling technical skills even though is performing good enough in designing equipments and tools.

The second problem in transferring technology by scaling up is the lack of skilled manpower. In many researches and government reports, the country has faced series challenges in the availability of skilled manpower who can easier the transfer of technology. However, government takes some actions like hiring German experts to TVETs. But since the actions brought insignificant results on upgrading skills, the Philippines' experts are now hired. So, in this short period of time how the skill necessary for transfer technology can be acquired?

The third problem here is also the policy framework towards technology transfer. In past decades the policy towards technology transfer at TVET was innovation. The teachers are obliged to train their trainees in the number of inventions. Now the system is switched to adapting the purchased technology. So, with this weaving policy how can technology is transferred?

The third problem regarding scaling up is people's awareness and attitude towards the importance of technology transfer. From the experiences MSEs fail predominantly as they are not aware of the advantage of organizing since they are obliged to do so. People in the country are involved in the process. It is difficult to change people's attitude in a very short period of time.

Both clustering and scaling up the best practices have things in common-both acts on upgrading of MSEs. The first approach is exercised by willingness of people in the same sectors while in the latter case the people are somewhat forced to organize. Besides, clustered firm maximizes cluster efficiencies keeping individual gains while scaling up MSEs maximizes only group

performances. The case can be compared with the present performances of private industries with SOEs. It is also confronted with why privatization is necessary for the country.

The other case that clustering is beneficial over scaling up practices is that benchmarking. In earlier cases benchmarks are copied from Germany and observed failures due to technological and cultural differences between the countries. Then Philippine is selected for the benchmarks and continues with all countries. But clustering keeps technology through upgrading it by competition.

The one that has arising question is that how skilled workers create their own company in the scaling up strategy? Nothing has said about but in clustering it is easy for skilled workers to graduate from. In general clustering is better than the current policy Ethiopia is following in transferring technology easily. Hence keeping the employment creation for the nation through MSEs cluster-based policy has to be practiced.

Chapter Five

Summary of the Major Findings

There are about 70 small scale metalworking industries in Sebeta, Burayu, Sululta, Laga Tafo, Dukem and Gelan that includes private and MSEs. The majority of industries established are not matured and their establishments are going to increase from 1991 onwards. This may show good trends towards attracting new entries. From 19985 to 1990 E.C., the establishments are insignificant that may point out the era of changing MSE policy for credits and organization by FeMSDA and MoTI. About 78.6% of the number of establishments lie in the age ranges of the first three and can show the immaturity of the industries. The reason behind this is as seen from the data from respective towns; the organized MSEs members withdraw and loose coordination and control of government bodies over industries. Hence industries need to support from government, NGOs and other institutions.

Most industries organized under MSE are getting decreasing in size, capacity, and number of employees. But the capitals owned by the remaining member of the groups are getting. Private industries' performances are getting increased from year to year. Currently, the number of workers emoployed including the owners in small scale metalworking industries in towns of Oromia Special Zone are about 662, which is insignificant when compared to other MSEs sectors employment absorption.

Even though most industries identified are scattered, some trends towards clustering are observed in Sebeta, Burayu and Dukem named as group1, group2, group3, and group4 contains 11, 7, 5 and 6 independent small industries respectively that work together through sharing resources. For example, industries named as group1 in Sebeta contains 11 separate industries placed in the same geographic area producing the same or differentiated products employee about 64 workers currently and increased their capital to 1.2 million Birr since engagement. This group is typical also in forming vertical disintegration and horizontal specialization of processes and hence is appetite for calling of clustering. The same is true with the remaining groups of industries.

The total average annual profits of metalworking industries in the selected towns is about 40 million Birr. From interviews and questionnaires, it seems that problems had an equal effort in influencing industries. But the most prominent problems are poor demand, lack of premises, lack of information and advice and lack of skilled manpower which constitute about 80 % of the problem. It is also analyzed that lack of premises and land shares almost equal weights of problems with demand orientation in industries. About 40% of industries respond workshops are rent, 30% report premises from government, and the rest uses self private residents and family residents. Most industries in rent point that they are facing challenges from the owners' restriction to energy, time and the like. They also report while they are starting to produce effectively, they are forced to leave the house. The owners also are not willing to renew the contract agreement for the rented workshop. About 50% industries respond that the number of workshops per industries is 2, 40% respond 1 and the rest are operating in 3 workshops. The number of working in a workshop varies greatly for all industries ranging from 2 to 16.

About 40% of SSMIs respond that training is given once organized by Trade and Industry Bureau. The rest responded negatively. From the trained workers, only 30% are trained with related to their jobs, the rest are taken organization and entrepreneurships. From the total responses by industries, 10% are not educated at all, 10% attended high school, 15% attended 10+1, 25% attended 10+2, 25% attended 10+3 diploma, 15% attended college diploma and none of the attended university degree or above. From the clue, most of the workers are TVET graduates of certificate and diploma. From owners' point of view, 30% have no qualifications, 25% are diploma graduates, 40% TVET graduates, and about 5% are holding university degree.

Most owners (about55%) were engaged in similar industries before establishing, 15% were working in garages, 10% were working in large industries, and the rest are TVET graduates and cooperatives. Most workers acquired skills from formal training and on job training by themselves. So there is less opportunities for workers to learn from each other. Only 20% of entrepreneurs cited other local metalworking industries are sources of information for innovation. The first knowledge acquisition will be external inputs that others can imitate or adopt it. The sources of initial capitals were personal deposits, MFI and banks, family and share in order of decreasing percentages.

Most of the industries are using the machineries and processes as purchased abroad. In this regard they can be classified under adopters. However, some industries tried to modify most of their processes and are classified under innovators. Some are existing copying the technology and use it. These can be imitators. Examples are welding machines transformers and cutting machines and in two industries moulding machines are copied. None of them are creating new technology, i.e., machineries and processes. In other dimension innovators can be adaptations to technology. The kinds of adaptations undertaken mainly involve cost cutting process improvements and low cost replication of imported machineries.

Most industries covered under this study operate with the same work procedures, methods and machineries. However, some are producing new products that they were not producing earlier years. The main problems that hinder them from producing new products are the low demand and lack of skilled manpower.

Nearly, about 67% of the industries are engaged in welding and assembling, and about 8.6% industries are engaged in combinations of the manufacturing processes determined. Most of the suppliers of raw materials are local shops and retailers. From the purchasing point of view, only industries grouped show positive trends towards purchasing metals together to enjoy economy of scale. But these industries also purchase from local suppliers that has a risk of extra cost at the place and shortage of raw materials when retailers are out of stock. It can be dealt also that most customers of industries are local markets. This restriction will not provoke industries to more production quantity and innovation. Raw materials are common or found in the same industry.

The customers of most industries are local markets and sometimes from Addis Ababa. Wastes of the industries are consumed by others and exactly by nowadays no scrap of metals. Casting is finished by machining is welded or assembled together and the scraps from one will be an input for others if they are placed together and communicate. Majority of machines are sitting idle in industries in a scattered manner. There is relatively less idle times in industries using their manufacturing processes by combining.

It is found that woodworking is complemented with metalworking industries. Half of the metalworking industries contain woodworking workshops with metalworking. Another event in clustering is vertical integration in which firms tend to specialize in carrying out specific

processes or stages in production and distribution channel. For example, in the case of casting one firm may specialize in pattern making and others in moulding, still other firm in casting the product and the last firm may finish the product by machining and sell the products. None of them report subcontracting besides some small scale industries are located in large industries, as the case in industries located in Dukem, Sebeta and Gelan. No industries are able to export their products.

Heterogeneous firms that contribute inputs to the metalworking industries are raw material suppliers, component suppliers, tool makers, etc. Services contributions to the clusters are financial services, banks, government agencies and advisors and traders. In the stake holders share, various governmental and non governmental institutions also operate within the cluster. Among these, the ones operating at the macro level are Ministry of trade and Industry, Ministry of labor and social affairs, Ministry of capacity building and the Federal micro and small enterprises development agency. Various NGO's, skill development centers and public institutions also work in the cluster by facilitating the potential benefits of the cluster and advocating a better policy environment to promote the local BDS market.

About 96.7% are not using R & D. But about half of them tried to develop products for markets and most workers do know the advantages of IT, but short of applying it to the work place due to capacity and know-how constraints. Generally, Cluster growth paths for metalworking industries are formulation, initiation, and quantity expansion and quality improvements. Most industries identified are dispersed and need formulation phase for CDP.Natural clusters found in Ethiopia are on the quality expansion phases and lack innovation except footwear cluster.

Most clusters' intervention strategies are formulated by UNIDO in collaboration with the Ministry of Trade and Industry include. But with regard to metalworking industries, UNIDO started intervening at Mekalle metalworking and woodworking cluster. Ethiopia expanded its policy of industrial development by technology transfer in MSEs through scaling up best practices from purchased technology from abroad in collaboration with TVET institutions and MFIs by close coordination of political leaders. Generally industries found in OSZ are dispersed and no trends toward clustering approach and must be clustered.

Chapter Six

Conclusions and Recommendations

6.1. Conclusions

Clustering approach benefitted countries in East Asia, Latin America and in lesser extent Africa in sharing to GDP by their industrial clusters. But Ethiopian clusters are not matured nor adds insignificant value to GPD because lack of supporting institutions and loose coordination and control of government bodies over the cluster. Other obstacles of clusters in Ethiopia are people's attitude and culture towards cooperating-competing. Successful clusters in Ethiopia are the clusters formed from the same ethnic groups and family channels.

Generally, manufacturing industries in Ethiopia adds less value compared to other sectors. From total manufacturing, SSM industries share insignificant value to production output in over Ethiopia, Oromia and OSZ. The main reasons behind these problems are lack of demand, lack of premises and lack of information on markets. Industries are born and die quickly and are a serious problem in industries organized under MSEs. The industries with no license perform less than those of licensed. The industries in a scattered form are fewer sources of innovation, skilled workforce, value addition, value chain upgrading, technology, information, infrastructure and markets. The number of establishments is large for the recent years and most industries are not matured and a limited number of women involvements are observed in industries.
Most of the workshop sizes are two each workshops contain 7 workers on average and the workshops are found through rents. The owners' engagement before establishments are from similar industries, TVET trainees and garages and most owners and workers are TVET graduates.

The raw material suppliers for the industries are retailers, local shops and steel factories and the customers of industries are local market and some times Addis Ababa. No industries invested for R&D and product development that can be inputs for innovation. Industries are unable to neither export their product nor satisfy local customers. Sources of skills for workers in industries are formal education and self apprenticeships.

The location of cluster in OSZ is in between Gelan and Sebeta nearer to Gelan for the availability of infrastructure and the cluster model plant helps to start and make industries to graduate from through clear framework in coordination of cluster actors. The basic decisive factors for the cluster for their existence are infrastructure, sources of technologies, human resource development, cross border linkage, facilitation of E-commerce, division of labor and entry of new firms.

Ethiopia is trying to foster technology transfer by scaling up of best practicing in MSEs and is a horizontal transfer in its type even though there are incidences that are mixed up with vertical transfer and clustering is more powerful approach than Ethiopian current strategy. There is lack of capable institutions and skilled manpower for the effective transfer of technology in Ethiopia. A frequent change of policy towards technology transfer is the main obstacle for the proper progress of technology transfer in addition to benchmark countries. Hence clustering is the remedy for all of the above problems.

6.2. Recommendations

Clustering needs the decision of higher government bodies for its implementations. Therefore I recommend the following points.

1. The policy of the country must give attention towards industrialization as most developed countries' development emanate from.

2. Cluster-based policies must be used for the country for manufacturing firms especially for MSEs to overcome external challenges and suit local economy so as to reduce unemployment and adds significant value on GDP. Besides the policy favors fastest mode of technology transfer, skilled manpower and promotion of MSEs to medium and large industries.

3. Technology parks, innovation parks, innovation centers and business incubation centers must be formed in different regions of the country keeping equities.

4. People's attitude, beliefs and culture of work must be changed through awareness creations to cooperatively compete each other in any sectors.

5. The government must motivate MSES through subsides and investment incentives, for example, tax exemptions, tax holidays, and investment privileges.

6. Micro-Finance institutions must be promoted to MSE Banks for the effective loan and investment facilitations.

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Appendix A: SSMI overall Performance Status

S.No	Industry	Established Year (E.C)	No. of workers during establishment	Current No. of workers	Capital during establishmnet (Birr1000)	Current capital (1000)	Average Annual income (1000)
1	Dima	1992	6	18	15	90	120
2	Solar	1991	12	6	8	100	65
3	Esayas	1996	5	8	10	200	100
4	Tadesse	1998	5	9	15	50	60
5	Illili	1991	1	7	27	74	25
6	Saron	1999	5	9	10	50	35
7	T.K	1989	6	11	60	180	140
8	Amir	1994	5	14	120	160	155
9	Mekab	1991	6	10	15	70	40
10	Biftu	1996	12	8	35	65	42
11	Agro-Build	1999	5	7	90	130	60
12	Group 1	1998	47	64	170	1200	900
13	Edget	1997	24	6	60	140	80
14	Gafat	1986	5	9	10	95	67
15	Bu'ura Gudina	1995	12	7	60	95	35
16	Awash	2001	5	6	110	110	___
17	Barkume	2000	8	12	40	78	15
18	Group 2	1999	28	37	75	95	68
19	Biftun Nubate	1996	12	5	60	30	10
20	Rehobot	1986	5	15	26	172	80
21	Tokuma	1998	11	10	55	75	46
22	Exodus	1991	5	7	46	71	32
23	Nufnuf	1997	8	5	40	48	12

24	Regasa	2000	5	6	60	73	17
25	Hizkel	2000	5	6	100	100	21
26	Addis	1996	5	5	52	46	28
27	Group 3	1997	18	33	110	290	87
28	Admas	1999	2	5	44	60	25
29	Ashenafi	1995	3	9	12	80	30
30	Nurhusein	1985	2	16	18	65	85
31	Tesfaye	2000	2	7	25	30	15
32	Aab	1995	7	11	93	162	50
33	kasahun	1996	2	6	28	36	15
34	Andinet	1997	4	9	60	100	45
35	Burayu 1	1996	4	15	120	235	90
36	Burayu 2	1998	2	6	80	120	55
37	Endale	2000	2	7	45	50	10
38	Takatane	1992	15	10	15	140	70
39	Andinet 2	1999	2	14	25	50	25
40	Pioneer	1997	2	7	35	60	20
41	Behalek	1987	2	18	10	180	80
42	Dire	1998	3	5	17	68	18
43	Mamush	1999	2	5	80	90	30
44	Akaki	1995	2	6	40	53	25
45	Solomon	1993	3	7	72	130	70
46	Group 4	1996	18	24	90	160	90
47	Duke	1996	2	11	47	60	30
48	Doyo	1997	15	12	60	76	40
49	Zekarias	1999	2	5	35	82	36
50	Siraledget	1998	24	8	90	50	15
51	Hamelmal	1999	2	6	40	60	20
52	Bekas	2000	5	5	150	150	45
53	Estifanos	2000	2	6	40	50	10

54	Niway	1994	2	16	135	200	80
55	Ketema	1996	2	7	20	15	20
56	Chalalaka	1993	6	6	60	80	20
57	Siyoum	1992	2	6	75	100	60
58	Hatau	1988	2	6	60	90	20
59	Beshir Abdu	1994	1	5	25	90	50
60	Yakob	2000	3	8	50	50	15
61	Mendelo	1995	12	8	50	170	90
62	Abdi	1997	8	5	60	80	20
63	Biratu	1999	2	5	80	120	25
64	Ashete Birra	1998	12	6	50	60	10
65	Zerihun	____	__	7	___	50	___
66	Yared	2000	2	5	35	40	10
67	Brothers	1990	3	9	120	280	90
68	Degefa	2000	2	5	25	15	5
69	Ra'iyi	1997	3	11	100	200	80
70	Kena Rabi	1998	12	6	60	40	5
71	Family	2001	5	5	90	90	___
Total			481	706	3945	8054	3984

Appendix B: Value chain of SSMI

No. of industries	Raw Materials	Suppliers	Core Process	Products	Customers	Possible Wastes
47	Sheet Metals, Angle Iron, LTZ profiles, Bars and Rods, RHS, Consumables, Tubes, Channels, Corrugated Sheets, Pipes, Wires, Beams,	Local Shops, Akaki Metal Products Factory, Addis Ababa Distributors/Agent, Foreign Companies	Welding, Assembling and Finishing	Windows, Doors, Gates, Wheel Barrows, Fences, Containers, Furniture, Concrete Mixers, combiners, Shelters	Public Institutions, Government Offices, NGOs, Addis Ababa	Scraps
6	Blocks, Rods, Bars, Profiles, Ingots,	Local Shops, Akaki Metal Products Factory, Addis Ababa Distributors/Agents, Walia Steel Factory, Foreign Companies	Machining and Finishing	Gears, Shafts, Axles, Screws, Bolts & nuts, Keys & pins, Machine	Local Garages, Addis Ababa Garages, NGOs, Government	Metal chips and scraps

				components, Tools	Institutions	
5	Metal ingots, scraps, and chips	Steel Factories, Welding and machining workshops, Foreign Companies	Casting and Finishing	Agricultural Equipments and tools, House utensils, Vehicle parts	Farmers, Government Offices, NGOs, Local users	Slags ,Impurities and chips
4	Raw blanks, Sheet Metals, Metal profiles	Steel Factories, Local Shops, Distributors, Foreign Companies	Forming	Seat and Table legs, Containers, Machine Tools, Farmers tools	Farmers, Government offices, Local people	Scraps and scales
8	Most metals from above lists	Steel Factories, Local Shops, Distributors, Foreign Companies	Combined processes from above	Most product from above lists	Farmers, Government Offices, NGOs, Local users, Addis Ababa Garages	Probably most wastes of above

Appendix C: Geographical Positions and Dimensions of SSMIs

Code	Industry Name	East Coordinates (m)	North coordinate (m)	Air distance (km)	Track Distance (km)	Remark
Sebeta						
1	Dima	458144	984972	18.53	24.2	Organized
2	Solar	458162	984797	18.6	24.8	Organized
3	Esayas	458000	984725	18.8	25.3	Private
4	Tadesse	456301	984725	20.3	27	Private
5	Illili	454352	983269	22.4	28.1	Organized
6	Meta Abo	454223	983209	22.6	28.4	Bear Factory
7	Saron	458292	984844	18.5	24	Private
8	T.K	458742	985058	18.1	23.4	Private
9	Amir	458839	984830	18.2	23.5	Private
A	Mekab	458791	984905	17.2	20.7	Organized
B	Biftu	459738	985382	16.2	19.8	Organized
C	Agro-Build	460869	985687	16.2	19.8	Private
D	Group 1	461684	986134	15.4	19.5	11SSMIS together
E	Edget	462645	986955	14.1	19	Organized
F	Gafat	462833	987166	13.8	18.7	Private
G	Bu'ura Gudina	463213	987598	13.3	18.3	Organized
H	Awash	463384	987739	13	18	Private
I	Barkume	463515	988187	12.6	17.8	Organized
J	Group 2	463735	988637	12.1	17.2	7 industries are grouped
K	Biftun	464276	991079	9.88	15	Organized

	Nubate					
L	Rehobot	464371	991741	9.34	14.5	Private
Burayu						
M	Tokuma	465742	1002345	6.79	10.8	Organized
N	Exodus	465277	1002877	7.48	11.8	Private
O	Nufnuf	564954	1002624	7.58	11.4	Organized
P	Regasa	464749	1002635	7.7	12	Private
Q	Hizkel	464550	1002784	8.01	12.4	Private
R	Addis	463764	1003196	8.89	13	Private
S	Burayu	463520	1003067	9.02	13.4	Cartoon Factory
U	Group 3	463529	1003127	9.04	13.3	5 SSMIs closer
V	Admas	463804	1003020	8.76	12.8	Private
W	Yoyo	463742	1002890	8.74	12.5	Biscuit Factory
X	Ashenafi	463849	1002680	8.53	12.45	Private
Y	Nurhusein	464186	1002611	8.21	12.3	Private
Z	Tesfaye	464519	1002674	7.97	11.9	Private
11	Aab	464528	1002815	8.04	12	Private
22	kasahun	464684	1002593	7.79	11.9	Private
33	Andinet	464817	1002432	7.58	11.7	Organized
44	Burayu1	465006	1002581	7.52	11.6	Private
55	Burayu2	465205	1002409	7.25	11.5	Private
66	Endale	465471	1002339	7	11.1	Private
77	Takatane	46563	1002556	7.01	11.1	Organized
Dukem						
27	Andinet2	487021	974280	28.7	32.1	Private
28	Pioneer	487321	974073	29.1	33.4	Private
29	Behalek	487986	973159	30.2	34.3	Private
30	Dire	488509	972484	31.1	34.9	Private
31	Mamush	488807	972035	31.6	35.1	Private
32	Akaki	488879	971932	31.7	35.4	Private

33	Solomon	488949	971874	31.8	35.7	Private
34	Rosetta	489022	971840	31.9	36	marble factory
35	Group 4	489107	971810	32	36.1	6 SSMIs together
36	Duke	489220	971772	32.1	36.4	Private
37	Doyo	489439	971656	32.3	36.6	Organized
38	Zekarias	489699	971444	32.6	36.9	Private
39	Siraledget	489966	971228	32.9	37	Organized
40	Hamelmal	490169	971064	33.2	37.5	Private
41	_____	490421	971064	33.5	37.9	Private
42	Bekas	490636	970636	33.8	38	Organized
43	_____	491822	969732	35.2	39	Private
44	Estifanos	492294	969391	35.8	39.7	Private
Gelan						
14	Niway	479444	977751	22.1	25.2	Private
15	Ketema	479745	977575	22.4	25.6	Private
16	Chalalaka	480174	977332	22.8	26	Organized
17	Siyoum	480644	977082	23.2	26.5	Private
18	_____	481419	976753	23.8	27	Private
19	Adal	482478	975937	25	28	Metal Factory
20	Mesfin Industrial	482697	975909	25.1	28.1	Subsidiary
21	Hatau	483070	975861	25.4	28.4	Private
23	Beshir Abdu	484002	975738	25.9	29	Private
24	Yakob	484500	975521	26.4	29.5	Private
25	Mendelo	485143	975148	27	30.1	Private
26	Abdi	485620	974791	27.6	30.8	Organized
Sululuta						
LL	Biratu	468574	1005317	7.6	9.5	Private
MM	Ashete Birra	468987	1006976	9.09	11.29	Organized
NN	_____	471209	1008602	10.5	13.52	Private

OO	____	472940	1012849	14.9	18.1	Private
PP	Balex	473491	1015490	17.6	21	Factory
QQ	Zerihun	473451	1015142	17.2	20.4	Private
RR	Yared	473393	1014760	16.8	19.9	Private
SS	Brothers	473319	1014523	16.6	19.8	Private
TT	Degefa	473260	1014383	16.4	19.7	Private
Laga Tafo						
AA	Nas foods	488155	1002395	17.6	22.7	Factory
BB	Ra'iyi	488345	1002550	17.8	22.9	Private
CC	_____	487793	1002120	17.2	22.4	Private
DD	Derese	487556	1001930	16.9	21	Private
EE	____	487420	1001814	16.7	20.7	Private
FF	Chuchu	487031	1001537	16.3	21.4	Private
GG	kena Rabi	486144	1001044	15.3	20.4	Organized
HH	Family	485635	1000110	14.7	19.8	Private

Appendix D: Export Performance of African Clusters

Cluster	No. of firms	Ave. No. of Employees	Markets
The Suame Manufacturing Cluster in Ghana	> 9,000	5–10	Domestic and export
The Kamukunji Metalwork Cluster in Kenya	> 2,000	1–3	Domestic
The Lake Naivasha Cut Flower Cluster in Kenya	24 (large firms)	250–6,000	Domestic and export
The Nnewi Automotive Components Cluster in Nigeria	85	< 12	Domestic and export
The Otigba Computer Village Cluster in Nigeria	> 5,000	8	Domestic and export
The Mwenge Handicrafts Cluster in Tanzania	2,200	15–20	Domestic and limited export
The Keko Furniture Cluster in Tanzania	—	2–130	Domestic and export
The Lake Victoria Fishing Cluster in Uganda	17(fishing plants)	35–200	Domestic and export
The Textile and Clothing Cluster in Mauritius	260	170	Domestic and international
The Wine Cluster in South Africa	> 340 (wine farms)	—	International

Textile and Clothing Cluster in South Africa	327	103	Domestic and international
Addis Ababa Footwear industry in Ethiopia	100	6-28	Domestic and Export

Appendix E: Cluster Development Models Procedures

Generally, the recommended steps for developing clusters in any nation based on the exposure of UNIDO in line with Ethiopian contexts are:

Step 1: Analyze the local economy

The objective of this initial analysis is to firstly identify the clusters that are drawing wealth into the local economy, and secondly, to prioritize these for attention. The clusters may be embryonic, at an early stage of development, or more mature and substantive within the locality. The focus needs to be on the driver clusters within the community that are already serving 'export' customers, be they tourists from a neighbouring community or overseas customers.
It is usually not difficult to identify the clusters within a locality, using one of two approaches, or preferably a combination of each.
A *top-down approach* based on available statistics is used in many countries.
Location quotients will identify local concentrations of economic activity, relative to other Ethiopian localities.
A *bottom-up approach*, through individual and group discussions, will uncover other clusters, and help in understanding the core competencies of a cluster that is identified through the top-down approach. 'Cluster Musters', initial cluster workshops pulling together more than 100 people from across the community, have been successfully used to identify local clusters. This bottom-up approach is particularly useful in highlighting niche clusters that would not be picked up by any published statistics, such as organic foods, and service clusters such as retirement or seismic engineering.

The bottom-up approach also serves to more clearly define the activity within the cluster. Tight definitions are much more valuable than broad classifications, such as highlighting 'furniture' rather than the broader 'timber processing'; 'outdoor apparel' rather than 'light manufacturing'; 'rural telephony equipment' rather than 'electronics'; 'adventure tourism' rather than 'tourism'; 'oil and gas engineering' rather than 'heavy engineering'. The short listed clusters that emerge from the top-down and the bottom-up review should:

- Already be generating 'export' income for your locality

- Already have a range of firms with some linkages between them. (A large branch plant or a meat works does not constitute a cluster)
- Already be a major contributor to the local economy, or have a clear opportunity to make a substantial impact
- Have appeal for the initial funders.

The clusters that emerge from this process will not be equal in importance. A selection process may be needed to shortlist those for immediate action. Criteria for prioritizing clusters:

- should relate to the size of the opportunity (current exports, and possible growth; current and potential employment; number of firms
- the infrastructure currently in place (specialized education / training facilities, a neighbouring, specialized physical infrastructure)
- the current culture of the cluster (degree of interaction / networking between firms; the motivation cluster stakeholders have to move forward; the availability of potential private sector leaders; the current existence of effective associations).

To be most effective, the cluster process should work on a portfolio of clustering initiatives. This will encourage positive competition between cluster groups, and provide the opportunity to pick up on and address cross-cluster issues.

Deciding on Boundaries

Clusters may cover only a part of a local government region, or traverse two or more regions. The *cluster boundaries* need to be carefully considered, with each cluster having a unique 'catchment area'. Some clusters will have a broad coverage; others will have a very local focus. Primary-based clusters and tourism clusters will tend to have wider boundaries than manufacturing or other service-based clusters.

Local council boundaries are irrelevant when establishing the commercial boundaries of a cluster. Cluster boundaries are driven by today's commercial factors, not yesterday's political decisions. The cluster region needs to be small enough to feel like a community, yet large enough to have enough critical mass to address key issues.

Factors to consider, and they may be in conflict with each other, are:

- How do customers view the region?
- What is the physical distance between the participants in the cluster? A drive of an hour, possibly less, may set the boundary. This can be the limit for frequent face-to-face

communications; further than this and participants could have difficulty meeting formally, or informally, on a regular basis.

- No ‘one-size’ will fit all local clusters; a multimedia cluster will have a much more compact arena than an extensive forestry cluster.
- Establish the necessary critical mass to enable the key issues to be adequately addressed.
- Boundaries are flexible – as clusters evolve, boundaries will also evolve. The boundaries will also evolve as the focus of the clustering initiative tightens, for example from ‘horticulture’ to ‘organics’.
- Some initiatives may benefit from linkages with neighboring clusters; others are likely to be in competition. As with firms, clusters benefit from both cooperation and competition.

Step 2: Initial cluster stocktake

With the possibilities for a pro-active clustering approach identified and shortlisted, the next step is to undertake an initial review of the priority clusters. The purpose of this stocktake is twofold:

- To identify the dimensions and nature of the local cluster and its place in the local economy
- To introduce the clustering process to the key stakeholders, securing their ongoing involvement in the process.

Where possible, build on existing associations and teamwork that is already in place.

Effective clustering is an inclusive process, and existing associations and their officials may well feel threatened by interest and activity in what they may perceive as ‘their turf’.

In addition to reviewing the published information, get more detailed and recent information from the senior stakeholders within the local cluster. The focus of these interviews should be on identifying common roadblocks and opportunities. For reasons of confidentiality these will not always surface in a workshop setting.

Undertaking a series of *interviews with key stakeholders* in the local cluster will enable the institutions to:

- Understand the cluster's opportunities and constraints;
- Assess the quality of linkages across the cluster and the extent to which the local players are working as a team
- Make an assessment of possible leaders

- Introduce the cluster concept to sceptics.

Based on the initial research and interviews, the facilitator needs to prepare a brief discussion paper on the key features of the cluster and the likely issues that will arise.
This is a public document, and should be made available to everyone with an interest in the cluster.

The process outlined here may suggest that this second stage in the cluster development process is distinct from the next stage: the establishment of the Leadership Group. In practice, this is often not the case. Where leaders can be clearly identified, get their involvement and support from the very start of this process. In no way should the clustering process suggest that their authority is being undermined.

The development of the Leadership Group is an ongoing process, and can usefully start while undertaking the initial cluster stocktake.

Step 3: Establish the Leadership Group

A key step in the establishment of all clustering initiatives is the early formation of a Leadership Group that is specific to the cluster. The facilitator plays a leading role in establishing this Group. It may initially be very informal, but over time will evolve and formalize. The facilitator needs to identify a group of senior stakeholders who collectively cover the broader dimensions of the cluster, and convince them of the merits of participating in the cluster. It is not always easy to get the key movers and shakers involved during the early stages. They may well be sitting on the fence watching sceptically to see if this particular initiative will take off or flounder. Senior people need to feel that there will be a pay-off for their time and involvement.

Maintaining this attention is often dependent on generating early benefits for the stakeholders. An early, and simple, measure of the success of a clustering initiative is the willingness of senior participants to front up to the next meeting; an early warning sign is if they delegate, or are ‘no-shows’.

The Leadership Group, usually some 6-8 people who are comfortable working together, should be predominantly from firms in the cluster core. The group should not be dominated by government representatives or association officials. It does not need to be in place straight away. The facilitator will usually be responsible for forming the initial Leadership Group and 'anointing' the Chairperson.
Occasionally this Leadership Group may relate closely to an existing association, but more often a new group is required.
Temporary teams with an issue focus will be developed under this Group. These teams benefit from tight integration with the Leadership Group through a Group member being part of each team.

The selection of the Chairperson from amongst the Leadership Group is a crucial aspect of cluster development. The facilitator needs to quietly establish whom the lead candidate for this position is, and make the initial approach. Occasionally, when it is not clear who the initial Chair should be, the facilitator will need to step in and provide this leadership. A useful approach for many clusters is to have Co-Chairs; possible one from a firm at the core, and one from the supporting soft infrastructure.

The facilitator is usually a long-term member of this Group, in part to represent the broader interests of the community, and in part to ensure that the development agenda for the cluster continues to move forward.

Step 4: Developing the cluster's vision

The initial stocktake will have established the current position of the cluster. Building on this is the establishment of a vision, a preferred future, for the cluster. If there is not agreement on the broad shape of this preferred future from across the cluster, then it will be even more difficult to subsequently gain agreement on the early action agenda to start moving the cluster towards this preferred future.

The facilitator needs to balance the need for a vision against the possible reluctance to create one. This is one of the most difficult aspects of the process, and it is not unusual to find only limited enthusiasm to participate in this discussion. Broad, high-level agreement is sought, not a detailed picture of the future.

A 'starter' vision for a cluster could be "*To double the cluster's scale of activity within five years*". Appropriate measures of activity for a cluster could be exports, employment, number of core firms, or the number of visitors.

It is likely over time that the vision will become more focused and more specific as the nature of the cluster's competitive arena and the opportunities available to cluster members are better understood.

Step 5: Identify stepping stones

After the "preferred future" or vision has been established the cluster stakeholders need to identify what broad steps are necessary to make it happen to deliver on the vision.

It is critically important to achieve a common understanding across the cluster on the key issues that need to be addressed. Identifying these issues through a workshop process is more powerful than having an 'independent review', and creates an environment that encourages those with passion for an issue to step forward in the next stage. The prioritization of these stepping stones should be by passion, rather than strategic impact: if no one within the cluster has the passion to address an issue or opportunity, then it simply remains on a 'to-do' list owned by no one.

Once the Leadership Group is firmly in place, it will be valuable to review more diligently the initial strategic agenda that develops through the workshop process.

Step 6: Immediate action agenda

With the key stepping stones now identified, there is the need to move on from the broader, long-term agenda to identifying the short term actions that will start moving the cluster towards the preferred future.

The objective of this step is to start developing an action agenda for each of the short listed issues. This involves

- Outlining the activity
- Defining the expected results

- Identifying the resources that are needed
- Identifying who from within the cluster has the specialized skills/contacts/knowledge needed and could be encouraged to participate in driving particular projects.

This action agenda is not producing a 'wish list', in the hope that others will move on the priority activities. Task forces work best if they select themselves. Occasionally the facilitator will need to be proactive in encouraging people to step forward. Each task force should have a leader and other supporting members, and if possible include a member of the Leadership Group. The term 'task force' is preferred over 'committees'; the task forces should be viewed as self-destruct teams that are dismantled as soon as objectives are realized.

Step 7: Institutionalization

Many cluster initiatives are initiated by UNIDOs, but over time move to a different home.
To be effective in the long term, the cluster process needs a permanent organization before the initial enthusiasm fades away. Often, a new organization is created and formalized. The process can take 12- 24 months, but occasionally this occurs much more quickly over a few months. The ideal end point is a self-funding organization with the Facilitator continuing as an active member of the Leadership Group.

This new 'meso' organization will likely serve a smaller geographic area than existing professional/trade organizations, and cover a broader range of organizations within that locality, reflecting the wide range of participants from across the cluster.

Step 8: Upgrading the strategic agenda

Once a Leadership Team is firmly in place, momentum has been established and some early benefits generated for the cluster participants, there is a base in place for upgrading the strategic agenda. Longer term / higher risk activities can now be undertaken without threatening the clustering initiative.
These could include:

- Benchmarking the cluster against international clusters
- Identifying capability gaps
- Developing a collaborative action agenda to address these

- Increasing awareness amongst schools of the career options within the cluster and developing school-business linkages
- Developing the cluster's identity, the brand, which may well support a number of clusters
- Joint initiatives with neighbouring and related clusters.

Take the opportunity, too, to extend the number of people directly involved in cluster initiatives. With larger organizations, the time may be right to build on the CEO's involvement in the first year and include second level managers - tomorrow's leaders – as the drivers of specific cluster programmes. When there are a number of clusters under development, each with a portfolio of initiatives, it is time to establish a mechanism to address the cross-cluster issues and opportunities that should by this stage have surfaced. Some of these aspects may be at the convergence of two or three of the clusters; others may well be more systemic and overarching within the community. They may, for example, relate to the level of services offered at the local airport, to the upgrading of secondary and tertiary education facilities, or the development of a regional branding programme.

An annual 'town hall' public meeting is useful in publicly highlighting the cluster programme, and renewing the enthusiasm and commitment of the Leadership Groups.
Such meetings should feature the business leaders from within the cluster, not the cluster facilitator or local politicians.

Appendix F: Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

FACULITY OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

GRADUATE PROGRAM IN INDUSTRIAL ENGINEERING

TITLE: "Small Scale *Metalworking Industries Cluster on towns of Oromia Special Zone*"

By: Dagne Birhanu Mamo

Address: Addis Ababa, Tel: 251-91-1991338, **Email:**danobantimogi@yahoo.com

Date: May 13, 2009

Small scale metal industries are very important for the country to decrease unemployment and shares to GDP. As metal and metal products are the basis for every construction and engineering activities, increasing their out put support the overall activities undertaken by the country. Hence these industries need to increase capacity, knowledge, and skill by clustering. To analyze the above benefits I use questionnaire as one of the methodology. It contains both objectives and subjective type questions. The questionnaire is prepared for the partial fulfillment of MSC degree in industrial engineering, way through can solve problems of metalworking industries of Oromia Special Zone. So, I thank in advance for your keen cooperation to fill this questionnaire patiently and be sure that data and information are confidential to me that is used only for the research.

Sincerely yours,

Dagne Birhanu

I. Identification Format

1. Industry Brand name_____

2. Industry Established year_____

3. Address of the Industry:

Town_____

Kebele_____

Tel_____

P. O. Box_____

E-Mail_____

4. Capital During engagement in Birr_____

5. Current capital in Birr_____

6. Number of employees during engagement

Male_____

Female_____

Total_____

7. Current number of employees

Male_____

Female_____

Total_____

8. What is the area of your industry in square meter?_____

9. How many apprenticeship workers are there in your industry?_____

10. How many work shops are there in your industry?_____

11. How many workers are there per work shop ?_____

12. Are you using your own house or rented houses for your work shop?

Rent ☐ Own ☐

II. Subjective and Objective Questionnaires for Clustering

1. Who is the Owner of the Industry?

- ☐ Government
- ☐ Private
- ☐ Share
- ☐ Joint venture
- ☐ Other Specify please_____

2. What is the qualification of the owner?

- ☐ None
- ☐ 1-8 grades
- ☐ 9-10 grades
- ☐ Preparatory complete
- ☐ TVET 10+1
- ☐ TVET 10+2
- ☐ TVET 10+3 (diploma)
- ☐ University Diploma
- ☐ University Degree

3. Who start the business?

- ☐ Family
- ☐ Individual and Men
- ☐ Individual and women
- ☐ Organized under MSE

4. What was the source of initial capital for the industry?

- ☐ Personal deposits
- ☐ Credit from financial institutions
- ☐ Transfer from other businesses
- ☐ Shares
- ☐ Family or relatives

5. What were the owners' engagements before start of this business?

- ☐ Working in the same industry
- ☐ Engaged in other businesses

☐ Engaged in training and education

☐ Job seekers

☐ Others, specify please_____

6. If your answer in 5 is the first one, how many years of experience in industries?

1-3 ☐ 4-6 ☐ 7-9 ☐ >9 ☐

7. What are the major products of your industry?_____

_____.

13. How many of your products produced per month?

Products	**Units per month**	**Remark**

8. What are the basic processes you are using to manufacture the products?

☐ Forming

☐ Fabrication

☐ Machining

☐ Bench working

☐ Casting

☐ Combination of the above, _____

9. What is the basis of your processes or products?

☐ Imitation

☐ Upgrading

☐ Invention

☐ Innovation

☐ Others_____

10. How many new products/processes are introduced to the market each year? _____

11. What are the raw materials used for your products?_____

_____.

12. How often do your raw materials ordered per year?

Once ☐ Twice ☐ Three times ☐ Four times ☐ Monthly ☐ Weekly ☐

13. What is the single ordering cost of your raw materials (Birr)? _____

14. Where do your materials purchased?

☐ Local and shops

☐ Local and Retails

☐ Foreign Local and distributors

☐ Foreign and Local

15. Who are your potential suppliers of the raw materials?_____

_____.

16. Are there any type of co operations or shares when raw materials purchased?

Yes ☐ No ☐

17. If your answer in 16 is yes who are the companies cooperating with?_____

_____.

18. How you transport the raw materials to the workshops/stores?

☐ Own vehicle

☐ Contract

☐ Shared with others

☐ Rent

☐ Others, point please_____

19. Where did your products sold?

☐ Local and shops

☐ Local and Retails

☐ Foreign Local and distributors

☐ Foreign and Local

20. Who are the potential customers of your company?

_____

_____.

21. Are there any type of co operations or shares when products sold?

Yes ☐ No ☐

22. If your answer in 21 is yes who are the companies cooperating with?_____

_____.

23. What is the total sales per year in Birr of your products?_____

24. What is the export sales percentage per year of your products?_____

25. What is the level of demand to your products?

☐ High

☐ Medium

☐ Low

26. If your answer in 25 is low, what are the main reasons?_____

_____

_____.

27. Are your machineries/equipments are operating at full capacity?

Yes ☐ No ☐

28. If your answer in 26 is yes, what are the busy hours per day of the machines?

Machine/Equipment Name	**Busy Time (hrs)**	**Remark**

29. Is there a possibility that machines/equipments are shared with other industries?

Yes ☐ No ☐

30. If your answer in 29 is yes who are the companies sharing?_____

_____.

31. Is there a possibility that skilled workers are shared between industries?

Yes ☐ No ☐

32. Is there information on technology upgrading?

Yes ☐ No ☐

33. If the answer in 32 is yes who is the source of information?

☐ Similar Industries

☐ Universities and Colleges

☐ NGOs

☐ Foreign Companies

☐ Others, note please_____

34. Is there a room for bazaars, show rooms and exhibitions?

Yes ☐ No ☐

35. If your answer in 34 is yes who prepared so?

☐ Ministry of Trade and Industry

☐ Ministry of labor and social affairs

☐ Ministry of capacity building

☐ Federal micro and small enterprises development agency

☐ NGOs

☐ Skill Development Centers

☐ Public institutions

36. What is the level of support you are taking from the above bodies?

Weak ☐ Good ☐ Strong ☐

37. Is there any subcontracting in your industry?

Yes ☐ No ☐

38. What are the main problems facing you?

☐ Lack of demand/market

☐ Lack of premises

☐ Lack of skilled manpower

☐ Problems regarding Government policy

☐ Unavailability of raw materials

☐ Lack of information on demand and technology

☐ Poor customer knowledge

☐ Others, specify please_____

39. What actions do you think to solve the problems encountered?

1._____

2._____

3. _____

40. Do you think that sharing resources, information and technology, joint ventures while purchasing and selling will minimize the problems?

Yes ☐ No ☐

41. What is the level of importance of the sharing above cases?

☐ Extreme

☐ High

☐ Moderate

☐ Low

☐ Not important

42. What infrastructures are fulfilled for your company (please put 'X' for the infrastructure owned)?

☐ Internet

☐ Telephone

☐ Roads

☐ Transport

☐ Water

☐ Expansion spaces

☐ Energy

III. Questionnaire to Workers

1. Have you receive training before? Yes ☐ No ☐

2. If not what type of training do workers need?

_____.

3. What is the level of education currently holding?

- ☐ None
- ☐ 1-8 grades
- ☐ 9-10 grades
- ☐ Preparatory complete
- ☐ TVET 10+1
- ☐ TVET 10+2
- ☐ TVET 10+3 (diploma)
- ☐ University Diploma
- ☐ University Degree

4. What is the probable source of skills acquired by employees?

- ☐ Formal learning institutions
- ☐ Brought up on job
- ☐ Previous formal employer
- ☐ Self learning/apprenticeship
- ☐ Training

IV. Support Institutions (Circle on criteria selected)

Criteria	1 None	2 Little	3 medium	4 Much
Major Suppliers	1	2	3	4
Major Customers	1	2	3	4
Major Partners of Same Trade (excluding suppliers and purchasers	1	2	3	4
Major Partners of Different Trade excluding suppliers and customers	1	2	3	4
Trade & Industry Organizations / Associations	1	2	3	4

Cross Industry Exchange Organizations	1	2	3	4
Universities and Colleges	1	2	3	4
Public Research Institutes	1	2	3	4
Public Supporting Organizations other than Research Purposes	1	2	3	4
Incubation Facilities	1	2	3	4
Financial & Banking Institutions	1	2	3	4