

Innovation and Barriers to Innovation: Small and Medium Enterprises in Addis Ababa

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Abstract

With increasing competition and quickly spreading of knowledge, the future of many businesses depend upon their ability to innovate. However, empirical and environmental scan evidence shows that low technological innovativeness of small and Medium Enterprises (SMEs) in Addis Ababa. Thus, this study examines barriers for technological innovation in SMEs. The data for the study was collected from four selected sub cities of Addis Ababa SMEs (Akaki, Bole, Kirkos and Yeka). The questionnaires were distributed randomly for 207 SME managers and/or owners to gather the needed information. The data gathered from managers or owners' using ordinary scale was analyzed quantitatively. On the other hand, interview data from official of sub cities was analyzed qualitatively. The mean, mode, percentage, and correlation analyses were used to process variables and data analysis. The result of this study indicates that the major barriers of introducing or expanding technological innovation for the sampled SMEs are: lack of government policy and regulation, lack of technological and market information, inadequate research and development, high cost of innovation, organizational culture, size of enterprise, lack of skilled personnel, lack of finance and absence of cooperation. In addition, the comparative analysis indicate that, except government policy and regulation, organizational culture, size of enterprise & lack of skilled personnel, all other factors were considered to be an important barrier to industry level and both for Small and Medium Enterprises. Similarly, all factors have statistically significant relationship for Industry, Small and Medium specific, except lack of cooperation, it is statistically insignificant for SME's specific technological innovation.

Keywords: Innovation, Barrier to Innovation, SMEs, Addis Ababa, Ethiopia

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1. Background of the Study

1.1. Introduction

In a rapidly changing world, the imperative for innovation increases. Innovation is common to all organizations' technology development and management, no matter how large a company is. "Innovation is the implementation of a new or significantly improved product or process, a new marketing, or organizational method in business practices" (OCED, 2005:46). Innovation is widely regarded as the most important competitive advantage that enables a company to thrive in today's dynamic business environment. It is undutiful that innovation derives prosperity for organizations and nations. Nowadays, it is commonly agreed that innovation is the critical path towards growth and prosperity for countries as well as for individual firms. It is the key to technology adoption, creation and explains the vast difference in productivity across and within countries.

Based on Global Innovation Index (GII) ranking of countries by region, Sub-Saharan Africa (including Ethiopia) is lower. Rating figure was computed on average of the following factors for each region: institutions, human capital & research, infrastructure, market sophistication, business sophistication, input, scientific outputs, creative outputs, output; and efficiency. On the other hand, Ethiopia ranked low on innovation indicating factors: gross expenditure on R&D, creative goods exports, university or industry collaboration on R&D, regulatory quality index, domestic credit to private sector, number of scientific and technical journal articles; & ICT use index (Dutta, 2011:50).

With increasing global competition and quickly spreading of knowledge, the future of many businesses depends upon their ability to innovate. In this regard Castells (2010) and Huang and Tsai (2011) argued that most modern economies pursue progressive strategies and policies to develop a responsive and dynamic small and medium enterprises (SME) sector. This is done with potential to innovate, capability to respond rapidly to evolving economic environments. Emerging opportunities and threats forced companies to investigate and invest more on innovation to decrease risk of becoming uncompetitiveness. In this regard, innovation is about new solution that offers better value to customers. Organization use innovation to confirm critical decision in responding to technological or market challenges (Brenner, 1987; Gomes, 1996).

The studies conducted by Freel (2005), Allocca and Kessler (2006), and Dibrell et al. (2008) as cited in Ilker and Baki (2011) show the increasing importance role of innovation and SME's in the world. For sure, there are many good reasons for paying attention to SME's. Currently the Ethiopian government use SME's as a strategy towards development and creating employment by having overall objective of the strategy of creating and enabling environment for MSE's. Having specific objectives to "facilitate economic growth, bring equitable development, create long-term jobs, strengthen cooperation between MSE's, provide the basis for medium and large-scale enterprises, promote export, balance preferential treatment between MSEs and bigger enterprises"(CSAE, 2004).

Hence, the role of innovation as a crucial driving force of economic development is widely acknowledged. In particular within the business setting, innovation is often considered to be a vital source of strategic change, by which firm generates positive outcomes including sustained competitive advantage. Moreover, as cited by Aminreza et al.(2011:80) Davila et al.(2006) organized reasons why enterprises undertake innovation: to improve quality, create new markets, expand product range, reduce labor costs, environmental damage and energy consumption; improve production processes and materials; and replace products or services. For these and other reasons, innovation has for many decades been subject to thorough analysis and research.

However, if countries are not in a position to engage effectively in innovation activities, inevitably they are going to be dependent on other countries innovated products, imported by hard currency from developed and other developing countries. This typically holds true for countries like Ethiopia. Likewise, firm's engagement in such activities is becoming mandatory, unless they lose their markets share and customers in the future, as a result of shift in demand of existing customers for new technology. Therefore, innovation helps to meet the customer requirements and enables firms to introduce technology which become one of the most important concerns for enterprises. Hence, the ability of a company, not only to keep up with its current business performance, but to exceed its own and its competition's expectations are critical to survive. With regard to this, Tidd et al.,(2005) realized that if firms are not ready to continuously renew their products and processes, their chances of survival are seriously threatened.

This is due to the great contribution of innovative activities to the firms' competitiveness and success; thus describing factors hindering firm (SME's) technological innovation activities has the intent of the research.

Thus, Small and Medium-sized Enterprises (SMEs) play extremely essential role in the quick-changing and increasingly competitive global market with a significant contribute on the economies of many countries in the course of their ability to innovate technological innovation (Zhu et al., 2006) cited in Xie et al.,(2010). The evidence from the environmental scanning, literature review and empirical work shows that low innovativeness of SMEs is due to many factors affecting adversely as Tahi (2011), Silva et al., (2007), Lim and Shyamala (2007), Mohen and Roller (2005), and Baldwin and Lin(2002) pointed out. Therefore, this study focused on generating relevant information to understand barriers for technological innovation of SMEs based on a review of the pertinent literature and empirical study of a representative sample of **207** SMEs out of the total of **405** in Addis Ababa.

1.2. Objective of the Study

1.2.1. General objective

This study is conducted with the overall objective of identifying various barriers of technological innovation and comparing technological innovation barriers of SMEs firms at industry and specific level, from selected sub cities in Addis Ababa.

1.2.2. Specific objectives

In addition to the general objective, the specific objectives of the study include:

- To identify whether selected SMEs introduce technology innovation or not
- To classify the type of technological innovation SMEs introduced
- To investigate the reason behind SME are not actively engaged in technological innovation
- To compare and examine the effect levels of each barriers on SMEs industry level; and small and medium enterprises specific technological innovation
- To rank the main barriers of technological innovation in SMEs industry level and small and medium enterprises specific
- To classify internal & external technological innovation barriers of SMEs industry level

2. Literature Review

2.1. Overview and Concept of Innovation

This chapter deals with the review of the literature on barriers to innovation in SMEs. Even though, innovation and its processes are perceived as a relatively new concept by organizations, it has been subject to discussions over several decades. The term innovation comes from Latin's *innovare*, which means "to make something new" (Amidon, 2003, Tidd et al., 2005). The definition, however, has developed over time and been interpreted very differently (Sauber & Tschirky, 2006). Innovation has continued to be a subject of interest to scholars from a number of different disciplines, including economics, business, engineering, science, and sociology. Arising from this, the concept has hence been viewed differently to the extent of introducing a debate as to what constitutes innovation (Cooper, 1998). It has hence come into view as a multidimensional concept which includes various dimensions like product-process-market-organizational, incremental-radical; and technological - non technological innovations.

Being one of the first definitions it was not as specified; it explained that any shift in the production function was to be seen as an innovation. Drucker (1985) defined innovation as the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. Similarly, Tidd et al. (1997) defined innovation as a process of turning opportunity into new ideas and putting these into widely used practice. Whereas, Baregheh et al.,(2009) define innovation as the multi-stage process whereby organizations transfer ideas into new or improved products, services or processes, in order to advance, compete and differentiate themselves successfully in their marketplace. Another dimension of innovation has been the nature of innovation with the two extremes being technological and non technological. Technological innovation has been used to refer to the process through which technological advances are produced, while non technological innovations include strategies, processes, structures and management techniques (Eris and Saatcioglu, 2006).

As Massa and Testa (2008:396) comment academics and entrepreneurs, may interpret innovation in a very dissimilar manner: while academics usually stress scientific novelty, for entrepreneurs, on the other hand, "innovation is anything that makes money".

The differing views researchers may have also a source of bias in innovation studies. Innovation is a complex and multidimensional phenomenon thus, Hagedoorn and Cloudt (2003) suggested that using multiple indicators to measure innovation has the double advantage and that a more comprehensive assessment of innovation performance is possible.

2.2. Types of Innovations

According OECD (2005), "innovation is the implementation of a new or significantly improved product, or process, a new marketing or organizational method in business practices, workplace organization or external relations". However, the broad definition of innovation can be more narrowly categorized as the implementation of one or more types of innovations, for instance technological or non technological innovations. Therefore, four types of innovations are distinguished according OECD, (2005); Jaramillo et al (2001:157-62): **Product innovation:** is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. **Process innovation:** is the implementation of a new or significantly improved production and/or delivery method for the creation and provision of services. **Marketing innovation** is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion and pricing that is use of new pricing strategies to market whereas, **Organizational innovation** is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations (OECD, 2005).

2.3. Overview of Small and Medium Enterprises

The term SME's universally stands for small and medium-sized enterprises but there is no consensus on the definition of SMEs. This is because definitions differ widely in different regions, and depend on the phase of economic development as well as their prevailing social conditions. There are several definitions of the term small and medium enterprises (SMEs), varying from country to country.

SMEs are defined for this study by adapting the definition given 2011 by Ethiopian Federal Micro and Small Enterprises agency (FMaSE): **Small enterprise** is those enterprises hired 6 up to 30 employee or total asset amount birr **100,000** up to **1.5 million birr** for industry sector and **50,000** up to **500,000** not greater than for services sector.

Medium Enterprise are enterprises found in manufacturing and service sectors of the Ethiopian economy with a total asset more than 1.5 million birr and a total asset of more than Birr 500,000² (Addis Ababa MSE's development agency bureau, 2011 as cited on Addis Ababa Communication office bureau). Hence, according to officer of FMaSE interview, the limit for medium enterprises and definition for large enterprises are not stated so far.

2.4. Empirical Studies Related With Barriers to Innovation

Under this section review of different journal or articles all over the world investigated in relation to barriers to innovation are considered including the Ethiopian case. While review is made different variables are considered in the study, identification of variables is done to make considered in the study based on the following previous studies.

2.4.1. Relation between Innovation and Barrier to Innovation

This part deal with various studies conducted by researchers, to establish linkage and endeavors to show that the independent variable that is barrier to innovation causes a great impact on innovation.

The identification of barriers for SMEs innovation can assist in fostering an innovative culture in firms by supporting new ideas or encourage proper innovation management. On a national level, it is important to identify and remove barriers in order to foster innovation based competition and to avoid or minimize the probability of failure to innovation (Woolthuis, 2005; Chaminade et al., 2009). On the other hand, from an innovation management perspective, it is important to identify the obstacles most commonly faced by firms along their innovative activities, in order to enhance the economic pay-offs from innovation-related efforts (Dougherty, 1992).

Moreover, due to the great contribution of the innovative activities to the enterprises' competitiveness and success, it is of great interest to identify the barriers and obstacles that limit the development of innovative activities in firms.

² One \$ equal to 19 Ethiopian Birr

As a result, studies show that firm differences in barriers to innovation were related to cost, institutional constraints, human resources, organizational culture, flow of information and government policy, high cost of innovation, lack of finance, high economic risk, lack of skilled personnel, lack of information about technology and market, lack of customer responsiveness and government regulations (Silva et al., 2007; Lim and Shyamala 2007; Mohen and Roller 2005; Baldwin and Lin, 2002). Likewise, SME's in OECD countries have identified some important barriers to innovation, such as a lack of available finance, infrastructure, skilled knowledge workers, and regulations (OECD, 2005).

2.5. Empirical Review of Selected Cases

The following are related to barrier to innovation selected empirical journal to review the case study based on sources of data, methodology used, sampling size, and country, variable considered and its result reached.

The survey study was examined barriers to innovation among a sample of 88 **Iranian** manufacturing SMEs. In-depth study of eleventh barriers to innovation (governmental regulations, lack of information on market & technology, lack of qualified personal, availability of finance, cost of finance, too high direct innovation costs, excessive perceived economic risk, international regulations, and uncertain demand dominated by established enterprises) were done through distributing questionnaire. The study identified reasons SMEs were not introducing innovation; 55.8% due to factor constraining and market condition was 29.4%. Finding also revealed that the economic factors such as excessive economic risk, lack of finance & high cost of innovation are significant impeding propensity of SMEs innovation. Similarly, lack of customer responsiveness, lack of qualified personnel and lack of resources to develop and commercialize new product viewed as other important constraints to innovation.

Moreover, the study showed that the most significant barriers are associated with costs, whereas the least significant are associated with lag of information and also the survey results show that Iranian SMEs aren't collaborating with universities & higher education institutions; they don't see university as a main source of information (Aminreza et al., 2011).

However, this study consider some variable other than this study like inadequate R&D and organization culture and compare SMEs technological innovation barriers on Addis Ababa, Ethiopia.

On the other hand, study was conducted by Silva et al., (2007) to identify the barriers to innovation that influence the innovation capability of **Portuguese** industrial firms based on information from database obtained through the Community Innovation Survey II. Questionnaire was administered to 819 firms, of those answered the questionnaire, 470 carried technological innovations during the period of 1995-1997. From the sample of 819 firms, 298 are innovated product or process. The high cost of innovation, lack of financing, lack of skilled personnel, high economic risk, organizational rigidities, government regulations, lack of customers' responsiveness, lack of technological and lack of market information are factors included under the study. The study revealed that high cost of innovation; lack of financing and lack of skilled personnel are the most important obstacles to innovation respectively and lack of information on market are the least factors hindering innovations of industrial firms. Logistic regression is preformed in order to identify the significant restraining factors of entrepreneurial innovative capability. However, this study considers some of the variables other than this study, and primary data is main sources inline of using descriptive and inferential statistics, finally the study were conducted SMEs in Addis Ababa, Ethiopia.

Similarly the study were conducted by Lim and Shyamala, (2007) based on national Survey of Innovation 2000-2001 data to investigate the obstacles to innovation faced by Malaysian manufacturing firms during the process of innovation. Innovation obstacle is evaluated by 671 firms (279 innovators and 392 non-innovators). The information was obtained on the relevance of each of nine obstacle including cost of innovation, economic risks, lack of sources of finance, lack of information on markets, lack of information on technology, lack of skilled personnel, lack of customers response, legislation & regulation and organizational rigidities are analyzed using descriptive statistics. The analysis explores the differences between firms by industry type and firm size.

The results show that among all obstacles, economic related factor appear to be the most important and also the ranking of obstacle by innovators and non innovators are more or less similar.

However, the level of importance of obstacles is different for innovator and non-innovator firms. Innovator firms are more likely face high cost of innovation and information related obstacles to innovation and non innovator firms face more likely finance, risk and man power related are more important obstacles to innovation. Furthermore, non innovators firms face different set of obstacles at different intensity from innovators. However, this study includes the interview of government worker and inclusion of variable like R&D and size of enterprise could obstacle technological innovation of SMEs in Addis Ababa, Ethiopia.

Likewise, the study conducted in **Malaysia** food processing industry in 2010 identified some barriers inhabiting innovation activities. The study was conducted using quantitative methodology with the help of survey questionnaires to collect information from SME owners and/or manager. Set of questionnaires are mailed to 500 SME food processing companies in 2010. The study identified four most important factors: of this economic risk and cost barriers are main factors which inhabiting innovation; and government and market barriers are the second most important barriers to innovation. In addition, Information Communication Technology and unskilled staff; and no gain and partnership are factors identified as barriers but low influence on innovation (Mohd and Syed, 2010). However, this study used mixed approach; and also comparative study was made between SME's at industry and specific in Addis Ababa, Ethiopian.

Study conducted to examine the factors that influence innovative firms in the manufacturing and service sectors sample of 3,964 in **Spain** to cooperate with research institutions in their innovation activities. A literature review was used to identify variables likely to influence a decision to cooperate with research institutions and a logit regression model is used to verify the importance of those variables. Study found that spillovers, R&D intensity, costs, risks and alternative cooperation strategies influence both manufacturing and service firms in the same way in their decision to cooperate with research institutions in R&D. However, the variables relating to firm size, being part of a larger group of companies and type of innovation were shown to affect manufacturing and service companies differently.

No control over the possible bias introduced into the study by not including firms that were not innovative (Concepcion et al., 2008). However, this study includes both innovators and non innovators. On other hand, study describe factors restrain technological innovation and also compare the effect level of SME at industry and specific enterprises in Addis Ababa, Ethiopia.

An empirical study of Mulu (2009), was conducted to examine entrepreneurs behavior and resources availability to the enterprises as a major determinant of innovativeness and its impact on firm growth, based on a survey conducted in 2003 by the EDRI³ on a 1000 microenterprises with 10 and fewer workers. The survey was done in six selected major town including Addis Ababa, **Ethiopia**. A total sample of 974 enterprises was interviewed. However, firms owned by female and old entrepreneurs are less likely to get involved in innovation. In an extended model of firm growth determinants that include innovation indicators, the study found strong evidence that innovators grow faster than non-innovators. In addition to innovation, firm growth is also affected by the firm size, age, access to finance, sector, and owner character factors. Even though, Mulu's study revealed that firm size significantly affect microenterprises innovation, this study incorporate additionally variables like GPR, LTMI, IRD, HCI, OC, LSP, LF and LC to study factors obstacle SMEs technological innovation and comparing obstacle at industry and specific level by taking only Addis Ababa sub cities.

The survey study result on SME's between **Addis Ababa** and the town of **Nazareth** on 27 Small, 35 Medium and 9 large-scale enterprises revealed that manufacturing product with slight modification on production process shows 44% (12 out of 27) small and 51% (18 out of 35) medium scale enterprises introduces product or process innovation. Similarly, 18% (5 out of 27) of small scale and 20% (7 out of 35) of medium scale enterprises has introduced new technology in the three year period. In contrast, none of large-scale enterprises included in the survey have under taken product, process or management-related innovation.

Study also identified major obstacles to innovation within SMEs in Ethiopia: lack of information support systems, shortage of technical skills, relatively weak intellectual property rights protection system, absence of proper and effective standard setting and quality control mechanism and lack of appreciation by government authorities (UNCTAD⁴, 2002:95-99).

³ Ethiopian Development Research Institute

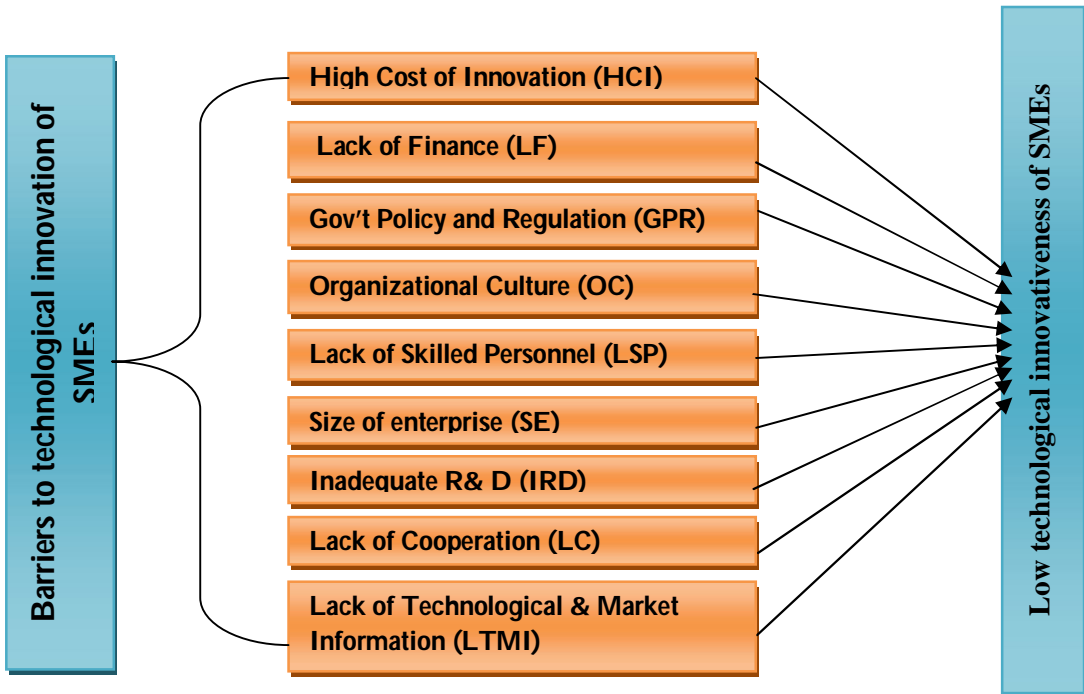
⁴ United Nations Conference on Trade and Development

In light of this, study intended to investigate factors hindering technological innovativeness of SME in Addis Ababa by including manufacturing & construction sector. Similarly, comparative analysis was made between SMEs industry level and specific innovation barriers.

2.6. Conceptual Frame Work

This conceptual frame work indicates the relationship between barriers of SMEs and SMEs technological innovativeness. The frame work indicates barriers of SMEs technological innovation like HCI, LF, GPR, OC, LSP, SE, IRD, LC, and LTMI result for low SMEs technological innovation. This framework was developed from the study of Aminreza et al.,(2011), Silva et al.,(2007), and Lim and Shyamala(2007) by taking the variable LSP, GPR, LTMI, LF and HCI; OC from Silva et al.,(2007) and Lim and Shyamala(2007); and R&D, Cooperation and Size (Mulu,2009) variables were taken from the study of Concepei'on et al.(2008).

Figure 2.1: Conceptual relationship between barriers of SMEs and their innovation



3. Research Methodology

3.1. Research Design

Both qualitative and quantitative approach was designed to investigate the problem under study. Employing mixed approach used to neutralize or cancel the biases of applying any of a single approach and a means to offset the weaknesses inherent in a single method with the strengths of the other method (Creswell, 2003). The purpose of this research is to describe and explain, the extent each independent variable are affecting SME's technological innovation and helps to better understand and clarify a problem or factor's which affect innovation of SME's.

3.2. Research Participants

The reasons for owners and/or managers of each SME's were chosen as suitable candidates for the questionnaire is that the owners or managers make most of the decisions with regard to the SME's Storey(2000) as cited in Aminreza et al.,(2011). In addition interview was conducted with four people (officials from each selected sub cities).

3.3. Sample Size Determination

Four sub cities of Addis Ababa SME's were selected and then selected SME's are stratified by size and sectors they engaged like construction, garment and textile, and woodwork and metalwork. Using sample determination formula developed by Watson Jeff(2001), sample size was determined.

$$n = \frac{\frac{P(1-P)}{A^2 + \frac{P(1-P)}{N}}}{R} \quad n = \frac{\frac{0.5(1-0.5)}{(0.05)^2 + \frac{0.5(1-0.5)}{405}}}{0.95} \quad n = \frac{197.316}{0.95} \quad n = 207 \text{ SME}$$

Lastly, samples were drawn from sampling frame randomly from each sectors of small and medium enterprises. 207 questionnaires were distributed for SME's owners and/or managers from four sub cities and 152 valid responses (73%) response rate was obtained were 112 collected from the owners or managers of small enterprise; whereas 40 questionnaires medium enterprises.

3.4. Method of Data Collection, Sources and Research Instruments

Survey method was used to collect information from managers or owners of SME's. The study was both, primary data was gathered by using questionnaire and interview to support data gathered by using survey, and Journal, articles, books and agency reports were used as secondary sources for the study. SME's manager or owner were asked to give their perception regarding enterprises technological innovation barriers using a four valued scale ranging from high importance medium to low importance and not relevant. Each variable is measured using information collected through appropriately designed questionnaires and by interview made with officials of sub cities of Addis Ababa. Respondents were asked to indicate degree of importance, using four Likert scale, the extent to which they found barriers (**High** (3), **Medium** (2), **Low** (1), and **Not experienced** (0) of those statements on progress of SMEs regarding technological innovation. Hence, likert question was asked positively to SMEs managers or owners on the scale. The scaling was taken **from Canada innovation survey 2005**.

3.4.1. Choice of the Survey Approach

Two approaches for collecting data on innovations: "**Subject**" approach deals collection of information about innovative behavior and activities of the firm and also deals factors influencing the innovative behavior of the firm (strategies, incentives and barriers to innovation). These surveys are designed to be representative of all industries so that the results can be grossed up and comparisons made. "**Object**" approach deals collection of data about specific innovations (a "significant innovation" of some kind or a firm's main innovation (OECD, 2005). For this study the "**subject approach**" was used to collect the needed data.

3.5. Data Quality Assurance

Reliability were tested using the Cronbach coefficient alpha, using **15** sample SME's managers and/or owners pilot test, to pre test the designed questionnaires whether it's appropriate to gather necessary data or not.

Based on reliability analysis the coefficient of Inadequate R&D, Size of enterprise and lack of availability of finance were within a range between 0.6 and less than 0.8 that is **accepted**, government policy and regulation, lack of technological and market information and Lack of cooperation are within a range between 0.8 and 0.85 that is **good** and the remaining high cost of innovation, organizational culture and lack of skilled personnel are within a range between 0.85 and 1 that is **excellent** this means more consistent and internally stable (Sekaran, 1992:173-287) as cited in Sayed (2011).

3.6. Method of Data Analysis

The method of data analysis and presentation of finding involves using qualitative and quantitative approach. Hence data tabulation and statistical computations was used. To analyze the findings descriptive statistics like percentage, mean, mode, tables and figures presentation was applied by using latest available version of SPSS 19 package. The SPSS program was used to analyze the results of the questionnaire. In addition correlation and reliability analysis was used.

4. Finding of the Study

Study describes and explains factors negatively affecting (barriers) for SME technological innovation. 207 questionnaires was distributed, to conduct the study on nine variables taken to measure the level by which SME's could be affected in the introduction or expansion of innovation despite, 152 usable questionnaires were obtained (73% response rate).

From the selected enterprises 58 had engaged in innovation whereas, the remaining 94 enterprises didn't introduced technological innovation. Out of those 58(38.1%) enterprises introduced technological innovation, 34(22.3%) are small & 24(15.7%) are medium enterprise. Proportionally, new technology introduced account construction, garment and textile; and metal and woodwork sectors were 10, 3 & 21 for small and 7, 4 & 13 are medium enterprises, respectively.

Of SME's engaged on technological innovation, the type of technology they introduced was product, process and both product and process were 7.9%, 7.2% & 7.2% for small and 5.9%, 3.3%, & 6.5% for medium enterprises, respectively.

Enterprises didn't introduce or expand technological innovation are 94(61.9%), 78(51.3%) are small & 16(10.5%) are medium enterprise. The **reason was** due to market condition, factor constraining innovation and both market and constraining factors were 1.9%, 67.1% and 4.6% for small enterprises and 0.6%, 20.4% and 5.2% for medium enterprises, respectively.

Why SME didn't engaged or expand in technological innovation was:

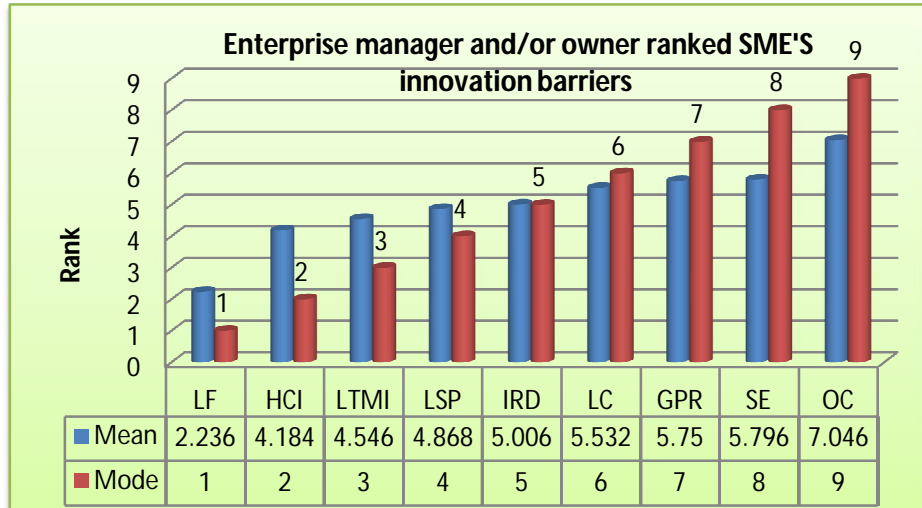
- ❖ Unfavorable government policy and regulation are obstacle for SME's industry technological innovation with 1.3434 grand mean and particularly, Low patent protection, absence of government R&D funding, low financial regulation assurance, low support for doing and expanding innovation, low access & usage of government loan, no modification of tax system to encourage innovators & provision of unequal support for all enterprise(not consistent with interview) are more important factors identified as barriers for SME's industry level technological innovation. Moreover, **GPR** is barriers for small enterprise technological innovation (1.2732) despite; it's not important obstacles for medium enterprise (1.5400). Similarly, with finding of this study Silva et al. (2007) and Lim and Shyamala (2007) noted that government regulation is important barriers to innovation.
- ❖ Lack of technological & market information is also important obstacles for SME's industry level technological innovation (1.2565). Particularly, Low access & utilization of up to date technological information and materials, lack of technological transfer institution, absence of access & usage of internet service; inadequate knowledge of market & their demand, & low effort for new technological markets to serve are an important obstacles for industry level technological innovation. Moreover, both small (1.1734) & medium (1.4892) enterprises specific technological innovation were obstacle by **LTMI**. This finding is similar with Silva et al., (2007) and Jaramillo et al., (2001) which identified as barrier for innovation.
- ❖ In a similar way, inadequate R&D (1.1118) is considered as an important obstacle to SME's industry level technological innovation. Even if, SME's believe that R&D enable to introduce or expand innovation, factors like, unable to have organized R&D office & equipped staffs, no engagement on R&D and absence to use new finding of R&D of private organization are important barriers to SME's industry level technological innovation.

Moreover, **IRD** is an important barrier **both** for **small** and **medium** enterprise, were grand mean values are 1.000 and 1.4250, respectively. Consistent to this finding Jaramillo et al., (2001) noted Inadequate R&D as obstacle to innovation.

- ❖ Similarly high cost of innovation (1.0451) is also an inhibiting factor to industry technological innovation. Particularly, Inability of hiring and purchasing of necessary skilled human power and equipment, cost of innovation is not tolerated by enterprises, inability of enterprises to acquiring external competence, no budgeted money for innovation activities, innovation is not ongoing bases, and fail to take risk by enterprises are important barriers to SME's industry level technological innovation. Moreover, **HCI** is an important barrier both for small (0.9285) and medium(1.3714) enterprise to engage in technological innovation. Lim and Shyamala (2007); and Silva *et al.*, (2007) also identified cost as restrain factor for technology introduction consistent to this finding.
- ❖ Likewise, **organizational culture** (1.4802) is also identified as an important barrier for SME's industry technological innovation. Particularly, Low employee empowerment, low synergies of resources, insignificant role of managers and/or owner to promote innovation, no spent time to listen employee ideas by supervisors, absence of updating staff with best practice and shortage of exploiting opportunities to innovation are important barriers to SME's industry level technological innovation. Moreover, **OC** is an important barrier for small enterprise (1.3493) technological innovation despite; it's not barriers for medium (1.8468). The study of Aminreza et al., (2011), Silva et al. (2007) and Lim and Shyamala (2007) identified **OC** as restraining factors for innovation.
- ❖ **Size of enterprises** which could be measured in financial and human recourses is important restrain factor for **industry** technological innovation (1.3661). Hence, Facing innovation related problem, limit in assignment of internal funds for innovation (true both for small and medium), and limited engagement of innovation with help R&D are barriers for technological innovation in line with enterprises size for industry level. Moreover, small enterprise technological innovation is restrained by **SE** (1.2857), despite for medium enterprises it isn't as such barriers (1.5383). Finding of Concepcio ´n et al.,(2008) identify **SE** as barrier to innovation consistent with this finding for industry & small.

- ❖ SME's at industry level technological innovations is restrained by **lack of skilled personnel** (1.3723). Therefore, inadequate number of trained personnel for innovation, absence of individual with creative & innovative ideas, managerial incapability to manage innovation process, & inadequate qualified employee within enterprise are important barriers for industry to engage in technological innovation. Moreover, **LSP** is an important barrier for small enterprise (1.2821), however, it's not as such barriers for medium enterprise (1.6250). Likewise, Aminreza et al., (2011) are consistent to this finding that innovation is affected by **LSP**.
- ❖ Lack of finance was identified as the **major obstacle for industry** technology innovation (0.5263). Particularly, Insufficient funds for innovation, absence of access to long term loans for innovation, absence of funds from outside sources, absence of investors which is encouraging firms through financing, and insufficient support from banks & financial institution to collateral requirements are impeding industry level technological innovation. Furthermore, **Lack of Finance** is important barrier for **both small and medium** enterprise were 0.4571 and 0.7200, respectively. This finding is in line with Mohd & Syed (2010), OCED(2005); Aminreza K, et al., (2011), Silva et al. (2007) and Lim and Shyamala (2007) that economic factors particularly **Lack of Finance** are factors restrain SME's innovation.
- ❖ **Lack of cooperation** is important barriers for **industry** technological innovation (1.1579). Thus, difficulty in finding cooperation partners for innovation, low cooperation with institution & business services providers, low access of expertise's from other firms, having low relationship with different association, deficiency of having cooperation with government, private institution & NGO in relation to innovation are important barriers for industry technological innovation. Moreover, **LC** is an important barrier for **both small** (1.1375) and **medium** (1.2150) enterprise specific technological innovation. Similarly, the finding of Mulu (2009) are in line with this study as identified **LC** as barriers for innovation.

Figure 4.1: SME’s industry level technological innovation barriers are ranked in this order from high important barrier to low important barriers



- ▶ This finding was similar with the finding of Aminreza et al., (2011); Silva, (2007); and Lim and Shyamala (2007) that economic factors like lack of finance and high cost of innovation are major factors restrain SME’s innovation.
- ▶ SME technological innovation obstacles ranked, lack of finance, lack of skilled personnel, inadequate R&D, lack of cooperation, size of enterprise and organizational culture are impeding industry level technological innovation in this order as internal factors.
- ▶ SME industry level technological innovation obstacles are ranked as follows: high cost of innovation, lack of technological and market information, and government policy and regulation as external factors.

4.1. Result of the Correlation Analysis

A correlation is a commonly used measure of the size of an effect and the value of $\pm .1$ represent a **Small** effect, $\pm .3$ is a **Medium** effect and $\pm .5$ is a **Large** effect. When data been measured at only the ordinal level they said to be non parametric and Pearson’s correlation is not appropriate. Thus, spearman’s correlation coefficient is used (Andy, 2005: 111).

Table 4.2: Spearman's correlation analysis

			GPR	TMI	RD	HCI	OC	SE	LSP	LF	LC
EIP	Industry	Coef	.391	.403	.509	.433	.280	.370	.392	.157	.189
		Sig.	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.026**
	Small	Coef	.305	.358	.469	.330	.180	.278	.346	.142	.155
		Sig.	.001*	.000*	.000*	.000*	.029**	.002*	.000*	.029**	.052***
	Medium	Coef	.437	.404	.405	.470	.309	.482	.320	.406	.238
		Sig.	.002*	.005*	.005*	.001*	.026**	.001*	.022**	.005*	.069***

Source: Survey result, and own computation **EIP**= Enterprise Innovation Performance

* - Correlation is significant at the 0.01 level (1-tailed).

** - Correlation is significant at the 0.05 level (1-tailed).

*** - Correlation is insignificant at the 0.01 and 0.05 level (1-tailed).

The above table **4.2** demonstrates the results of Spearman's Correlation on the relationship between the level of SMEs industry, small and medium specific enterprises technological innovation performance with barriers to innovation for the sample respondents. Correlation has significant association between enterprise innovation performance and barriers to technological innovation **except** for lack of cooperation for small and medium enterprises specific at .01 and .05 level.

5. Conclusion

Medium enterprises better engaged on technological innovation, particularly those SME's in garment and textile, and woodwork and metalwork sector from that construction sectors.

Factors constraining innovation is the main reason for small and medium enterprise so far did not innovate or actively engaging in technological innovation.

For organization government policy and regulation has positive and negative effect on firm performance. As a result, enterprise innovation performance might be also encouraged or discouraged by policy and regulation of countries government.

Regarding this government policy and regulation is an important restraining factor for SME's industry and small enterprise technological innovation. However, it's not taken as an important inhibiting factor for medium enterprise technological innovation.

Information is power to every organization or SME's to cope up in this dynamic environment and to overcome competitive restrain factors. However, lack of technological & market information is obstacle to SME's industry and both small and medium enterprise specific technological innovation. It is undeniable that R&D importance for firms to innovate new technologies, to imitate technology and to gain competitive advantage. However, if those firms don't have adequate engagement on R&D, it can be difficult to perform well in the introduction of creating new technology or adding values on existing products. Therefore, inadequate R&D is barrier for SME's at industry and at specific small and medium enterprise technological innovation.

To engage on innovation enterprise is able to have necessary resources and capabilities. As a result of asking huge money to own those resources and capabilities, enterprise isn't in a position to own and engaged on technological innovation. Hence, high cost of innovation is a major obstacle to SME's industry and both small and medium enterprise technological innovation.

Usually innovation idea is created from people mind and those organizations govern the collection of peoples, resources and values they have. The culture organization have can limit or foster performance of innovation in organization. Thus, organization culture is important barriers to SME's industry level and small enterprise technological innovation unlike true for medium enterprise technological innovation.

Generally, size is associated with the enterprise capital and number of hardware or soft ware firm have. As a result, larger firm has a probability to own such capabilities from small one. Therefore, SME's industry and small enterprise technological innovations are obstacle by size of enterprise even though, for medium enterprise it's not important barriers.

Organizational activities cannot be achieved without the existence of human beings. However, enterprise has inadequate skilled human power; so it's difficult attain its objectives as it's required. This is true for SME's, that skilled human power is required in the introduction or expansion of new technologies. Therefore, lack of skilled personnel is taken as inhabiting factors for SME industry and small enterprises, unlike for medium enterprise technological innovation.

Finance is the main root of business. If firms do not have sufficient amount of finance it's impossible to compete with others. That is why lack of finance is important barriers for SME's industry, small and medium enterprise specific to engage on technological innovation.

Due to fast changing environment and increase of knowledge dissemination, it difficult to SME' to maintain competitive advantage through internal R&D. Particularly, for radical innovation that is drawn on new scientific knowledge that emanated from universities and research organization as a result it's important to cooperate with others. So, lack of cooperation is important barrier for SME's industry and small and medium enterprise specific technological innovation even though, statistical insignificant relation between lack of cooperation and small and medium enterprise technology innovation performance.

Notably, Lacks of finance, lack of skilled personnel, inadequate R&D are the three most impeding SME's industry level technological innovation with internal factors. On the other hand, High cost of innovation, lack of technological and market information, and government policy and regulation are the three main impeding SME's industry level technological innovations within external factors.

6. Suggestion for Further Research

- ▶ It would be interesting to examine why small and medium enterprise noted organization culture as low restrain factors for technological innovation by including or only considering non technological innovation (market and organization innovation).
- ▶ Moreover, finding out why, how and what the remedy should be Ethiopia is on the bottom (lowered) of the technological innovation continued?

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