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

By

Sileshi Talegeta

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Approved by the board of Examiners and Advisor:

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Examiner	**Signature**	**Date**
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Examiner	**Signature**	**Date**
_____	_____	_____
Advisor	**Signature**	**Date**

Declaration

I, Sileshi Talegeta declare that this paper is a result of my independent research work on the topic entitled "**Innovation and Barriers to Innovation: Small and Medium Enterprises in Addis Ababa**" in partial fulfillment of the requirements for **Masters of Business Administration degree at Addis Ababa University.** This work has not been submitted for a degree to any other university. All the references are also duly acknowledged.

Sileshi Talegeta

Signature_____

Date _____

Confirmation

This is to certify that **Sileshi Talegeta** has carried out this research work on the topic entitled "**Innovation and Barriers to Innovation: Small and Medium Enterprises in Addis Ababa**" under my supervision. This work is original in nature and has not been presented for a degree in any University and it can be submitted for the partial fulfillment of the requirements for the award of the degree of Master of Business Administration (MBA).

Zewedie Shibire (**PhD**)

Signature_____

Date _____

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 and 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.*

Key Words: **Innovation**, **Barrier to Innovation**, **SMEs, Addis Ababa**

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Acronyms

CSAE	Central Statistical Authority Agency of Ethiopia
EDRI	Ethiopian Development Research Institute
EUR	Eurocurrency
FMaSE	Federal Micro and Small Enterprises agency
GDP	Gross Domestic Product
GII	Global Innovation Index
GPR	Government Policy and Regulation
HCI	High Cost of Innovation
ICT	Information Communication Technology
IT	Information Technology
IKED	International Organization for Knowledge Economy and Enterprises Development
IRD	Inadequate Research & Development
LC	Lack of Cooperation
LF	Lack of Finance
LSP	Lack of Skilled Personnel
LTMI	Lack of Technological and Market Information
MSEs	Micro and Small Enterprises
MoWUD	Ministry of Works and Urban Development
NBE	National Bank of Ethiopia
OC	Organizational Culture
OECD	Organization for Economic Cooperation and Development
SE	Size of Enterprise
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for Social Science
UNCTAD	United Nations Conference on Trade and Development
USPTO	United States Patent and Trademark Office
WDI	World Development Indicators
WEF	World Economic Forum

Definition of Terms

Definition of innovation adopted from OCED, 2005 manuals:

→ **Innovation** is the "implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations".

Innovation categorized into two: **technological** and **non technological**. Technological innovation includes *product* and *process* innovation.

→ **Product innovation** is the "introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses". This includes significant improvements in technical specifications, components and materials, incorporated software and other functional characteristics.

→ **Process innovation** is the "implementation of a new or significantly improved production or delivery method". It includes new or significantly improved methods for the creation and provision of services.

SMEs are defined for this study by adapting the definition given "Tire" 2003 E.C by Federal Micro and Small Enterprises agency (FMaSE)

→ **Small Enterprise**: "Those enterprises hired **6** up to **30** employees 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 of **more than 1.5** million birr and a total asset of more than Birr **500,000**".

Chapter One: Introduction

1.1. Background of the Study

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; and ICT use index(Dutta, 2011:50)(See appendix b, table 5 and 6)

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. Because, it helps to take actions, then the natural flow of SME's innovation will be re-established and maintained.

Thus, 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**.

1.2. Statement of the Problem

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)**.** Particularly, SMEs in developing countries are important socially and economically for wide dispersion across rural areas, employ a significant number of labor forces in their local economies, provide an opportunity for entrepreneurial and business skill development and so on. The ongoing globalization process also highlights the importance of innovation in all SMEs (O'Regan et al., 2006) as cited in Xie et al.,(2010). Thus, innovation is an area that has expanded dramatically in recent years. Particularly, technological innovation is vital to the competitive performance of enterprises and of nations, and for the sustained growth of the world economy. Technological innovation provides the most obvious means for generating revenues, safeguarding and improving quality & saving enterprises costs.

So, innovation uses as a bridge and link between technology and competitive advantage. It is the quest for competitive advantage that causes firms to invest in technological innovation. Studying the connection of SMEs technological innovation and factors adversely affecting innovation are important to make SMEs to increase innovativeness and competitiveness. In this regard, Roper (1997:146) pointed that "technological innovation is a key factor in SMEs competitiveness". Nevertheless, "technological innovation is not as such simple to achieve, especially for SMEs with little experience and resources" (Kaufmann and Todtling, 2002).

As cited in Xie et al.,(2010) "many failure stories of SMEs in technology innovation

reveal that there are various factors hindering their innovation process" (O'Regan et al., 2006). Although the phenomenon on innovation factors of SMEs has captured the interest of many scholars, less study focuses on the issue from the developing countries especially in Africa. Even though, in developing countries like Ethiopia, SMEs are important for number of reasons, their engagement on innovation is lower when compared to other developing countries. Based on standard innovation indicator (patent application, scientific and technological journal articles in 1999) Ethiopia stood low compared to Uganda, Tanzania, and Kenya (WDI,2004 and USPTO,2005) as cited in IKED(2006:16).

Ethiopia is located at the bottom in technology production and absorption in WEF rankings based on traditional innovation output indicators. Only Chad ranks lower with respect to its technological capacity. Hence, technology ranking is calculated, the low standing reflects three problems in Ethiopia: a very weak ICT infrastructure, a low capacity to absorb foreign technology and unfavorable perception in the private sector of the national innovation system (IKED, 2006). This indicates that a specific focus of Ethiopia national innovation culture is warranted for low innovativeness of SMEs and crucial barriers to innovation were preventing SMEs.

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, the lower focus initiates to conduct further investigation to describe factors obstacle SMEs engagement on technological innovation or expansion in Addis Ababa.

1.3. Research Questions

Pursuant to the empirical literature review the following research questions were proposed:

- Did your enterprises introduce technological innovation?
- What type of technological innovation do SME introduce?
- Why are not SME introducing and/or expand technological innovation?
- What is the effect of technological innovation barriers on SME industry level; and small and medium enterprises specific technological innovation?
- What are the major important barriers to technological innovation of SMEs industry and small and medium enterprises specific?
- What are the main technological innovation barriers (internal and external) for SMEs industry level?

1.4. Objective of the Study

1.4.1. 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.

1.4.2. 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

1.5. Significance of the Study

The study was significant because it is expected to provide knowledge on the factors negatively affecting technological innovations of SMEs, specifically it is useful to: help establish the factors that are consistent in the success of SMEs technological innovation, remind owners of those internal factors since these are directly controllable by the managers or owners of a SMEs, remind owners about those external factors uncontrollable by the managers or owners of a SMEs, help as a base for other researches to do research on the topic under study by filling the literature gap in the area and help the policy makers to assess factors hindering technological innovation of SMEs and to take corrective measure if it is mandatory. Importantly, it initiates the concerned organization to reassess its existing practices with a view to encourage technological innovation on SMEs.

1.6. Limitation of the Study

In addition to the common limitation such as time and resource constraints the study has the following limitation:

- Lack of up-to-date information about each sector of SMEs.
- Lack of cooperation to provide exact number of SMEs for each sub city by agency
- Absence of empirical evidence particularly in Ethiopian and African context
- All sectors were not included in the study since; some of enterprises do not fulfill or meet the adopted framework or definition of small and medium enterprise. Therefore, the study is not in a position to generalize to all sectors of small and medium enterprises function in Addis Ababa.

1.7. Scope of the Study

The unit of analysis for this study was owners and/or managers of SMEs who are currently actively engaged in the production and marketing of good or service from selected four sub cities in Addis Ababa. This research was a cross-sectional study, as this research problem, that is barriers to technological innovation, was studied at a given time (Saunders et al., 2007).

This study didn't compare and contrast the finding of different sub cities one with the other, since it's strongly believed that the sub cities are homogenous. Moreover, the study deals only factors adversely affecting SMEs technological (product and process) innovation with the exclusion of non technological (marketing and organizational) innovation. The study is only inclusive of sectors like construction work, garment and textile; and metal and woodwork of SMEs of selected four sub city of Addis Ababa and only comparison is made based on SMEs at industry level and specific size.

1.8. Organization of the Study or Paper

Generally the paper is organized into **five chapters**. The **first chapter** presents background which continued statement of the problem and continued with the research questions, objective of the study, significance of the study, limitation of the study, scope of the study and organization of the paper. The **second chapter** deals with the literature review and conceptual framework of the study. The **third chapter** is research methods, sample size and sampling methods, method of data collection, data quality assurance and etc. **The fourth chapter** handles data presentation, analysis and interpretation. The **fifth chapter** wind ups the paper by summary of major findings, conclusion and recommendation.

Chapter Two: 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. Hence, organization can achieve competitive advantage

through acts of innovation, and they can approach innovation in its broadest sense, including both new technologies and new ways of doing things (Porter, 1990).

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 Cloodt (2003) suggested that using multiple indicators to measure innovation has the double advantage and that a more comprehensive assessment of innovation performance is possible. Regard to this, there is many possible ways to measure innovation. In general, *input* measures involved with *expenditure on innovation* whereas *outputs* are considered to be at least one technically new or improved product or process from a firm. Two basic families of science and technology indicators are directly relevant to the measurement of innovation: resources devoted to R&D and patent statistics (OECD, 2005).

Traditionally, innovation has been perceived as the application of new technologies or application of formal R&D to produce new products or processes to acquire competitive advantage. In this context Tidd et al (2001:12) viewed innovation as a challenge to organizations; in essence unless organizations are prepared to renew their product and

process on a continuing basis, their survival chances are seriously threatened. Moreover, Hattori and Wycoff (2002:25) stated that, the challenge now is to live and thrive in the new world, where the call is for more innovation. As result, technological innovations has become one of the most attractive and promising areas of study in management and others even if, radically different methods of approach and absence of a commonly accepted and precise terminology. The increasing urgency for this area of study can be traced to a number of environmental developments, including globalization, increased competition, shortened product life cycles, products commoditization and rapidity in technological transfusion (Cardinal, 2001).

Traditionally, industrial economists break down the process of technological innovation into a sequence consisting of three phases: Invention (Bringing new technology to market), innovation (the adoption of invention to particular use to provide new solution to customers) and diffusion (imitation) (Barthwal, 2007, Mariano 2004:314-15). 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. Likewise, "technological innovation is the transformation of an idea into a new or improved saleable product or operational process in industry or commerce" (OECD, 1981). The minimum requirement for an innovation is that, the product, process, marketing or organizational method must be new (or significantly improved) to the firm. Innovation activities are all scientific, technological, organizational, financial and commercial steps

which actually, or are intended to, lead to the implementation of innovations. Some innovation activities are themselves innovative; others are not novel activities but are necessary for the implementation of innovations. A common feature of an innovation is that it must have been implemented (OECD, 2005).

2.1.1. Types of innovations

An enterprises can make many types of changes in its methods of work, its use of factors of production and the types of output that improve its productivity or commercial performance. Tidd et al (2005) argue that there are four types of innovation; consequently the innovator has four pathways to investigate when searching for good ideas: product innovation, process innovation, positioning innovation (repositioning the activities they delivered); and paradigm innovation (where major shifts in thinking cause change). On the other hand, four types of innovations are distinguished according OECD, (2005)*;* Jaramillo et al (2001:157-62): product innovations, process innovations, marketing innovations and organizational innovations. Accordingly each type of innovation is discussed as follows (OECD, 2005).

2.1.1.1. Product innovation: is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. It includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. New products are goods & services that differ significantly in their characteristics or intended uses from products previously produced by the firm. Product innovations related to goods includes: products with significantly reduced energy consumption, and significant changes in products to meet environmental standards and so on.

2.1.1.2. **Process innovation:** is the implementation of a new or significantly improved production and/or delivery method for the creation and provision of services. It includes significant changes in the equipment and/or in the procedures or techniques that are employed to deliver services. It intends to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. Production methods involve the techniques, equipment and software used to produce goods or services including installation of new or improved manufacturing technology, such as automation equipment, computerized equipment for quality control of production and improved testing equipment for monitoring production.

2.1.1.3. 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. It's aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, and finally intends to increase the firm's sales.

2.1.1.4. Organizational innovation: Is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. It intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction, reducing costs of supplies. In business practices, it involve the implementation of new methods for organizing routines and procedures for conduct of work, implementation of new practices to improve learning and knowledge sharing within the firm and other knowledge to make more easily accessible to others.

2.1.2. Distinguishing between product and process innovations

With respect to goods, the distinction between products and processes is clear. Regarding services, however, it may be less clear, as the production, and consumption services can occur at the same time. Some distinguishing guidelines are: if the innovation involves new or significantly improved *characteristics of the service offered* to customers, it is a product innovation, if the innovation involves new or significantly improved *methods, equipment* and/or *skills used* to perform the service, it is a process innovation and if the innovation involves significant improvements in both the characteristics of the service offered and in the methods, equipment and/or skills used to perform the service, it is both a product and a process innovation (OECD, 2005).

2.1.3. 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. As a result, various indicators are used to define them, for example, the number of employees, amount of capital, total amount of assets, sales volume and production capacity.

The commonly used criteria at the international level to define SMEs are the number of employees, total net assets, sales and investment level. While employment is the criterion to define, then there exists variation in defining the upper and lower size limit of SMEs. A SMEs has become the focus of attention for development stakeholders interested in market-oriented solutions to poverty and economic development. Hence, European

Commission defines SMEs as "enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million", subject to certain additional conditions regarding the ownership structure (EC, 2003a).

However, in Ethiopia SME defined as based on hired employee and total asset excluding buildings. The improved federal Micro and Small Enterprises development agency adapted a definition of enterprises taking into consideration number of hired employee's and total asset excluding buildings for industry and services sector and five year inflation rate and foreign exchange rate taking into consideration: **Small enterprise**: Those enterprises hired 6 up to 30 employee or total asset amount birr 100,000 -1.5 million birr for industry sector and 50,000-500,000 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 500,000. **(***Addis Ababa MSE's development agency bureau,* 2003 E.C *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. This is due to large enterprises are not registered under FMaSE agency up to now.

The Small and Medium-enterprises sector is the second largest employment-generating sector after the agriculture sector (Desta, 2002) as cited in Lishan (2006). So, the SME sector in Ethiopia provides employment and income opportunities for fairly a sizeable portion of the population. The overall contribution of the SMEs sector to the GDP was 3.4% in 1999 hence; no data were available about current SMEs contribution to the GDP as a matter of facts. Inline to this government also admitted SMEs role in achieving

economic growth with the establishment of Federal Agency for Micro and Small Enterprise development. SMEs development Strategy aims to integrate SMEs development into the national vision and economic development plans Lishan (2006). Additionally, government set overall SME strategy to create an enabling environment for the development & growth of the sector for facilitating economic growth & equitable development; to provide basis for medium and large scale enterprises; promote export; balance preferential treatment between SMEs and bigger enterprises (CSAE, 2004).

However, it isn't deal that a substantial number of Ethiopians make their living from incomes generated from SMEs, the sector suffers from a range of constraints. The following problems are pointed that hamper the growth of SMEs: lack of finance, weak entrepreneurial culture, poor product quality, shortage of raw material, underdeveloped markets, limited demand for goods, and poor access to infrastructure and technology (Lishan, 2006:22-25**)**.

Particularly, the five-year growth and transformation plan has given particular attention to the expansion and strengthening of micro and small enterprise. The sector is believed to be the major sources of employment and income generation for a wider group of society. The major objective of this program, which is creating and promoting MSEs in urban areas foresee to reduce urban unemployment rate. According to ministry of works and urban development (MoWUD), total populations of 176,543 MSEs were established in 2009/10 employing 666,192 people. The number of established and total employment created went up 141.6 and 25.6 percent, respectively, compared to a year ago. In 2008/9 73,062 MSEs is created 530,417 numbers of employments and in 2009/10 176,543 was 666,192 numbers of employments. Regarding regional distribution, about 48.6 percent of

total MSE's were located in Tigray, followed by Amhara (31.1%), Oromia (9%), Harari (5.4%) and **Addis Ababa (3.4%).** (NBE Annual report 2009/10:11-12**)**

The role of SMEs in the economic growth need not be over-emphasized and their vitality is clear to the health of the economy. Innovation activities observed in Ethiopia SMEs might grouped into two: Improvements to existing product or manufacturing of copied product with minor adjustments of new design copied from abroad or minor modification to production process or technological innovation. Thus, SMEs in Ethiopia their most activities are technological changes based on imitation with minor improvements. Regardless of the above, SMEs engaged in technological innovation are active in trying to adjust to changing demand condition by investing in skills and technology to go in line with change market needs.

Innovation and entrepreneurship hold the key to enhancing the role of SMEs in improving the Ethiopian economy and enables them to transform relatively fast to large enterprise. In this regard, the study of UNCTAD (2002) noted that technological innovation or change were economically important and enabled enterprises to remain competitive and profitable. And also SMEs under manufacturing sector is the most dynamic and innovative enterprise in the country. Even though, the government planning for relatively fast transformation of SMEs to large enterprises they are not going as perceived as preliminary observation and interview concerned. Progressive change in SME's will be possible if they adhere themselves with innovation as Mulu(2009*)* study has revealed positive effects on the firm growth, so it is interesting to find out why not all firms engaged in technological innovation activities.

2.1.4. Factors adversely influencing innovation

The identification of factors measuring and influencing firms' innovation is a popular topic in the empirical literature. As far as the factors influencing the innovation output are concerned, various factors have been identified in literature, of both internal and external nature. The research methodology followed to select these factors were a combination of literature analysis, preliminary observation and interview with a panel of experts.

Enterprises can engage in innovation for a number of reasons. Their objectives may involve products, markets, efficiency, quality or the ability to learn and to implement changes. Identifying enterprises' motives for innovating and their importance is of help in examining the forces that drive innovation activities, such as competition and opportunities for entering new markets or else. However, innovation activities can be hampered by a number of factors. A number of 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 (Mohen and Roller 2005; Baldwin and Lin, 2002).

There might be reasons for not starting innovation activities at all or there may be factors that slow such activities or affect them adversely. These include economic factors, such as lack of finance, high costs or lack of demand, factors specific to an enterprise, such as lack of skilled personnel or knowledge, and legal factors, such as regulations or tax rules. The ability of enterprises to appropriate the gains from their innovation activities also affects innovation. For example, enterprises are unable to protect their innovations from imitation by competitors; they will have less incentive to innovate. On the other hand, if an industry functions well without formal protection, promoting such protection can slow

the flow of knowledge and technology and lead to higher prices for goods and services (OCED**,** 2005). According to the Jaramillo et al., (2001) following **are identified as factors affecting innovation activities**:

1. **Economic**: excessive perceived risks; cost too high; lack of appropriate sources of finance; and pay-off period of innovation too long.
2. **Business**: insufficient innovation potential (R&D, design); shortage of skilled staff; lack of information on technology and on markets; innovation expenditure hard to control; resistance to change in the firm; deficiencies in the availability of external services; and lack of opportunities for co-operation.
3. **Other reasons**: lack of technological opportunity; lack of infrastructure; no need to innovate due to earlier innovations; weakness of property rights; legislation, norms, regulations, standards, taxation; and customers unresponsive to new technology.

2.2. 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.

2.2.1. Internal and External barriers

Barriers to innovation can be classified in different ways and different typologies e.g. origin, source. A useful classification of barriers is made by Piatier (1984); he classifies company's internal and external barriers. Hadjimanolis (2003) admits that external barriers have their origin in the surrounding environment and cannot be influenced. However, a company can influence internal ones.

Government policies and regulations, is a frequent source of barriers to innovation (Poll et al., 1999). He views barriers as a component of a national innovation climate in the country. Bureaucratic procedures, lack of properly settled national strategy, problems in policy communication and execution may cause abnormal external barriers for innovation process. Regarding internal barriers Klein (2002) has classified five barriers existing on '' individual'' or ''organizational'' level: ability barriers; knowledge barriers; functional barriers; intentional barriers and affective barriers. He pointed internal barriers have to be perceived to be more important than the external ones. They are easier to identify and deal with.

2.2.2. 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. Many of the major obstacles to innovations in developing countries are related to the institutional environment: government authorizations, procurement, technical norms and standards, competition, customs, industry university relations, finance and banking, intellectual and other property rights, without counting those obstacles of a more informal nature.

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. 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).

Following were the nine (lack of finance, high cost of innovation, lack of skilled personnel, inadequate R&D, size of enterprise, government policy and regulation, lack of cooperation, lack of technological and market information and organizational culture) were identified barriers for innovation from literature are discussed.

2.2.2.1. Lack of Finance

Extensive investigation is made on the literature studying the importance of external financial resources (Hewitt, 2006). Particularly, studies of SMEs consistently stress that the lack of finance is one of the most important constraint to innovation (Silva et al.,2007; Lim and Shyamala 2007). Some common results emerge from these studies. For instance, the lack of financial resources appears to be perceived as more important

by small firms than large firms while organizational factors are more relevant barriers for large enterprises than small (Baldwin and Lin 2002; Iammarino et al.,2007; D'Este et al.,2008). Similar to this, Tourigny and Le (2004) found that the lack of financial resources is likely to be perceived as an important hampering factor by SME as compared to large ones.

According to Hall (2002) financial problems are particularly acute in the case of innovation activities due to: innovation projects are riskier than physical investment projects and therefore outside investors require a risk premium for the financing of innovation activities. Secondly**,** because of problems of appropriability innovators are reluctant to share with outside investor's information about their innovations. This asymmetric information problem hampers the financing of innovation. Thirdly, the difficulty of using intangible assets as collaterals also leads to increased costs of external capital in the form of a risk premium. Some innovation projects may not be started, delayed or abandoned because of the risk of bankruptcy and the low value of intangibles in case of liquidation (Gomes et al., 2006).

2.2.2.2. High cost of innovation

The study made by Canepa and Stoneman (2008) find that cost of innovation was major important barriers to innovation. Similarly, Tourigny and Le (2004) found that the high cost of innovation is likely to be perceived as an important hampering factor by large firms as compared to small ones.

Similarly, the study of Aminreza et al.,(2011), Silva et al.,(2007), and Lim and Shyamala (2007) revealed that cost of innovation as restrain factors for innovation.

2.2.2.3. Lack of skill personnel

Actually, SMEs represent a major share in GDP of the country; however it is believed that many of these smaller organizations lack managerial and technical skills, which inhibit their effectiveness as well as competitiveness in new technology adoption and retention. Improving these skills within SMEs is therefore, very important, not only for the enterprises but for an economy as a whole (Jones & Tilley, 2003). Hence, once SME's equipped in skill they can play their part in development of technology in the country. The lack of technically qualified personnel has been found to affect negatively the ability to innovate by small firms with a sample of United Kingdom manufacturing (Galia and Legros (2004), Freel (2000)

Similarly, a study conducted by Vinnova (2007) among SMEs in Sweden enterprises in the metal manufacturing industry and by Tourigny and Le (2004) were majority of survey is SME on Canada were noted lack of skilled personnel as high impediments to develop or introduce new or significantly improved technological innovation.

2.2.2.4. Inadequate Research & Development

Usually, empirical evidence showed or used that, research and development as a proxy variable for innovation. Putting case that used as proxy, when it comes to R&D and innovation, assuming that the effort to innovate draws from the capacity that firms have to invest in R&D, and then this type of investment is expected to be more financially constrained than investment in physical capital. This results from the fact that R&D, in opposition to physical capital is not only harder to use as collateral (possible credit multiplier effects), but is also of a riskier nature and entails significant information asymmetry problems (Hall, 2002). In particular, these information asymmetries may be

further amplified if firms try to conceal their R&D projects, fearing any leak of information to competitors that could prove to be fatal in their attempt to innovate.

According to Griffith et al.,(2004) the two roles for R&D are those stimulating innovation and enabling to understand and imitate the discoveries which remain confidential by other originating firms. R&D therefore plays an important role for the development of an absorption capacity and is equal criteria for technology transfer and innovation. Cohen and Levin (1989) have provided a similar view about the importance of R&D in nurturing both learning and innovation.

Thus, without adequate knowledge, information and systematic analysis, by making R&D it is even harder to assess potentials and threats of the global business to the companies. In terms of R&D, it is mainly aimed at the needs of big enterprises, so there is often a lack of know-how about any latest and new emerging technologies including Internet in SMEs (Decker et al., 2006). Similarly, there is no data available on the level of expenditures on R&D in Ethiopia on private sectors and perception in the Ethiopian business community is very little spending on R&D taking place (IKED, 2006:14).

2.2.2.5. Size of Enterprise

A great deal of research has addressed the relationship between firm size and innovation (Schumpeter, 1942) and he argued that large firms are more innovative than small firms. According to the Schumpeterian arguments large firms are better placed to develop and exploit new technologies as a result of larger availability of resources, better appropriable conditions and greater ability to benefit from scale economies. Likewise, others noted that, larger firms are more likely to draw on an internal pool of financial and knowledge-related resources, as well as benefiting from scale advantages to spread the fixed costs of

innovation over a larger volume of sales as a result they get advantage (Acs and Audretsch, 1990).This makes larger firms less vulnerable to barriers to innovation (Cohen and Klepper, 1996). On the other hand, the empirical literature provides mixed results. It has been argued that small firms are better able to adapt rapidly to market changes and large firms tend to be more bureaucratic, which renders them resistant to change (Acs and Audretsch, 1990).

Alternatively, SMEs firms, assuming they hold more flexible structures, may be more innovative in their responses to changes in consumers' needs and environmental conditions (Rogers, 2004). There are studies that find a positive relationship between size and innovation (Cohen and Klepper, 1996), while others are unable to confirm this positive influence.

Cohen and Levin (1989) summarize several arguments for such an effect occurring: larger firms may have an advantage in securing finance for risky projects, and there may be scale economies in technology of R&D. Likely, study made to know the influence of firm size over degree of innovation in a service sector, indicate that firm size, measured by turnover, is related positively with degree of innovation(Daniel et al., 2001).

Likewise, significant differences were observed between small and medium-sized companies and between product and process innovators (Mary and Graeme, 2011). Scherer (1990) proved also that small firms tend to achieve high innovation rates in relation to size and also, R&D productivity tends to decrease with firm size.

On the other hand, Mulu (2009:11) finding revealed that size of the firm is positive & highly significant relation with firm innovativeness, hence large firms are more likely to participate in innovation activities due to resources advantage over smaller one.

2.2.2.6. Government policy and regulation

This part of the discussion dealt with the relation between government policy and regulation with SMEs technological innovation. The level of government support for innovation can be difficult to gauge especially since there is limited information on R&D activity and there may be a number of policy options (Scotchmer, 2004). The role of government is to encourage SMEs or companies in holistic manner to move to higher levels and gain competitive advantage in the globalize space environment through its many agencies, deploying several measures and platforms to assist SMEs (Samad, 2007).

Regarding government respect to public financial support, it has been shown to effectively reduce financial constraints of enterprises; it enhances innovation and stimulates R&D investment (Bloom et al., 2002; Bérubé and Mohnen, 2009). However, this may depend on the type of subsidy, since subsidies to different stages of the innovation process may either stimulate or replace R&D spending (Clausen, 2009).

2.2.2.7. Lack of Cooperation

It is becoming more and more difficult to maintain a competitive advantage through internal R&D because of the fast changing environment and the increase of knowledge dissemination and expansion via www. Nowadays large multinational companies are looking to generate knowledge externally through acquisitions, venture capital investments, collaborations or knowledge spillovers (Kang & Kang, 2009). More or less this is true for SMEs enterprise also.

Robson et al.,(2009) found that contacts with other firms, either locally or in export markets, appeared to stimulate innovation activity. Firms engage in collaboration in order to complement their internal resources and accordingly team up with partners who

control the relevant complementary resources required (Miotti and Sachwald, 2003).

The majority of innovation studies, however, found a positive effect of collaboration on innovation performance (De Man and Duysters, 2005). The same is convincing as mentioned by Tsai (2009) showed with certainty that cooperation influences innovation, financially constrained and rely even more on externally generated knowledge. Todtling et al.,(2009) showed importance of innovation, that advanced or radical innovations are drawn on new scientific knowledge, generated in universities and research organizations, while incremental innovations take place more in interaction with partners from the business sector and others.

2.2.2.8. Lack of technological and market information

Information is power to the enterprises. The presence of information technologies in organizations has expanded significantly to a point where there is no organization that can function without these tools. Besides, with this expansion, the success of every organization depends largely on how well it uses information technology to manage its information and knowledge resources (Cascio, 2001). Be it technological or market information is important to SMEs to cope up and to overcome different restrain factors.

According to Assefa (1997), small scale enterprises have difficulties in gaining access to appropriate technologies information on available techniques. Morikawa (2002) find a positive and statistically significant relationship between information technology and innovation for only small firms. However, ICT is a lower inhabiting factor on innovation of SME (Mohd and Syed, 2010).

Despite, the significant contribution that IT has made to business, many studies indicate that there are a large number of unsuccessful IT implementations in SMEs and that the

adoption rate is very slow (Acar et al., 2005; Shin, 2006) as cited in Ahmed et al.,(2010). In fact, the rate of adoption and utilization of IT by SMEs is slow but it is increasing with the passage of time as more and more SMEs are realizing the importance of IT.

Likewise, in our country, particularly for SMEs IT is at infant stage hence, enterprises innovation is less restrained by IT. So, IT variable is not compressively studied under this study to examine innovation barriers.

2.2.2.9. Organizational Culture

The culture of enterprises might have influence on the innovation performance of the firm. Tushman and O'Reilly (1997) pointed out those successful organizations have the capacity to absorb innovation into the organizational culture and management processes and that organizational culture lies at the heart of organizational innovation. On the other hand, Martins and Terblanche (2003) explain that, a culture supportive of creativity encourages members of enterprises to think innovative ways of representing problems and finding solutions. Besides, to stimulate innovative effort it is also important to include the following points: quantifiable goals based on organizational standards, innovation culture and programs, supported education and knowledge training and value teamwork and constructing incentives are important and have influence on the creativity of employees (Carneiro, 2008). Furthermore, Siguaw et al.,(2006) noted organizational culture as a division of operational competency shaped by the innovation orientation of the firm.

Importantly, small and medium enterprises have to meet certain requirements in terms of their internal behavior and their external relationships to innovate and adopt technological progress successfully (Tylecote, 1996).

2.2.3. 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, ICT 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 **(**Concepcio´n 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 EDRI 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.

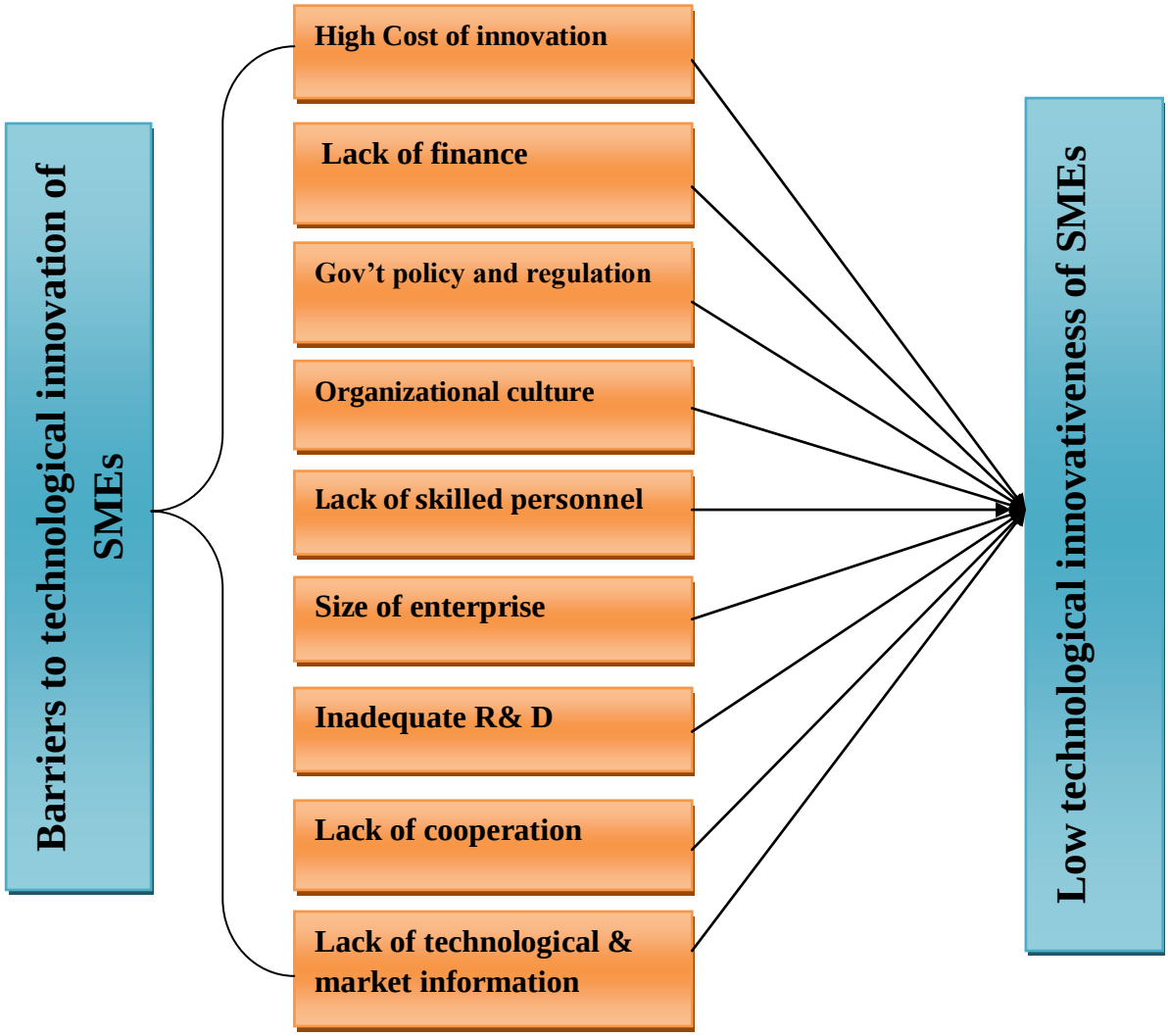
The survey study result on SME's between **Addis Ababa** and the town of **Nazareth** on 27 Small, 35 Medium and 9 large-scale enterprises revealed that manufacturing product with slight modification on production process shows 44% (12 out of 27) small and 51% (18 out of 35) medium scale enterprises 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 (UNCTAD, 2002:95-99)**.** 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.

2.3. 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



Following this chapter the research methodology was developed and discussed briefly.

Chapter Three: Research Methodology

This chapter deals with the research methods, materials and procedures; sample size and sampling methods; method of data collection, sources and research instruments; description of variables, data quality assurance; and method of data analysis.

3.1. Research Methods, Materials and Procedures

3.1.1. Study area and subject

The study is conducted within the periphery of Addis Ababa in four selected sub cities (**Akaki**, **Bole**, **Kirkose**, and **Yeka**) on Small and Medium Enterprises.

3.1.2. Research design

Both qualitative and quantitative approach was designed to investigate the problem under study. Employing mixed approach used to neutralize the biases of applying any of a single approach (Creswell, 2003). The data gathered by using likert scale from managers and/or owners was analyzed by using quantitative methods, on the other hand, data gathered from official of sub cities through interview was analyzed qualitatively to cross check the finding. The purpose of this thesis was to describe factors adversely affecting SMEs technological innovation and helps to better understand and clarify a problem.

This study was a cross-sectional, the selected approach was based on research problem and research question, were the research problem is basically focused on barriers to technological innovation which must be studied at a given time (Saunders et al., 2007). A cross sectional study was chosen, first due to time restrictions that is the possibility to conduct longitudinal studies, when collecting primary data, are difficult. Secondly, a

cross-sectional study is a suitable alternative when conducting a survey (Saunders et al., 2007; Zikmund, 2000).

3.1.3. Research participants

Information gathered from the firm or enterprises provides the opportunity to assess the perceptions of enterprise owners or managers toward barriers to technological innovation. To finalize the research, data was collected from each owners and/or managers of SME firms' from four selected sub city in Addis Ababa. The reasons for owners and/or managers of each SME were chosen as suitable candidates for the questionnaire was the owners or managers make most of the decisions with regard to the SMEs. Moreover, the questionnaires were distributed among the managers, because previous studies reported that managers' perception significantly impacted enterprises innovation climate (Storey, 2000; Lefebvre et al, 1997) as cited in Aminreza et al.,(2011).

In addition to data gathered by using survey from owners and/or managers, interview was conducted with four people working in facilitating manufacturing and construction sectors work from the selected sub cities (officials from each sub city).

3.2. Sample Size and Sampling Methods

Top four sub cities small and medium enterprises are selected out of ten sub cities from Addis Ababa based on their number of enterprises comprise to represent the total population of SMEs in Addis Ababa. The sampling frame was stratified by size and sector. Briefly, stratification across sectors was made based on the intensity of the sector activities such as **Construction work, Metal and Woodwork and Textile and Garment**.

3.2.1. Sample size determination

The following formula developed by **Watson Jeff (2001),** was applied to determine appropriate sample of population for the study:

$$n = \frac{\frac{P(1-P)}{\frac{A^2}{Z^2} + \frac{P(1-P)}{N}}}{R} \quad n = \frac{\frac{0.5(1-05)}{\frac{(0.05)^2}{(1.96)^2} + \frac{0.5(1-0.5)}{405}}}{0.95} \quad n = \frac{197.316}{0.95} \quad n = 207_{\text{SME}}$$

Where: n= Sample size required

***N=Number of people in the population (total population) =405* SME**

P=Estimated variance in population, as decimal (0.5 for 50-50 or unknown)

A=Precision desired (5%)

Z= Z-values,* most researchers use *based* on the 95% confidence level *(1.96 → 95%)

R=Estimated response rate, as decimal (95% →0.95)

As per the above computation, out of the total **405** SMEs population, **207** were selected as a sample size. The total populations was **405,** that is **322** for small and **83** for medium enterprises, respectively, for selected four sub cities of Addis Ababa **(Addis Ababa MSE agency report, 2003 E.C)**. All sample frames were insereted to computer by assigning serial number for each enterprise in the frame. Finally, SMEs from Addis Ababa four sub cities are **randomly selected** in line with their sectors to fill the questionnaires.

Then questionnaire was distributed to all 207 owners or managers of SMEs. However, 152 valid responses (73%) response rate was obtained. Out of the total **152** response rate **112** was collected from the owners or managers of small enterprise; whereas **40** questionnaires was collected from the owner or manager of medium enterprises. From the 112 small enterprise, 40 question was obtained from construction sectors, while 11 from garment and textile sector and the rest 61 questionnaire was from metal and woodwork. On the other hand, out of **40** questionnaires gathered from medium

enterprises **16** were from construction sector, where as **4** were collected from garment and textile and **20** questionnaire was gathered from metal and woodwork.

3.3. Method of Data Collection, Sources and Research Instruments

Survey method was used to collect information from managers or owners of SME four selected Addis Ababa sub city. The study was both, primary data was gathered by using questionnaire and interview was made to support data gathered by using survey, and Journal, articles, books and agency reports was used as secondary sources for the study. The primary data is collected using interview and open & close ended questionnaires and this was personally administered. Basically the likert type questionnaire was developed by adopting the Canada innovation survey of 2005**.**

Then questionnaire was translated into Amharic considering the level of understanding of unit of analysis. While translation is made necessary check was made by those professional in the area. Then questionnaire was distributed to **207** SMEs from selected sub cities in Addis Ababa. Semi-structured interview was conducted with four manufacturing and construction sector facilitators from SMEs in selected sub cities in 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. The scaling was taken **from Canada innovation survey 2005.** SMEs manager or owner were asked to give their opinion regarding enterprises technological innovation barriers using a four valued scale ranging from high importance medium to low importance and not

relevant. Hence, likert question was asked positively to SMEs managers or owners on the scale.

3.3.1. Choice of the survey approach

According to OECD (2005) there are two approaches for collecting data on innovations: the "**subject**" approach start from the innovative behavior and activities of the firm. The approach deals the 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. The other one is the **"object**" approach involves the collection of data about specific innovations (a "significant innovation" of some kind or a firm's main innovation). For this study the "**subject approach**" was used to collect the needed data.

3.4. Description of Variables

The study attempts to investigate the relationship between factors negatively affecting innovation and SMEs technological innovation. Besides, the *independent variables*, that includes internal and external factors affecting (barriers to) innovation are studied using **(**as many studies reveal) high cost of innovation (HCI), lack of availability of finance(LF), government policy and regulation(GPR), organizational culture(OC), lack of skilled personnel(LSP), Size of enterprise(SE), Inadequate R&D(IRD), Lack of cooperation(LC), and lack of technological and market information(LTMI) and the *dependent variable* are "technological innovativeness" of SMEs. Each variable is measured using information collected through appropriately designed questionnaires and by interview made with officials of sub cities of Addis Ababa.

3.5. Data Quality Assurance

To make sure whether collected data are correct, the necessary activities, including using appropriate instructions and instruments by reviewing previous works on the same area.

3.5.1. Reliability Analysis

Reliability was tested using the Cronbach coefficient alpha, using **15** SMEs managers or owners pilot test, to pre test on the designed questionnaires. According to the stability coefficient' ***Cronbach's Alpha'***, if the coefficient is < 0.60, the consistency and internal stability is considered weak, if the coefficient **≥** 0.60 **≤** 0.80, it is considered **accepted**, if the coefficient is varies between **(0.80 - 0.85)**, it is **good** and if coefficient is **≥ 0.85 to 1**, it is considered **excellent**. So, if the coefficient is **> 0.70**, this means **high credibility** in the answers of the investigated subjects (Sekaran, 1992:173-287) as cited in Sayed (2011).

Table 3.1: Reliability analysis for each variable

Question About	Sub items	No of items	Value of Alpha coefficient		Value of credibility Coefficient= √Alpha
LSP Variable	**50-54**	**5**	**.88**		**.93**
HCI Variable	**32-38**	**7**	**.85**	**Excellent**	**.92**
OC Variable	**39-46**	**8**	**.88**		**.93**
LTMI Variable	**21-27**	**7**	**.83**		**.91**
LC Variable	**60-64**	**5**	**.84**	**Good**	**.91**
GPR Variable	**11-20**	**10**	**.84**		**.92**
SE Variable	**47-49**	**3**	**.72**		**.85**
IRD Variable	**28-31**	**4**	**.64**	**Accepted**	**.80**
LF Variable	**55-59**	**5**	**.61**		**.76**
Total		**54**			

Sources: SPSS result, 2012

3.6. Method of Data Analysis

To analyze the findings descriptive and inferential statistics like percentage, mean, mode, tables and figures presentation, and also correlation analysis was applied by using latest available version of SPSS 19 package program used to analyze the results of the questionnaires.

Chapter Four: Data Presentation, Analysis and Discussion

4.1. Introduction

The study is intended to describe factors negatively affecting (barriers) for SME technological innovation by taking four sub cities in Addis Ababa. The previous chapter was dealt with a detailed methodology, which shows the research methods, materials and procedures, method of data collection and analysis. Whereas, this chapter present the analysis and discussion of data collected through survey method.

The result of survey study was analyzed using SPSS version 19, by using descriptive and inferential statistics like frequency, percentage, and mean, mode, cross tabulation, and correlation analysis. Four likert scale was used to gather data, that is importance of barrier for SME's technological innovation expressed as Not relevant (experienced) - **0**, Low-**1**, Medium-**2**, & High- importance-**3**. Then the two lift side (not experienced and low importance) and right side scales (medium and high degree of importance) are summed together to indicate whether the barrier are important or not for SMEs technology innovation. At last, if most respondent responded to lift side, just the factor is important barriers for SME technological innovation otherwise; the factor is not important barrier for SMEs technological innovation.

The analysis and discussion part were organized as follows: section 4.1 presents introduction, where as demographic profile of respondents were presented in section 4.2, and followed by cross tabulation of enterprise sector and technological innovation performance with enterprises scale in section 4.3, section 4.4 presents barriers of technological innovation in SMEs industry and comparative effect on small & medium enterprises specific technological innovation, section 4.5 deals with ranking of

technological innovation barriers in SMEs industry, were as section 4.6 is ranking of internal & external technological innovation barriers of SMEs industry, and followed by a correlation analysis in section 4.7 and the final 4.8 section summarize the chapter.

4.2. Demographic Profile of Respondents

Enterprises were classified based on small and medium in line with the framework give by federal micro and small enterprises (MSEs). Further, SMEs are classified into three sectors: construction work, garment & textile work and metal & woodwork. Finally, from 207 distributed questionnaires, 152 usable questionnaires were obtained (73% response rate).

Table 4.2: General background information of SME Managers and/or Owners

Variables	Classification of variables	Frequency	Percentage
Gender	Male	128	84.2
	Female	24	15.8
Education background	Primary School	3	2
	Secondary School	57	37.5
	Diploma & Degree	88	57.9
	Masters & Above	4	2.6
Position in the enterprise	Managers	74	48.7
	Owners	78	51.3
Enterprise established as	Sole Ownership	76	50
	Partnership	24	15.8
	Co-operative	52	34.2
Enterprise scale you are engaged	Small	112	73.7
	Medium	40	26.3
Enterprise sector you are engaged	Construction work	56	36.8
	Garment &Textile	15	9.9
	Metal & Woodwork	81	53.3
Year of enterprise operated	0-2 Years	27	17.8
	3-5 Years	55	36.2
	5-7 Years	60	39.5
	Above 7 Years	10	6.6

Source: Survey result, 2012

SMEs managers or owners were asked their sex, education, position, form of enterprise, enterprise scale, enterprise sector and year of operation. As it is shown, on table 4.2, in

terms of sex of respondents, 84.2% were males while the rest15.8% were females, where as 2% were primary education, 37.5% were secondary school, 57.9% diploma and degree and 2.6% masters and above education background. Concerning the position of respondents in the enterprise 48.7% are managers and the rest 51.3% are owners, were as enterprise established as sole ownership, partnership & cooperative are 50%, 15.8% & 34.2%, respectively. Regarding enterprise included on the study 73.7% are small and 26.3% are medium. On the other hand, enterprises are engaged on construction, garment & textile & metal & woodwork sectors 36.8%, 9.9% and 53.3%, respectively. Regarding year of operation, enterprises between 0-2 years are 17.8%, between 3-5 years are 36.2% and 39.5% are between 5-7 years. Generally the majority of the respondents considered on study are sole owned small scale enterprise with 5 up to 7 years of operation within metal & woodwork sector.

Accordingly, data was collected from those small and medium enterprise manager or owners to investigate barriers to SMEs industry in general and for small and medium enterprises in particular. In addition interview was conducted with sub cities construction & manufacturing process leaders. Hence, the next section deals about the result obtained from the survey.

4.3. Cross tabulation between Enterprises Scale with Enterprises Sectors and Technological Innovation Performance

The cross tabulation was made between enterprises scale with enterprises sector, scale with their innovation performance, scale with the type of innovation they introduced and finally enterprise scale with reasons, why they didn't introduced or expand innovation.

The results obtained from respondent regarding this issue were presented in the table 4.3.

Table 4.3: Cross tabulation between enterprises scale with enterprises sector and technological innovation performance

		Small			Medium			SME's industry		
		No	Yes	Total	No	Yes	Total	No	Yes	Total
Sector	Construction work	30	10	40	9	7	16	39	17	56
	Garment and Textile	8	3	11	0	4	4	8	7	15
	Metal &woodwork	40	21	61	7	13	20	47	34	81
Total		78	34	112	16	24	40	94	58	152
		Small			Medium			SME's industry		
		Count		%	Count		%	Count		%
Enterprise introduce Innovation	Yes	34		22.3	24		15.7	58		38.1
	No	78		51.3	16		10.5	94		61.8
Total		112		73.6	40		26.3	152		100
If"**YES**" what" type of innovation	Product innovation	12		20.7	9		15.5	21		36.2
	Process innovation	11		19	5		8.6	16		27.6
	Both innovation	11		19	10		17.2	21		36.2
Total		34		58.7	24		41.3	58		100
If **"NO"** reason for not introducing or expanding	Market condition	3		1.9	1		0.6	4		2.6
	Factors constraining	102		67.1	31		20.4	133		87.5
	Due to both reason	7		4.6	8		5.2	15		9.8
Total		112		73.6	40		26.3	152		100

Source: Survey result, 2012

As it is presented on the above table 4.3, respondents were asked sectors they engaged, level of innovation performance, type of technological innovation they introduced, and reason why they didn't introducing or expanding technological innovation in relation to their enterprises scale.

As the table 4.3 shows, small enterprise involved on the study are 112(73.7%), while the remaining are medium enterprises which is 40(26.3%) of sampled enterprises. This

indicates the line share of the SMEs industry taken by those small enterprises and so they aren't fairly supposed to growth or changed to medium enterprises fastly.

As depicted on table 4.3, out of those enterprise engaged on construction sector (56), the small enterprises and medium enterprises account 40 and 16, respectively. Regarding their innovation performance, 30 small enterprises were not introduced innovation, but 10 of them are introducing innovation. Regarding medium enterprise, out of 16 SMEs engaged on construction sectors 9 were not engaged on innovation however, 7 of them are engaged on technological innovation.

From total garment and textile sectors included and returned for the study (15), 11 were small enterprise and 4 were medium enterprises, and out of 11 small enterprises 8 were not introduced innovation and of 4 medium enterprises all of them are engaged on technological innovation.

From total metal and woodwork sectors considered and returned for the study (81), 61 were small and 20 were medium enterprises. Out of 61 small enterprises 40 of them are not introducing innovation and 21 of them are innovator. On the other hand, 13 of medium enterprises engaged on metal and woodwork enterprise were introducing innovation and remaining 7 weren’t introducing technological innovation.

Medium enterprises are better engagement on the innovation of new technology from that of small enterprises, and also garment and textile, and metal & woodwork sectors are better engagement in technological innovation unlike construction sectors. Engaging in construction sectors has factor negatively affecting enterprises technological innovation. This is due to construction sectors are trying & devoting time and resources

for delivering the order of the government for the construction of condos houses. This resulted them low engagement on technological innovation.

Out of those 58(38.1%) enterprises introduced technological innovation; 34(58.7%) and 24 (41.3%) are small and medium enterprises, respectively. Likewise, of those small enterprises introduced technological innovation 34**(**58.7%**);** the type of technology introduced was product innovation, process innovation and both product and process innovation which accounts for 12(20.7%), 11(19%) and 11(19%), respectively. Of those medium enterprises introduced technological innovation 24(41.3%) the type of technology they innovate is product innovation, process innovation and both product and process innovation are 9(15.5%), 5(8.6%), and 10(17.2%), respectively.

In contrast, out of those enterprises so far didn't introduce technological innovation 94(61.8%) enterprises; 78(51.3%) & 16(10.5%) are small and medium enterprises, respectively. Of those small enterprises didn't introduced or introduced innovation 112(73.6%), the reason was due to market condition, factors constraining innovation, and both market & innovation constraining factors are 3(1.9%), 102(67.1%), and 7(4.6%), respectively. Of those medium enterprises didn't introduced or introduced innovation 40(26.3%); the reason was due to market condition, factors constraining innovation, and both market & factors constraining innovation are 1(0.6%), 31(20.4%) and 8(5.2%), respectively. Moreover, an interview script taken from the respondents indicated that, the working environment (place of work) isn't suitable to perform such activities, and lack of raw materials for innovation. Likewise, they stated that lack of market for innovated products is another impediment to engage on innovation, as a result enterprises capital is tied up for long time with new developed or improve technology, no market integration

for innovative output and lower acceptance of society on innovation made in the country is another impediment for the SMEs to engage in technological innovation.

This finding is consistent with Aminreza et al.,(2011) that indicated, the main reason why enterprises didn't innovate are due to factor constraining and the market condition.

Hence, innovation is the result of collected efforts made by individuals and organization, because it's process by which innovators are passing with struggles and trial and error to develop and make real the intangible thing. Thus, the efforts to introduce or expand innovation were affected by positive or negative factors. Those positive factors encourage the enhancement of engagement in the area, whereas negative factors are hindering enterprises engagement on such activities. SMEs in Addis Ababa are also restrained by factor, which discourage the attempt to engage on technological innovation.

4.4. Barriers to SMEs Industry and Specific Technological Innovation

A barrier to innovation was studied by various researchers to establish linkage and attempt to show that the barrier to innovation causes a great impact on the performance of small and medium enterprises. For example, Silva et al.,(2007) and Lim and Shyamala (2007) noted that high cost of innovation, lack of finance, high economic risk, organizational rigidities, lack of skilled personnel, lack of information about technology and market, lack of customer responsiveness and government regulations were considered as important obstacles to innovation in SMEs. In similar way, the following section deals with, presentation and discussion of survey finding on barriers to technological innovation regarding the nine variables considered in the study.

4.4.1. Government Policy and Regulation

Firms who operate in a country always regulated under the government of that country, which is why government policy and regulation is considered in this study as a factor for the introduction or expansion of technological innovation in SMEs. Government policy can be seen in two dimensions for the firms to engage in technological innovation (i.e it can encourage them to rely on innovation or it can discourage them to innovate new technology). According to Samad (2007) government policy encourage SMEs to move to higher levels and gain competitive advantage. In contrary, the study of Lim and Shyamala (2007) identified as an inhibiting factor. Moreover, the result obtained from the respondents regarding government policy and regulations were shown on table 4.4, as follows:

Table 4.4: The effect of government policy and regulation on SMEs industry and Small and Medium enterprises specific technological innovation

		SMEs Industry(n=152)							Small (n=112)	Medium (n=40)
		NE	L	M	H	Total	Mean	Mode	Mean	Mean
Q11	**Fr.**	2	34	74	42	152	2.0263	2	**2.0179**	**2.0500**
Q12	**Fr.**	12	30	**47**	**63**	152	2.0592	2	**1.9643**	**2.3250**
Q13	**Fr.**	34	67	39	12	152	1.1908	1	**1.1161**	**1.4000**
Q14	**Fr.**	58	47	33	14	152	1.0197	0	**0.9911**	**1.1000**
Q15	**Fr.**	48	55	31	18	152	1.1250	1	**1.0893**	**1.2250**
Q16	**Fr.**	20	54	48	30	152	1.5789	1	**1.5089**	**1.7750**
Q17	**Fr.**	36	67	33	16	152	1.1908	1	**1.0982**	**1.4500**
Q18	**Fr.**	42	63	40	7	152	1.0789	1	**0.9911**	**1.3250**
Q19	**Fr.**	62	48	32	10	152	0.9342	0	**0.8304**	**1.2250**
Q20	**Fr.**	30	73	33	16	152	1.2303	1	**1.1250**	**1.5250**
Grand							1.3434		**1.2732**	**1.5400**

Source: Survey 2012 NE- (Not Experienced) - 0, L- (Low) - 1, M- (Medium) - 2, H - (High)-3

Information reported on the above table was interpreted or scrutinize in the following way. The computation is made regarding scales of the response by categorizing into two sides: **not important** and **important** barriers to technological innovation. The responses given on the scale like "**0**" and "**1**" fall to factors as important barriers for SME technological innovation on other hand response given "**2**" and "**3**" on the scale fall to not important barriers to SME's technological innovation. The mean value is used thus, total responses is divided to total observation then the responses of each question might be between **0** and **3**.The mean value between **0** and < **1.5** are "**important barriers**" and mean value between ≥**1.5** and ≤ **3** are "**not important barrier**" for SMEs technological innovation.

4.4.1.1. Effect of government policy and regulation on SMEs industry level technological innovation

Table 4.4, reveals that respondents' response regarding government policy and regulation whether it's barrier to industry level technological innovation or not. Accordingly, government policy and regulation is obstacle for SME's industry technology innovations were the grand mean value is 1.3434. Moreover, low patent protection (Q13), absence of government R&D funding (Q14), low financial regulation assurance (Q15), low support for doing & expanding innovation (Q17), low access & usage of government loan (Q18), no modification of tax system to encourage innovators (Q19) and unequal support for all enterprise(Q20) are important barriers which hinder SME's technological innovation 101(1.1908), 105(1.0197), 103(1.1250), 103(1.1908), 106(1.0789), 140(0.9342) and 103(1.2303), respectively.

However, fair government strategy(Q11), fair government policy(Q12) and fairly sharing new technologies experience with help of government (Q16) are not important barriers for SME's industry technological innovation 116(2.0263), 110(2.0592) and 78 (1.5789), respectively. Moreover, interview script showed that government policy and regulation aren't attractive as such: it lacks consistency in which regulation and strategies are changed from time to time, absence of government R&D funding which help enterprises innovation activities, absence of regulatory measure to encourage innovators, inadequate effort by government to transfer technological know-how, absence of modification of tax system to promote innovation are important obstacles for SMEs innovation. However, regarding the policy they agreed as hopeful because enterprise are encouraged by government policy to engaged on innovation despite, weak patent protection for innovators, and equal support is given for SMEs in line with their scale operate, even though owners or managers response weren't consistent.

4.4.1.2. Government policy and regulation and its comparative effect on small and medium enterprises technological innovation

Small and medium enterprise owners and/or managers were asked whether government policy and regulation is taken as barriers for technological innovation or not. The extent by which government policy and regulation affects technological innovation of small and medium enterprises were compared based on the mean value obtained from the survey response, as described on table 4.4, and the grand mean value for small enterprises is 1.2732. This result shows that, the large number of small enterprises agreed that government policy and regulation is an important barrier to technological innovation. However, the result shown in table 4.4, indicated that government policy and regulation

didn’t considered as such important obstacles for medium enterprises to engage in technological innovation were the mean value is 1.5400. Government policy and regulation are important barriers for small enterprises technological innovation unlike for medium enterprises technological innovation. This is a result of current policy and regulation seem what suitable and encourage them through different support than small.

Hence, government policy and regulation is an important barrier for SMEs industry and small specific technological innovation. In line with this result, Silva et al.,(2007) and Lim and Shyamala (2007) noted that a government regulation is important barriers to innovation. Similarly, government policies and regulations, is a frequent source of barriers to innovation (Poll et al., 1999) and this supported by uncertainty about government policy, and also became a significant barrier to innovation. For organization government policy and regulation has positive and negative effect on firm performance. This is the fact that every organization is governed under the umbrella of state government policy and regulation. As a result, enterprises innovation performance might be also encouraged or discouraged by policy and regulation of countries government. Having this in mind, SMEs by very nature has a number of problems as a result of size and capability and others factors to engage on technological innovation.

SMEs will engage on innovation for different reasons, may be for maintaining market share & existing customer or else. To do so, their ownership for newly developed technology should be maintained; otherwise they are de motivated to engage on such activities. As far as SMEs engine for the development of industry in the country, if they unable to get needed support (especially small enterprises) will remain them to not play their role in the development of new technologies in the country.

4.4.2. Lack of Technological and Market Information

The other factors considered as barriers for SMEs to engage in technological innovation in this study were, technological and market information. Regarding this issue result obtained from survey were presented in the following table 4.5.

Table 4.5: Effect of lack of technological and market information on SMEs industry level and enterprises specific technological innovation

		SMEs Industry(n=152)							Small (n=112)	Medium(n=40)
		NE	**L**	**M**	**H**	**Total**	**Mean**	**Mode**	**Mean**	**Mean**
Q21	**Fr.**	10	70	62	10	152	**1.4737**	1	**1.3839**	**1.7250**
Q22	**Fr.**	21	70	45	16	152	**1.3684**	1	**1.2946**	**1.5750**
Q23	**Fr.**	60	59	28	5	152	**0.8553**	0	**0.7857**	**1.0500**
Q24	**Fr.**	61	50	31	10	152	**0.9342**	0	**0.8393**	**1.2000**
Q25	**Fr.**	28	53	59	12	152	**1.3618**	2	**1.3304**	**1.4500**
Q26	**Fr.**	19	88	38	7	152	**1.2171**	1	**1.0982**	**1.5500**
Q27	**Fr.**	18	48	65	21	152	**1.5855**	2	**1.4821**	**1.8750**
Grand							**1.2565**		**1.1734**	**1.4892**

Source: Survey, 2012 NE (Not Experienced) – 0-L (Low) - 1, M (Medium)- 2, H(High)–3

4.4.2.1. Effect of lack of technological and market information on SME's industry level technological innovation

As shown above on the table 4.5, the grand mean value for lack of technological & market information is 1.2565 implies that it's an important obstacle to SMEs technological innovation. Likewise, low access & utilization of new technological information (Q21), low access & utilization of new technological materials (Q22), lack of technological transfer institution (Q23), no access & usage of internet service (Q24);

inadequate knowledge of market & their demand(Q25) & low effort for serving new markets (Q26) are important barriers to SME's technological innovation 80or1.4737, 91or1.3684, 119or0.8553, 111or0.9340, 81or1.3618 & 107or1.2171, respectively as indicated on table 4.5. However, SMEs participation in conference and exhibition (Q27) is not important barriers to SMEs industry innovation 86 (1.5855). Interview scripts admit information is important and base for making technology innovation. However, SMEs lack important technological information. This is a result of enterprises are not in a position to update themselves by reading new scientific journals and other and absence of the internet service around working place aggravate the problem. Likewise, SMEs has problem on marketing information. Thus, SMEs industry introducing technological innovation particularly product innovation without having information about the market, whether the product is needed by customers or not and price for innovated product is set without analyzing the market condition.

4.4.2.2. Lack of technological and market information and its comparative effect on Small and medium enterprises technological innovation

According to the survey shown on the above table 4.5, some of the factors considered under lack of technological and market information are barrier for small and medium enterprises specific technological innovation in a similar way, while the other factors affects in a different way. However, the grand mean values for small and medium enterprises are 1.1734 and 1.4892, respectively. This indicates that both small and medium enterprises technological innovation are obstacle by lack of technological and market information. Moreover, lack of available technological transfer institution (Q23), lack of internet access and usage for innovation (Q24), and lack of important knowhow

about markets and their demand to innovation (Q25) are important impediments both for small and medium enterprises to introduce innovation as indicated above on table 4.5.

However, factors like lack of access & utilization of up to date technological information and materials, lack of finding new technological market to serve existing clients, and low participation in conferences & exhibitions to share technological innovation information are considered as important barrier for small enterprises whereas, this factors are didn't taken as restrain factors for medium enterprises to engage in technological innovation. Interview script from respondents, support survey finding from owner or manager that is factors (participation in conference and exhibition and fairly access on information related to technological and materials) didn't affect medium enterprises, because medium enterprises owners have an opportunity to participate on different experience sharing forum that is mainly organized by the government.

Both industry and specific small (Morikawa, 2002) and medium enterprises technological innovation is obstacle by lack of technological and market information. Information about technology and markets can underpin the importance and potential advantage of becoming more innovative (Galia and Legros, 2004). Finding is similar with Jaramillo et al., (2001) and Silva et al., (2007) which identified as barrier for innovation. In addition Asseffa (1997) confirmed that a problem of information on private sectors even if information is power to every organizations or enterprises. Be it technological or market information is important for SMEs to cope up in this dynamic environment and to overcome competitive restrain factors. Information technology is crucial because it is the means to develop or modify technological innovation. However, if SMEs had a shortage in this regard like access of new technological findings from electronic and print journals,

technological materials, technology transfer institution it's difficult to SMEs to engage on new technology introduction or expansion. Information regarding market or customer needs also a problem for SMEs, hence limited knowledge about users demand with regard to technological innovation might not be effective after they developed or improved new technology as a result those new or significantly improved technologies hasn't needed by markets or potential users. Moreover, to imitate or radically introduce technological innovation, the access for and utilization of up-to-date information and materials are critical for enterprises otherwise; their new technological innovation role is restrained.

4.4.3. Inadequate Research and Development

Research and development (R & D) usually used as a proxy variables for measuring innovation performance in many empirical studies. This study also consider as one of the factor which can affect technological innovation in SMEs. Table 4.6 deals with the effect of inadequate R&D on SMEs industry as a whole and particularly in small and medium enterprises as follows.

Table 4.6: Inadequate Research and Development effect on SME's industry, and Small and Medium enterprises specific technological innovation

		SMEs Industry (n=152)							Small (n=112)		Medium(n=40)	
		NE	L	M	H	Total	Mean	Mode	Mean	Mode	Mean	Mode
Q28	**Fr.**	60	58	29	5	152	0.8618	0	**0.7500**	**0**	**1.1750**	**1**
Q29	**Fr.**	57	44	32	19	152	1.0855	0	**0.9107**	**0**	**1.5750**	**2**
Q30	**Fr.**	12	46	74	20	152	1.6711	2	**1.6250**	**2**	**1.8000**	**2**
Q31	**Fr.**	70	50	20	12	152	0.8289	0	**0.7143**	**0**	**1.1500**	**1**
Grand							**1.1118**		**1.000**		**1.4250**	

Source: Survey 2012 **NE (Not Experienced) - 0, L (Low) - 1, M (Medium) - 2, H (High) – 3**

4.4.3.1. Effect of inadequate R&D on SME's industry technological innovation

Table 4.6, reveals that managers or owners response regarding whether inadequate R & D is important barriers for SMEs technological innovation or not. As it is depicted above on table 4.6, the grand mean value for inadequate R & D is 1.1118 shows that, inadequate R&D is important barriers to SMEs industry level technological innovation. However, (Q30) even if enterprises fairly believe R&D, enables to innovate SMEs (1.6711), despite they are unable to have organized R&D office & equipped staffs (Q28), no engagement on R&D (Q29) & absence to use new finding of R&D of private organization (Q31) are important barriers to SMEs industry technological innovation 118 (0.8618), 101(1.0855) and 120 (0.8289), respectively. Moreover, the interview result also ensured that SME's has not engaged in such activity so far. This is as a result of cost to conduct research and development; and lack of equipped staff to do is the main reasons to SMEs as pointed.

4.4.3.2. Inadequate R&D and its comparative effect on Small and Medium enterprises technological innovation

The result obtained from the survey on table 4.6 indicates lack of adequate R&D is an important barrier both for small and medium enterprises were the grand mean value is 1.000 and 1.4250, respectively for small and medium enterprises.

The absence of enterprises engagement on R&D are important barriers to small enterprises technological innovation; quite the opposite medium enterprises has fairly engagement on R&D (Q29) which is not important barrier to medium enterprises technological innovation were the mean value is 0.9107 and 1.5750 for small and medium enterprises, respectively. Although, lack of R&D office & equipped staffs (Q28) & absence to use R&D finding of private organization (Q31) are important barriers for

small and medium enterprises technological innovation 0.7500 & 1.1750 and 0.7143 & 1.1500, respectively. However, both small and medium enterprises believe active involvement on R&D enable to innovate new technology (Q30), were the mean value is 1.6250 and 1.8000, respectively.

Inadequate R&D is important barriers to industry and specific SMEs level technological innovation. This finding is in line with the finding of Decker et al.,(2006); Jaramillo et al.,(2001); IKED(2006) which conform technological innovations are obstacle by inadequate research and development.

It is undeniable that R&D is important for firms to introduce new technologies and gain competitive advantage. However, if those firms (SMEs) don't have adequate engagement on R&D, it can be difficult to perform well in the introduction of new technology or adding values on existing products or understanding of client need and want. As a result, R&D is critical to understand needs and wants of clients ahead and helps to develop new technology in line with their demand. Unlike to this SMEs so far didn't engaged on R&D and also unable to use new finding of private R&D organization hence, it's difficult to be sure whether their new technology is needed by clients or not. Thus, SMEs at industry and specific technology innovation introduction or expansion was adversely affected by inadequate R&D.

4.4.4. High Cost of Innovation

High cost of innovation is the most obvious barrier to innovation as empirical evidence shows. Likewise, this study considered this variable to measure whether SMEs technological innovation at industry or specific level affected by this variable, the survey result obtained from the respondents were shown on the following table 4.7.

Table 4.7: The effect of high cost of innovation on SMEs industry level & specific Small and Medium enterprises to engage in technological innovation

		SMEs Industry level(n=152)							Small(n=112)		Medium(n=40)	
		NE	L	M	H	Total	Mean	Mode	Mean	Mode	Mean	Mode
Q32	**Fr.**	27	75	38	12	152	**1.2303**	1	**1.0625**	**1**	**1.7000**	**2**
Q33	**Fr.**	40	72	26	14	152	**1.0921**	1	**0.9554**	**1**	**1.4750**	**2**
Q34	**Fr.**	76	45	22	9	152	**0.7632**	0	**0.7589**	**0**	**0.7750**	**0**
Q35	**Fr.**	34	38	46	34	152	**1.5263**	2	**1.5000**	**2**	**1.6000**	**3**
Q36	**Fr.**	77	50	21	4	152	**0.6842**	0	**0.5179**	**0**	**1.1500**	**1**
Q37	**Fr.**	59	60	17	16	152	**0.9342**	1	**0.7679**	**0**	**1.4000**	**1**
Q38	**Fr.**	41	73	22	16	152	**1.0855**	1	**0.9375**	**1**	**1.5000**	**1**
Grand							**1.0451**		**0.9285**		**1.3714**	

Source: Survey, 2012 **NE (Not Experienced)-0, L (Low) - 1, M (Medium) - 2, H (High) – 3**

4.4.4.1. Effect of high cost of innovation on SMEs industry technological innovation

Table 4.7, reveals that SMEs manager or owner response whether high cost of innovation obstacle SMEs industry level technological innovation or not. High cost of innovation is important obstacle to SMEs industry technological innovation**s** were grand mean value is 1.0451 as it is shown on table 4.7. On the other hand, 80 or 1.5263 enterprises encourage staff to devote time & resources for innovation (Q35) are not important barriers to SME's industry technological innovation. However, inability of hiring or purchasing necessary skill or equipment(Q32), unable to tolerate cost of innovation (Q33), inability of enterprises to acquiring external competence (Q34), absence of budgeted money for innovation activities (Q36), innovation is not ongoing bases(Q37), innovation failure risk is no accepted(Q38) are 102(1.2303), 112(1.0921), 121(0.7632), 127(0.6842), 119(0.9342) and 114(1.0855) are important barriers to SMEs industry level technological innovation, respectively. Besides, interview response of agency workers deal that high

cost of innovation impedes SMEs technological innovation. Even if, some SMEs having skills, times to introduce technological innovation, as result of cost the already developed innovation idea kept on hand rather than making available or expand to the markets.

4.4.4.2. High cost of innovation and its comparative effect on Small and Medium enterprises technological innovation

Respondents were asked whether high cost of innovation is important barrier for technological innovation in small and medium enterprises or not. The result obtained from the survey indicated on table 4.7, high cost of innovation is an important barrier both for small and medium enterprises technological innovation, were the grand mean value is 0.9285 and 1.3714, respectively for small and medium enterprises.

Likewise, incapable to admit cost of innovation (Q33), lack of ability to acquiring external competence (Q34), low budgeted money for innovation activities (Q36), unable to make innovation ongoing bases (Q37) are important barriers both for small and medium enterprises technological innovation were the mean value for small 0.9554, 0.7589, 0.5179, & 0.7679 and for medium 1.4750, 0.7750, 1.1500, & 1.4000, respectively.

On contrary to this, both small and medium enterprises technological innovations are not obstacle: staffs are encouraged to devote time & resources to innovation (Q35) were mean value is 1.5000 for small and 1.6000 for medium enterprises. However, small enterprises inadequately hire or purchase skill or equipment for innovation (Q32) and also low risk bearing while failure is possible (Q38) is important barrier to innovation were mean value 1.0625 and 0.9375, respectively. Contrary to this, medium enterprises

technological innovation isn't impeded as such as indicated the mean value in the above table 1.7000 and 1.5000, respectively.

Importantly, both industry and specific SMEs technological innovation was obstacle by high cost of innovation. This finding is consistent with finding of Lim and Shyamala, (2007); Silva *et al*., (2007) and Canepa and Stoneman (2008) as identified cost as restrain factor for new technology introduction or expansion.

To engage on innovation enterprises is able to have necessary resources and capabilities. To own those capabilities enterprises incur huge money. As a result of asking huge money to own those resources and capabilities, enterprises fail to own and engaged on technological innovation. Hence, owning those hardware and software are major restrain factors for SMEs which has low financial performance and capability. As a result, SMEs is not in a position to acquire external competence, innovation isn't ongoing, failure in innovation isn't take despite, innovation is trial and error process, due to those reasons SME's introduction or expansion activities are obstacle by cost.

4.4.5. Organizational Culture

Organization culture usually cited as factors affecting innovation of small and medium enterprises as literature concerned. Table 4.8, depicts that organization culture effect on SMEs at industry level, and particularly at small and medium enterprises level technological innovation.

Table 4.8: Organization culture effect on SME's industry, Small & Medium enterprises specific technological innovation

		SMEs Industry (n=152)							Small (n=112)		Medium (n=40)	
		NE	L	M	H	Total	Mean	Mode	Mean	Mode	Mean	Mode
Q39	**Fr.**	22	58	40	32	152	**1.5395**	**1**	**1.4643**	**1**	**1.7500**	**2**
Q40	**Fr.**	30	52	50	20	152	**1.3947**	**1**	**1.2857**	**1**	**1.7000**	**2**
Q41	**Fr.**	10	16	64	62	152	**2.1711**	**2**	**2.0625**	**2**	**2.4750**	**3**
Q42	**Fr.**	37	50	40	25	152	**1.3487**	**1**	**1.1696**	**1**	**1.8500**	**3**
Q43	**Fr.**	26	56	30	40	152	**1.5526**	**1**	**1.3661**	**1**	**2.0750**	**3**
Q44	**Fr.**	39	45	43	25	152	**1.3553**	**1**	**1.2589**	**1**	**1.6250**	**3**
Q45	**Fr.**	56	51	26	19	152	**1.0526**	**0**	**0.8661**	**0**	**1.5750**	**3**
Q46	**Fr.**	42	45	23	42	152	**1.4276**	**1**	**1.3214**	**0**	**1.7250**	**3**
Grand							**1 .4802**		**1.3493**		**1.8468**	

Source: Survey 2012 **NE - (Not Experienced)-0, L - (Low)-1, M - (Medium)-2, H - (High)-3**

4.4.5.1. Effect of organization culture on SMEs industry technological innovation

Table 4.8, reveals that SMSs manager or owner responses regarding whether SMEs organization culture obstacle technological innovation or not. As it is shown on table 4.8, the mean grand value for organizational culture is 1.4802 this indicates that SMEs organization culture is important barrier to SMEs industry technological innovation.

Likewise, (Q40) enterprises inadequate empowerment of employee to come with new ideas 1.3947, (Q42) enterprises doesn't encourage synergies of different resources to innovation 1.3487, (Q44) supervisors doesn't spend time to listen employee ideas 1.3553 and (Q45) enterprises doesn't update staff with best practices learning 1.0526 and (Q46) shortage of enterprises to see opportunities for innovation 1.4276 are important barriers to SMEs technological innovation as the above table 4.8 shown.

Even if, SMEs managers or owners responded organization culture as the list important barriers to technological innovation, interview script from agency workers confirmed that enterprises organization culture are hindering SMEs technological innovation performance so far. They noted SMEs has not unified goal which govern the entire member in the enterprises and also miss trusted each other as a result they are not motivated to engage activities related to technological innovation.

However, (Q41) indicates that enterprises fairly believe innovation as key to growth in changing environment, (Q39) enterprises believe fairly on anybody could create & innovate and (Q43) enterprises manager or owner play insignificant role to promote innovation are 2.1711, 1.5395 and 1.5526 is not important barriers to SMEs technological innovation, respectively.

4.4.5.2. Organization culture and its comparative effect on small and medium enterprises technological innovation

The result obtained from the survey indicated that organization culture is an important barrier for small enterprises with a grand mean value of 1.3493 despite; medium enterprises technological innovation were not restrained by their enterprises culture as depicted on table 4.8, with grand mean value of 1.8468 and mode value also 3.

Moreover, little trust on anyone could be creative & innovative(Q39), low employee empowerment(Q40), low synergies of resources (Q42), manager or owner play insignificant role (Q43), supervisor lack time to listen employee's ideas (Q44), slight renew employees with best practice (Q45), and seeing little opportunity for innovation (Q46) are important barriers for small enterprises technological innovation, however for medium enterprises technological innovation the above factors aren't important barriers.

Organization culture is important barriers for industry and specifically for small enterprises technological innovation unlike for medium enterprise. Similarly, the study of Aminreza et al., (2011), Silva et al., (2007) and Lim and Shyamala (2007) are identified organization culture as restraining factors for firms' innovation.

Organizational culture is one of the factors that dictate success in innovation however, creating the culture that support creativity and innovation is challenging one. Actually, continuous innovation is becoming a necessity if firms want to stay competitive. SMEs rate of innovation may influenced by different factors, among factors organization culture has often been recognized among the most important factors. Usually innovation idea is created from people mind and those organizations govern the collection of peoples, resources and values they have. The culture an enterprise has can limit performance of innovation in SMEs. SMEs culture is important obstacle for technological innovation hence, organization hasn't empowering employees to spent time on new technology innovation or expansion as result of lower confidence on employee, this results employee to not motivate to engage on such activates and also SMEs entrepreneurial spirit and innovation creativity and rewards philosophy are poor which de motivate engagement on technological innovation.

4.4.6. Size of Enterprise

Size of enterprises is usually a factor considered that influence innovation capacity of SMEs (Avermaete et al., 2003), however, various results are noted as mixed effect on enterprises innovation. Regarding this, table 4.9, depicts responses on the effect of size on enterprises technological innovation at industry, and particularly at small and medium enterprises level.

Table 4.9: Size of enterprise effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs Industry (n=152)						Small (n=112)		Medium (n=40)	
		NE	L	M	H	Mean	Mode	Mean	Mode	Mean	Mode
Q47	**Fr.**	22	70	35	25	**1.4145**	1	**1.3661**	**1**	**1.5500**	**2**
Q48	**Fr.**	15	76	29	32	**1.4932**	1	**1.4464**	**1**	**1.4900**	**1**
Q49	**Fr.**	34	73	29	18	**1.1908**	1	**1.0446**	**1**	**1.5750**	**2**
Grand						**1.3661**		**1.2857**		**1.5383**	

Source: Survey, 2012 **NE - (Not Experienced)-0, L - (Low)-1, M - (Medium)-2, H-(High)–3**

4.4.6.1. Effect of size of enterprise on SMEs industry level technological innovation

Table 4.9, reveals that SMS‘s managers or owners responses whether size of enterprise obstacle SME’s technological innovation or not. Size of enterprise is important barriers to SME’s technological innovation were the grand mean & mode value is 1.3661 & 1.00, respectively. Likewise, enterprises face little problem of innovation due to being small or medium (Q47), enterprises size impedes internal funds assigned for innovation (Q48) and engagement on innovation with help of R&D matter enterprise size (Q49) are important barriers to SME’s technological innovation as the mean value 1.4145, 1.4932 & 1.1908, respectively as indicated on table 4.9.

4.4.6.2. Size of enterprise and its comparative effect on Small and Medium enterprise technological innovation

Small enterprises technological innovation is restrained by size of enterprises were grand mean value is 1.2857 however, for medium enterprises it’s not important barriers for technological innovation were mean value is 1.5383, as depicted on table 4.9.

Factors like facing problem related to innovation due to being small (Q47) and low engagement on innovation with help of R&D is restricted by size (Q49) are important barriers to Small enterprises technological innovation were 1.3661 & 1.0446 mean value, respectively. Unlike to this, medium enterprises technological innovation isn't restrained by this factor were the mean value is 1.5500 & 1.5750, respectively. Quite the opposite, low assignment of internal funds for innovation as a result of size (Q48) both small and medium enterprises technology innovation is impeded with 1.4464 & 1.4900 mean value, respectively.

Both industry level and small enterprises technological innovation were restrained by enterprises size, unlike medium enterprises technological innovation. The finding of Mulu (2009), Cohen and Klepper, (1996); and Concepcio´n et al., (2008) identify size of enterprise as barrier to innovation consistent with the finding of this study, industry technological innovation were obstacle by size.

Usually size is associated with the enterprises capital and number of hard ware or soft ware firm have. As a result, larger firm has a probability to own such capabilities from small one. Moreover, assignment and engagement for technological innovation requires capital and time. Thus, it's highly related with the turnover the enterprises have and also similarly the probability to use competence like R&D to engage on innovation is critically linked with size. Actually, access to finance, skill & resources just related with size and inline lower ability to benefit from scale advantage, size of the firm can determine SME's technological innovation performances even though different view in literature.

4.4.7. Lack of skilled personnel

Lack of skilled personnel is usually considered as factor for SMEs innovation as empirical evidences noted. This study also considered lack of skilled personnel to measure barriers to technological innovation at SMEs industry level and particularly at small and medium enterprises level as depicted on table 4.10.

Table 4.10: Lack of skilled personnel effect on SMEs industry, and Small and Medium enterprise specific technological innovation

		SMEs Industry (n=152)						Small (n=112)		Medium (n=40)	
		NE	L	M	H	Mean	Mode	Mean	Mode	Mean	Mode
Q50	**Fr.**	13	68	60	11	**1.4539**	**1**	**1.3929**	**1**	**1.6250**	**2**
Q51	**Fr.**	31	86	28	7	**1.0724**	**1**	**0.9286**	**1**	**1.4750**	**1**
Q52	**Fr.**	18	73	40	21	**1.4211**	**1**	**1.3214**	**1**	**1.7000**	**1**
Q53	**Fr.**	25	80	29	18	**1.2632**	**1**	**1.1518**	**1**	**1.5750**	**1**
Q54	**Fr.**	12	44	81	15	**1.6513**	**2**	**1.6161**	**2**	**1.7500**	**2**
Grand						**1.3723**		**1.2821**		**1.6250**	

Source: Survey, 2012 **NE- (Not Experienced)-0, L- (Low)-1, M- (Medium)-2, H- (High)-3**

4.4.7.1. Effect of lack of skilled personnel on SMEs industry technological innovation

SME managers and/or owners response regarding lack of skilled personnel is important obstacle to enterprise technological innovation or not. The lack of skilled personnel is important barriers to SMEs industry technological innovation were the grand mean value is 1.3723 on above table 4.10.

Moreover, enterprises has inadequate number of trained personnel for innovation (Q50), industry lack individual with creative & innovative ideas (Q51), industry has lack of managerial know how to manage innovation process (Q52) & lack of qualified personnel

with enterprise (Q53) are important barriers to SMEs industry technological innovation with a mean value of 1.4539, 1.0724, 1.4211, and 1.2632, respectively as of table 4.10. However, with market qualified personnel are fairly available (Q54) with a mean value of 1.6513 are not important barriers to SMEs industry technological innovation. Additionally, interview script indicates, SMEs technological innovation is highly impeded by lack of skilled personnel as indicated by participants. Even if owners or managers are fairly educated line share of the member which represent the SMEs are fairly unskilled as result industry technological innovation were restrained by lack of skilled personnel.

4.4.7.2. Lack of skilled personnel and its comparative effect on small and medium enterprises technological innovation

The lack of skilled personnel is an important barrier for small enterprises with a grand mean value of 1.2821 and unlike medium enterprises technological innovation were 1.6250 as table 4.10. Unlike medium, small enterprises technological innovation is impeded by the following factors: inadequate number of trained employees (Q50), incapable managers or owners to manage technological innovation process (Q52) and inadequate qualified employees within enterprises (Q53) were the mean values are 1.3929, 1.3214 and 1.1518, respectively. That means medium enterprises technological innovation are not impeded by those (Q50, Q52 and Q53) factors which is not important barriers for enterprises technological innovation were the mean values are 1.6250, 1.7000 & 1.5750, respectively. Both small and medium enterprises have lack of individual with creative & innovative ideas (Q51) with a mean value of 0.9286 and 1.4750, respectively.

Thus, unlike medium enterprises shortage of skilled personnel is an obstacle for industry and small enterprises specific technological innovation. Likewise, the finding of Tourigny and Le(2004), Galia and Lerros, (2004), Aminreza K, et al., (2011); Silva et al. (2007) and Lim and Shyamala (2007) are consistent to my finding that innovation is affected by lack of skilled personnel.

Organizational activities cannot be achieved without the existence of human beings. Equally, innovation activity is learning process that is closely related to skills and competencies available and effectively mobilization within and outside the firm. However, for those SMEs it's not simple to own such capabilities as survey revealed enterprises has inadequate skilled human power; so it's difficult to enterprises to introduce or expand technological innovation as required. Once SMEs managers and/or owners are lack of skill and education, thus enterprises innovation will be restrained as a result, enterprises face lack of successful innovation strategy. In fact, innovation might be introduced with low educated people, despite understanding the situation and effectively and efficiently to introduce technological innovation, educated and creative mind is important. This is the fact, for SMEs in Addis Ababa, that skilled human power is shortage for the introduction or expansion of new technologies.

4.4.8. Lack of Finance

Lack of finance is usually cited factors which adversely affecting SMEs technological innovation (OECD, 2005). The effect of lack of finance on enterprises technological innovation at SMEs industry level and specific small and medium enterprises depict on table 4.11.

Table 4.11: Lack of finance effect on SMEs industry, and Small & Medium enterprises specific technological innovation

		SMEs Industry(n=152)						Small (n=112)		Medium (n=40)	
		NE	L	M	H	Mean	Mode	Mean	Mode	Mean	Mode
Q55	**Fr.**	38	76	28	10	**1.0658**	**1**	**0.9821**	**1**	**1.3000**	**1**
Q56	**Fr.**	100	42	6	4	**0.4342**	**0**	**0.3750**	**0**	**0.6000**	**0**
Q57	**Fr.**	132	15	5	-	**0.1645**	**0**	**0.1429**	**0**	**0.2250**	**0**
Q58	**Fr.**	120	23	7	2	**0.2829**	**0**	**0.1964**	**0**	**0.5250**	**0**
Q59	**Fr.**	84	41	18	9	**0.6842**	**0**	**0.5893**	**0**	**0.9500**	**0**
Grand						**0.5263**		**0.4571**		**0.7200**	

Source: Survey, 2012 **NE- (Not Experienced)-0, L - (Low)-1, M - (Medium)- 2, H - (High)-3**

4.4.8.1. Effect of lack of finance on SMEs industry level technological innovation

Respondents were asked whether lack of finance is important barrier for technological innovation or not in SMEs. Lack of finance is an important and one of the major barrier for SMEs technological innovation were a grand mean value of 0.5263 as the survey result obtained indicates in table 4.11. Moreover, enough fund aren't available within enterprises to innovation (Q55), absence of access to long term loans from banks to innovation (Q56), absence of funds from sources outside enterprises (Q57), absence of investors which is encouraging firms through financing (Q58), insufficient support from banks & financial institution while collateral requirements is needed (Q59) are main important barriers to SMEs industry technological innovation 1.0658, 0.4342, 0.1645, 0.2829, and 0.6842, respectively. Moreover, interview script support response of manager or owner that technological innovation of SMEs is mainly obstacle by lack of finance and finance related problems. And they pointed, by very nature innovation is intangible assets; as a result anybody could not give money by bearing the risk associated.

4.4.8.2. Lack of finance and its comparative effect on small and medium enterprises technological innovation

Respondents were asked whether lack of finance is important barrier for technological innovation or not in small and medium enterprises. The lack of finance is major important barrier for both small and medium enterprises technological innovation with a grand mean value of 0.4571 and 0.7200, respectively as depicted on the above table 4.11. Moreover, factors related to lack of finance like, adequate funds aren't available within enterprises to innovation (Q55), absence of access to long term loans from banks to innovation (Q56), absence of funds from sources outside enterprises(Q57), absence of investors which is encouraging firms through financing (Q58) and insufficient support from banks & financial institution to collateral requirements(Q59) are impeding small and medium technological innovation as mean value for small enterprises 0.9821, 0.3750, 0.1429, 0.1964, and 0.5893, respectively and mean value for medium enterprises 1.3000, 0.6000, 0.2250, 0.5250, and 0.9500, respectively as indicated on table 4.11.

Hence, lack of finance is important barriers to SME's industry and small and medium specific technological innovation. This finding is supported the finding of Mohd & Syed (2010), OCED(2005)*;* Aminreza et al.,(2011), Silva et al.,(2007) and Lim and Shyamala (2007) that economic factors particularly lack of financing are factors restrain SME's innovation.

Finance is the main root of business. As result, enterprises need finance to invest in new equipment and machinery, reach out to new markets and products, and cope with temporary cash flow shortages as well as to develop new technology and expand it. If firms do not have sufficient amount of finance it's impossible to compete with others by

engaging in activities which gain competitive advantages. So, due to lack of availability of finance SME's has shortage of assigning fund for technological innovation so far, this resulted on low engagement of SMEs on new technology developments. Particularly, while data gathered from manager or owner they explained that even they have prototype technological innovation on their hand, however due to lack of finance they are unable to reach to the market. Due to intangibility nature of innovation those financial institution also not ready to make available such loan service for SMEs at industry and specific technological innovation, thus it affect adversely technology innovation of enterprises.

4.4.9. Lack of Cooperation

Cooperation is important for exchanging and sharing different capabilities (Robson et al., 2009; De man and Duysters, 2005). As a result, absence of cooperation could affect firm's innovation performance. So, this study considers lack of cooperation as factors which might affect technological innovation of SME's, table 4.12 depicts result.

Table 4.12: Lack of cooperation effect on SMEs industry, and small and medium enterprises specific technological innovation

		SMEs Industry (n=152)						Small (n=112)		Medium (n=40)	
		NE	L	M	H	Mean	Mode	Mean	Mode	Mean	Mode
Q60	Fr.	17	72	45	18	**1.4211**	**1**	**1.4286**	**1**	**1.4000**	**1**
Q61	Fr.	36	94	10	12	**0.9868**	**1**	**0.9821**	**1**	**1.0000**	**1**
Q62	Fr.	28	81	33	10	**1.1645**	**1**	**1.1250**	**1**	**1.2750**	**1**
Q63	Fr.	32	78	30	12	**1.1447**	**1**	**1.0714**	**1**	**1.3500**	**1**
Q64	Fr.	27	96	20	9	**1.0724**	**1**	**1.0804**	**1**	**1.0500**	**1**
Grand						**1.1579**	**1**	**1.1375**	**1**	**1.2150**	**1**

Source: Survey 2012 **NE- (Not Experienced)-0, L- (Low)-1, M- (Medium)-2, H - (High)-3**

4.4.9.1. Effect of lack of cooperation on SMEs industry technological innovation

Managers or owners were asked whether lack of cooperation is important barrier for SMEs technological innovation or not. The lack of cooperation is an important barrier for SMEs industry level technological innovation with a grand mean and mode value of 1.1579 and 1, respectively as shown from the survey in table 4.12.

Moreover, difficulty in finding cooperation partners for innovation (Q60), low cooperation with institution & business development services providers (Q61), low access of expertise's from other firms (Q62), low relationship with different association (Q63), deficiency to done close with government, private & NGO in relation to innovation (Q64) are important barriers to SME's industry technological innovation were the mean value is 1.4286, 0.9868, 1.1645, 1.1447 and 1.0724, respectively.

Moreover, from interview script agency workers strongly agree that SME's technological innovation was fairly obstacle by lack of cooperation with different parties particularly; enterprises even are not in a position to cooperate with other enterprise around them.

4.4.9.2. Lack of cooperation and its comparative effect on Small & Medium enterprises technological innovation

Both small and medium enterprises technological innovation hindered by lack of cooperation which is important barrier were a grand mean and mode value of 1.1375 & 1 for small and 1.2150 & 1 for medium enterprise, respectively as shown on table 4.12.

Moreover, factors like difficulty in finding cooperation partners for innovation (Q60), low cooperation with institution & business development services providers (Q61), low access for expertise's from other firms (Q62), having low relationship with different

association (Q63), deficiency to done close with government, private & NGO in relation to innovation(Q64) are important obstacle to small and medium enterprise technological innovation as mean value for small enterprises 1.4286, 0.9821, 1.1250, 1.0714 & 1.0804 and mean value for medium enterprises are 1.4000, 1.0000, 1.2750, 1.3500 & 1.0500, respectively as indicated on table 4.12.

Lack of cooperation is important barriers for SMEs industry technological innovation as well as for small and medium enterprise specific. Similarly, the finding of Tsai (2009) and Todtling et al.,(2009), are in line with this study identified lack of collaboration as barriers for innovation.

Cooperation is important for developing better and winning ideas. Even though, it's created with consent or interest of different parties like industry (SMEs), universities, financial institution and also government. As a result, if government isn't encouraging cooperation of different parties in the country like technical and vocational school, universities, suppliers, customers and industries (SMEs), it's difficult to happen while introducing or expanding technological innovation. Thus, it has an implication to SME's technological innovation that lack of access: to well-trained manpower, to basic and applied research results of new technologies, to professional expertise not usually found in an individual firm and so on. So, absence of establishing a system of communication and co-operation by SMEs result them to be in a vacuum with their attempt of technological innovation rather than sharing and developing their engagement on area of technological upgrading or innovation.

4.5. Ranking of Barriers for SMEs Technological Innovation

The ranking of variables was based on obstacle SMEs faces. Thus, SMEs industry level barriers for technological innovation are ranked by managers or owners accordingly, as survey result indicate in **table 4.13. {See on appendix part table 4.13}**

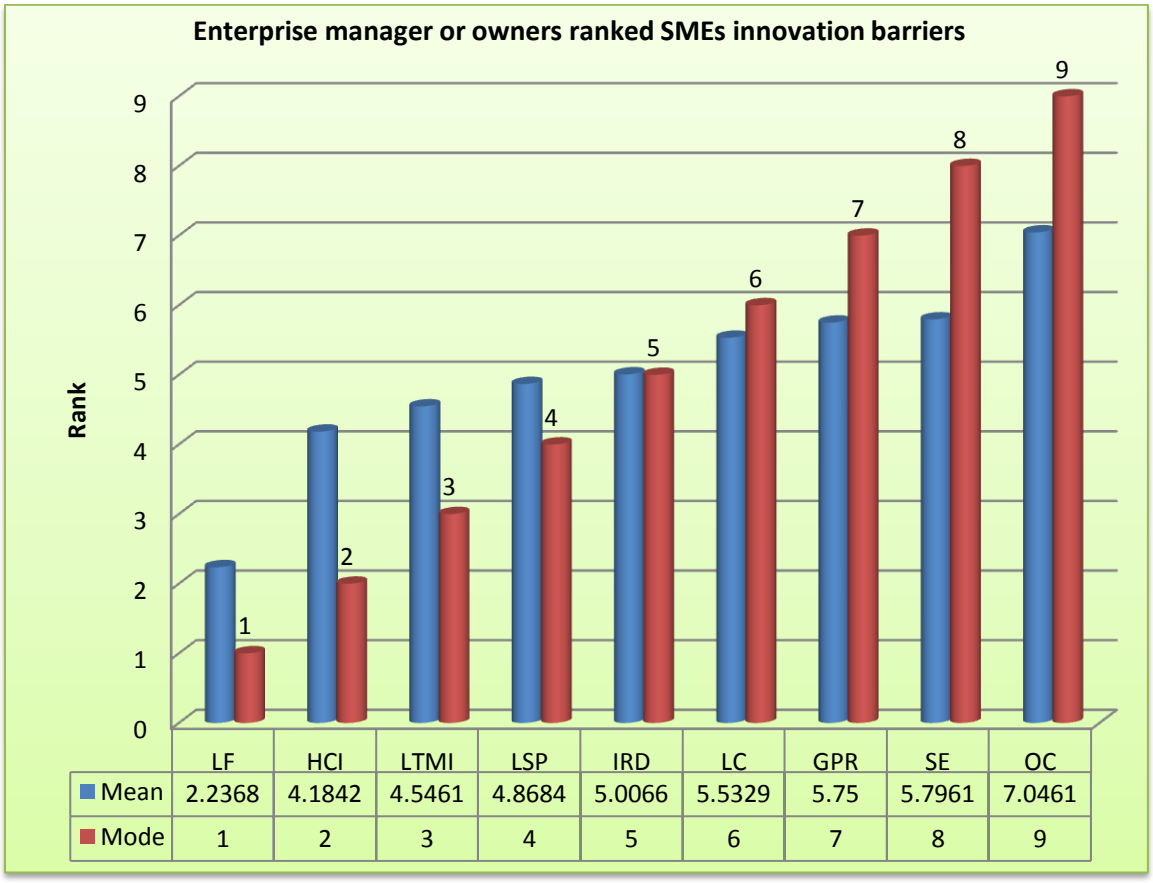
Enterprises managers or owners are asked to rank SMEs technological innovation barriers. Prioritization of obstacles is given based on extent of enterprises technological innovation impeded by those nine variables identified from literature. Ranking is arranged based on the ***mean & mode value*** of respondent responses regarding barriers to SMEs technological innovation. While ranking is prepared, for lower mean first rank is given because response rate is multiplied by its rank to get grand total sum, then it will be divided by total number of usable sample (152) to get its mean.

Thus, SMEs industry level technological innovation barriers are ranked in this order: Lack of finance, High cost of innovation, Lack of technological & market information, Lack of skilled personnel, Inadequate R&D, Lack of cooperation, Government policy and regulation, Size of enterprise, and Organization culture from ***high important barrier*** to ***low important barriers*** for SMEs industry level technological innovation.

Moreover, the ranking of barriers for Small and Medium enterprises specific is more or less similar with industry. Small enterprises ranked barriers as LF, HCI, LTMI, LSP, IRD, LC, SE, GPR and OC and Medium enterprises as LF, HCI, IRD, LSP, LTMI, GPR, LC, SE, and OC in this order from high important to low important barriers to enterprises specific technological innovation.

This study was similar with finding of Aminreza et al.,(2011); Silva et al.,(2007); and Lim and Shyamala (2007) that economic factors like Lack of finance and High cost of innovation are major factors restrain SMEs innovation.

Figure 4.2: Ranking of barriers for SMEs industry technology innovation



The study identified economic factors as main restrain factors for SMEs at industry technological innovation. As a result of economic factor, SMEs at industry level technological innovation were hindered due to unable to assign money for innovation activities, unable to take risk and have useful technology for innovation and shortage of skilled and competent manpower for innovation and has inadequate R&D engagement. These resulted SMEs at industry technology innovation aren't developed as expected by officials of sub cities of SMEs.

4.6. Ranking of Internal and External Barriers for SME's Industry Innovation

Barriers to innovation were classified as internal and external (Piatier, 1984). The survey results portray managers or owners response regarding prioritization of obstacles.

Table 4.14: Ranking of **internal and external** barriers of SMEs industry technological innovation

Factors			1st	2nd	3rd	4th	5th	6th	Total	Grand Total	Mean	Mode
Internal barriers	LF	Freq	102	20	14	5	1	3	145	227	1.56	1
	LSP	Freq	19	43	39	17	4	4	126	334	2.65	2
	IRD	Freq	11	30	39	23	9	7	119	367	3.08	3
	LC	Freq	9	22	19	36	14	7	107	366	3.42	4
	SE	Freq	8	23	26	19	28	4	108	372	3.44	5
	OC	Freq	6	13	14	11	8	36	88	374	4.25	6
External barriers	HCI	Freq	89	50	13	-	-	-	152	228	1.5	1
	LTMI	Freq	39	60	53	-	-	-	152	318	2.09	2
	GPR	Freq	25	43	84	-	-	-	152	363	2.38	3

Source: survey, 2012 **1st = Main barrier** **3rd or 6th = Least barrier to innovation**

SMEs managers or owners were asked to prioritize the internal and external factors negatively affecting SME industry level technological innovation as survey depict on table 4.14. Ranking is made based on the mean & mode value of respondent's response regarding barriers for SMEs industry level technological innovation.

With **internal factors** that obstacles SMEs industry technological innovation, respondent prioritize that LF, LSP, IRD, LC, SE and OC are impeding SMEs technological innovation in the order having a mean and mode of **1.56** & **1, 2.65** & **2, 3.08** & **3, 3.42** & **4, 3.44** & **5** and **4.25** & **6,** respectively.

Moreover, SME managers or owners pointed out internal problem that limits them from engaging technological innovation are: objectives of striving to fulfill and secure survival (hand to mouth) so that they haven't time & ability to engage on such activities, wrong or lower attitude regarding SMEs, members doesn't believe that growth and expansion is possible with SMEs, offering of inadequate quality standardized product to markets, absence of giving attention to technology innovation: this means usually SME's working to secure their survival not to create new things and doesn't try to see out of vacuum.

Regarding **external factors** that obstacles SMEs industry level technological innovation, respondents prioritized in this order: high cost of innovation, lack of technological and market information, and government policy and regulation were a mean and mode value of 1.50 & 1, 2.09 & 2 and 2.38 & 3, respectively. Moreover, managers and/or owners specified external problem that limits them from engaging technological innovation: lack of infrastructure like, electric power and water, poor attitude and trust of the society in country made technology innovation, absence of identified division of SMEs which encourage development of innovation activities, absence of displaying area for enterprises innovated products, lack of credit service providers and presence of bias working while service provided, lack of provision of training to encourage or develop innovation skill, limited flexibility of working activity particularly, for construction sectors, lack of integration while government support is provided, unable to get necessary materials & inputs on time, high inflation on inputs materials, weak government policy implementation, absence of tax recommencement while purchasing necessary materials & unable to get internet services.

4.7. Result of the Correlation Analysis

A correlation is a way to index the degree to which two or more variables are associated with and it's coefficient is a standardized measure of an observed effect. It is a commonly used measure of the size of an effect and the value of **± .1** represent a **Small** effect, **± .3** is a **Medium** effect and **±.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).

Spearman's correlation analysis was computed on table **4.15** to determine whether or not statistical significant relationships has among industry, small and medium enterprises **technological innovation barriers** with **technological innovation performance**.

Table 4.15: Spearman's rho correlation matrix between Industry, Small & Medium enterprises specific barriers to innovation with technological innovation performance.

			GPR	LTMI	IRD	HCI	OC	SE	LSP	LF	LC
EII	Industry	Coef	.391	.403	.509	.433	.280	.370	.392	.157	.189
		Sig.	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.026**	.01*
	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 **EII= 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 4.15 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. Moreover, the result obtained from the correlation analysis were presented as follows.

From the table 4.15, there is a moderate and large statistically significant relationship between industry, small and medium specific technology innovation performance with **GPR**. The relation (r=.391, p<0.01), (r=.305, p<0.01) and (r=.437, p<0.01), respectively for industry, small and medium enterprises this means there is a significant positive relationship. Therefore, GPR improves and there is a corresponding improvement in industry, small and medium enterprises technology innovation performance.

Similarly, there is a moderate and large statistically significant relationship between industry, small and medium enterprises specific technology innovation performances with **LTMI**. Thus, (r=.403, p<0.01), (r=.358, p<0.01), and (r=.404, p<0.01), respectively for industry, small and medium enterprises specific technological innovation performance. As a result, LTMI access improved there is a corresponding improvement in industry, small and medium enterprises technological innovation performances.

In the same way, there is a large and statistically significant relationship between industry, small and medium enterprises specific technological innovation performance with **IRD**, Were (r=.509, p< 0.01), (r=.469, p< 0.01) and (r=.405, p< 0.01), respectively for industry, small and medium enterprises specific technological innovation

performance. This means improvement in engagement of IRD, subsequently industry, small and medium enterprises technological innovation improved.

In similar way industry, small and medium enterprises technological innovation performance has moderate and large positive statistically significant relationships with **HCI**. Were (r=.433, p<0.01), (r=.330, p<0.01) and (r=.470, p<0.01), respectively for industry, small and medium enterprises. Therefore, cost of innovation improved there is a corresponding improvement in industry, small and medium enterprises technological innovation performances.

On the other hand, there is moderate and positive statistically significant relationship between industry innovation performance (r=.280, p<0.01) with **OC**. Similarly, small and moderate; and statistically significant relationship between small (r=.180, p<0.05) and medium (r=.309, p<0.05) enterprises specific technological innovation with OC. Therefore, OC improved consequently industry; specific small and medium enterprises technology innovation performance can improve.

Other hand, industry, small and medium specific technology innovation performance has moderate and large positive statistically significant relationship with **SE**. Were (r=.370, p<0.01), (r=.278, p<0.01) and (r=.482, p<0.01), respectively for industry, small and medium enterprises specific technological innovation performance. Therefore, change in size of enterprises consequently resulted in change on industry, small and medium enterprises technological innovation performances.

There is medium and strong statistically significant relationships between industry (r=.392, p<0.01) and small enterprises (r=.346, p<0.01) technological innovation

performance with **LSP**. Whereas, moderate and statistically significant relationship between medium enterprises specific technological innovation (r=.320, p<0.05) with LSP. Therefore, LSP improved consequently industry and small specific technology innovation can improve and likely medium enterprises specific technology also improves.

Likely, there is smaller and statistically significant relationship between industry and small specific innovation performance (r=.157, p<0.05) and (r=.142, p<0.05) for industry and small, respectively with **LF**. On the other hand, medium enterprises (r=.406, p<0.01) specific technological innovation performance has large and positive statistically significant relationship with LF. Therefore, LF improved consequently industry; small and medium specific enterprises technology innovation can improve.

Finally, there is small and positive statistically significant relationship between industry (r=.189, p < 0.01) technological innovation performance with **LC**. However, small and moderate and statistically **insignificant** relationship between small enterprises (r=.155, p>0.05) and medium enterprises (r=.238, p>0.05) specific technological innovation with **LC**. LC improve, consequently industry technology innovation can improve. Nevertheless, cooperation improvement hasn't lead significant change with small & medium enterprises specific technology innovation performance.

Therefore, the correlation between small and medium enterprises specific technological innovation has statistically insignificant with **LC** despite, for industry, LC has significant relation. On the other hand, SME's industry, small and medium enterprises specific technological innovation have a significant relation with GPR, LTMI, IRD, HCI, OC, SE, LSP and LF.

4.8. Summary of the Chapter

In this chapter, data obtained from survey and interview has been analyzed in line with making sure the consistency and internal stability of each items on the scales. The nine identified variables were used to analyze the barriers of SMEs at industry, small and medium enterprises specific level technological innovation. As a result, all variables considered restrain industry and enterprises specific technological innovation with the exception of GPR, SE, OC and LSP variables which is not important barriers for medium enterprises technological innovation.

Furthermore, the correlation analysis indicates as **lack of cooperation** (**LC**) is statistically **insignificant** correlation **0.05** level of significance with small and medium enterprises specific technological innovation performance. Otherwise, all factors are statistically **significant** relation with industry and both small and medium enterprises specific technological innovation performance with barrier to technological innovation at **0.01** and **0.05 level** of significance.

The summary of findings, conclusion, and possible recommendation are proceeding in the next chapter.

Chapter Five: Summary of Findings, Conclusion and Recommendation

The study was intended to look at barriers for technological innovation of small and medium enterprises in Addis Ababa four sub cities. The purpose of this chapter is to windup the study by stating summary of the findings, conclusion and recommendations.

5.1. Summary of Findings

The study aimed to describe barriers of SMEs technological innovation posing the following research question: did SMEs introduce technology innovation and its type, the reason why enterprises didn't innovate, what are the main technological barriers at industry level and specific, what are internal and external barriers of SMEs, and ranking of barriers to innovation. Those raised questions are answered by using survey data from managers and/or owners of SMEs and official of sub cities. Therefore, Valid 152(73%) responses were obtained from respondents to measure the level by which SMEs technological innovation is affected adversely by nine identified variables.

- From the selected enterprises 58(38.1%) had engaged in technology innovation where as the remaining 94(61.8%) enterprises didn't introduced innovation. Out of those enterprises hadn't made technological innovation (94 SMEs), 78(51.3%) and 16(10.5%) were small and medium enterprises, respectively.
- Out of those 58(38.1%) enterprises introduced technological innovation, 34(22.3%) are small & 24(15.7%) are medium enterprises. Of small enterprises introduced technological innovation the type of technology they introduce was product, process and both product and process innovation that forms 12(20.7%), 11(19%) and 11(19%), respectively. On the other hand, of medium enterprises introduced technological innovation, the type of

technology introduced is product, process and both product and process innovation that forms 9(15.5%), 5(8.6%), and 10(17.2%), respectively.

- Out of those enterprises didn't introduce or introduced technological innovation 112(73.6%) & 40(26.3%) are small and medium enterprises, respectively. The reason was due to market condition, factors constraining innovation, and both market & factors constraining innovation are 3(1.9%), 102(67.1%), and 7(4.6%), respectively for small enterprises. Similarly, the reason way didn't engaged in technology innovation, was due to market condition, factors constraining innovation, and both market & factors constraining innovation, were 0.6%, 20.4% and 5.2%, respectively medium enterprises.

The following factors are identified in the study as factors affecting SMEs industry and specific small and medium enterprises technological innovation engagement:

- Unfavorable government policy & regulation is important obstacle for SMEs industry technological innovation, were the grand mean value is 1.3434. Low patent protection for innovation, low support for doing & expanding innovation, low access & usage of government loan, and no modification of tax system to encourage innovators are more important factors for SMEs industry level technological innovation. Moreover, GPR is barriers for small with a grand mean value of 1.2732 despite, it's not obstacles for medium enterprises technological innovation were the grand mean value is 1.5400.
- On the other hand, lack of technological & market information is important obstacle for SMEs industry level technological innovations were grand mean value is 1.2565**.** Low access & utilization of up to date technological information and materials, absence of internet service, lack of information technological transfer institution, and inadequate knowledge of market & their demand are important factor for industry level technology

innovation. Moreover, both small and medium enterprises technological innovation are obstacle by LTMI, were the grand mean values is 1.1734 and 1.4892**,** respectively.

- Similarly, inadequate R&D is important obstacle to SMEs industry level technological innovation were the grand mean value is 1.1118. Unable to have organized R&D office & equipped staffs, no engagement on R&D & absence to use new finding of R&D of private organization are important factor for SMEs industry level technological innovation. Moreover, IRD is an important barrier both for small and medium enterprises were the grand mean values 1.000 and 1.4250, respectively.
- Similarly, High cost of innovation is an inhibiting factor for industry technological innovation, were the grand mean value is 1.0451. Inability of hiring and purchasing of necessary resources & equipment, inability of enterprises to acquiring external competence, no budgeted money for innovation activities, and fail to take risk by enterprises are more important factors at industry level. Moreover, HCI is important barrier both for small and medium enterprises to engage in technological innovation, were the grand mean values is 0.9285 and 1.3714, respectively.
- Likewise, Organizational culture is identified as an important barrier for SMEs industry technological innovation, were the grand mean value is 1.4802. Low employee empowerment, low synergies of resources, no spend time to listen employees ideas by supervisors, and absence of updating staff with best practice are important factors for SMEs industry technological innovation. Moreover, OC is an important barrier for small enterprises with a grand mean value of 1.3493 however; it's not important barriers for medium enterprises technological innovations were grand mean value is 1.8468.

- Size of enterprise which could be measured in financial and human resources is important restrain factor for industry technological innovations were grand mean value is 1.3728. Facing innovation related problem, limit in assignment of internal funds for innovation, and limited engagement of innovation with help of R&D are important for industry level technological innovation. Likewise, small enterprises were restrained by SE with grand mean value of 1.2857 despite, medium enterprises technological innovation weren't obstacle by SE as grand mean value is 1.5383.
- Lack of skilled personnel is important barrier for technological innovations in SMEs at industry level, were the grand mean value is 1.3723. Inadequate number of trained personnel for innovation, absence of individual with creative & innovative ideas, and inadequate qualified employees within enterprises are important factor for SME at industry to engage in technological innovation. Moreover, LSP is an important barrier for small enterprises with a grand mean value of 1.2821; however, it's not important barriers for medium enterprises technological innovations were grand mean value is 1.6250.
- Lack of finance is an important and one of the major barriers for industry technological innovations were the grand mean value is 0.5263. Insufficient funds for innovation, absence of access to long term loans for innovation, absence of investors & banks which are encouraging enterprises through financing are factors more important for industry technological innovation. Furthermore, LF is more important barrier for both small & medium enterprises with a grand mean value of 0.4571 & 0.7200, respectively.
- Lack of cooperation is important barriers for SMEs industry technological innovation were the grand mean value is 1.1579. Difficulty in finding cooperation partners for innovation, low cooperation with institution, government, NGO's & business

development services providers, and low access of expertise's from outside firms are important factors for industry technological innovation. Moreover, LC is an important barrier for both small and medium enterprises specific technological innovation with a grand mean value of 1.1375 & 1.2150, respectively.

- SME's industry level technological innovation barriers are ranked in this order from high important to low important barriers: LF, HCI, LTMI, LSP, IRD, LC, GPR, SE, and OC.
- Correlation has significant association between SME's at industry level; and small and medium enterprises specific technology innovation performance with barriers to technological innovation except lack of cooperation for small and medium enterprises specific.

5.2. Conclusion

The following conclusion was pointed out from the finding of the study:

- Medium enterprises in garment and textile, and metal and woodwork sectors are better introducing technological innovation from that of small enterprises in construction sector.
- Factors constraining innovation is the main reason for SMEs not innovate or actively engaging in technological innovation.
- Enterprises loss confidence on the benefit of technological innovation and de motivated to engage on innovation due to absence of support and access to loan so enterprises remain to not play what expected thus, unfavorable government policy and regulation is obstacle for SMEs at industry and small enterprises technological innovation.
- Information is power for SMEs to cope up in this dynamic environment and to overcome competitive restrain factors. Enterprises unable to learn what is going on outside enterprises regarding new technologies and its dynamic environment as a result of

absence of information technology, and the shift in demand of potential customers for new technology introduction so; LTMI is obstacle for SMEs industry and specific technological innovation.

- Enterprises are unable to access new finding which enable to do radical technological innovation as a result of no engagement on R&D, and also difficult to imitate technology actively and gain competitive advantage well in creating and adding values thus, inadequate R&D is barrier for SMEs industry & specific technological innovation.
- Enterprises at industry and specific level is unable to have necessary resources and capabilities which is critical to engage on technological innovation, due to cost to own external competency hence, HCI is a major obstacle for SMEs at industry & specific technological innovation.
- By and large innovation idea is created from people mind and those organizations govern the collection of peoples, resources and values they have. So, enterprises culture aren't encouraging employees to devote time on new ideas and employees are not updated with best practices regarding innovation thus, Organizational Culture is obstacle for SMEs at industry and small enterprises technological innovation.
- Larger firm has a probability to own capabilities from small one hence enterprises have shortage of capital for engaging in technological innovation accordingly. Therefore, Size of enterprise is obstacle for SMEs at industry and small enterprises innovation.
- Organizational activities cannot be achieved without the existence of human beings. However, enterprises has shortage of creative and innovative idea in line with shift in demand of markets so it's difficult to be successful in the engagement of new technologies therefore, **LSP** is obstacle for industry and small enterprises technological innovation.

- Finance is the main root of business. Hence, it's the main problem of SME, they couldn't assign funds for making technological innovation and even funds are not available from outside in the form of loan or support to complete prototype or expand new technology therefore, Lack of finance is barrier for SME at industry & Small enterprises
- Due to fast changing environment and increase of knowledge dissemination, it's difficult to SMEs to maintain competitive advantage through internal capability. Since, enterprises have no cooperation with universities, institution and research organization they can't access expertises from outside related to technological innovation. Therefore, lack of cooperation is barrier for SMEs at industry level technological innovation.
- Notably, LF, LSP, and IRD with internal and HCI, LTMI and GPR within external are the three most factors impeding SMEs at industry level technological innovation.

5.3. Recommendation

Based on conclusion, the study recommends the following points to overcome SMEs industry level, and small and medium enterprises specific restrain factors to engage or expand technological innovation.

5.3.1. SMEs Industry level; and Small and Medium specific should

- Access up to date technology information and materials by having web gadget access, reading technological journals, creating information integration and partnership with technological institution & vocational schools and with others in line with the shift in demand of customers of new technology.
- Engaged on radical innovation by having organized R&D offices and equipped staff and be able to use new finding of R&D of private organization for introduction or expansion of their technological innovation hence, enterprises can gain competitive advantage.

- SMEs at industry and small enterprises in particular should: believe that anybody in the enterprises could have a potential to innovate, encourage empowerment & synergies of resources, share best practices to employees in line with playing of significant role by managers or owners in spending time to listen employee ideas, and use possible opportunity to promote enterprises technological innovation.
- Hence, the industry and small enterprises specific should have adequate number of trained personnel for technological innovation by in reaching the potential of existing employees through upgrading their knowledge or hiring new employee.
- Enterprises at industry and small specific should enhance engagement on technological innovation by assigning internal funds for enterprises technological innovation in line with increasing capital and turnover of the enterprises.
- Enterprises at industry level be in a position to find partners with government, private R&D organizations, different association which helps to share experiences and expertise' in line with engagement of technological innovation.

5.3.2. Government and its policy makers; and for industry parties

The government has in a position to give due emphasis to SMEs sectors and their role in accomplishment of five years growth transformation plan in creating employment and expanding industry in country by engaging in new technology development or creation. Therefore, **government and its policy makers** should

- Set a clear policy and regulation that can encourage SMEs at industry & specific technology innovation
- Formulate independent agency which control innovation activity accordingly
- Design R & D funding (innovation fund) and enable patent is protected

- Make financial regulation to insure finance provision for innovation activities
- Support or encourage SMEs at industry level and specific small and medium enterprises to expand innovation by making access to government loans
- Modifying tax for encouraging innovators while purchasing valuable plant
- Encourage cooperation between SMEs and different parties in the country
- Allowing construction sectors to produce offer other than government order in line with shift in demand of customers

For industry parties

- Like university, business and research development organization should be in a position to share and inform new findings for SMEs at industry level technological innovation
- Banks and financial institution should design technological innovation encouraging schemes that promotes SMEs technological innovation at industry level and small and medium specific
- On other hand, financial institution should adjust in such a way to gave credit to those enterprises engaged in technological innovation according viability of technological innovation with low collateral requirement request.

5.3.3. Further research suggestion

- It would be interesting to examine barriers to technological innovation with comparing different sectors in small and medium enterprises.
- Moreover, finding out why, how and what the remedy should be Ethiopia is on the bottom (lowered) of the technological innovation continued?
- Further, it would be interesting to examine the impact of information technology on SME technological innovation

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Appendix

a. Questionnaires and interview guide

i. Questionnaires

Addis Ababa University

School of graduate studies

Masters of Business Administration (MBA) program

Questionnaire on factors Affecting innovation of Small and Medium Enterprise's (SMEs) in selected Addis Ababa sub cities

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Dear Respondents,

This questionnaire is designed to explain the extent of barriers to innovation of SME's in selected Addis Ababa sub cities. This study is conducted in partial fulfillment of the requirements for the Master's degree in Business Administration (MBA) at Addis Ababa University. Its main objective is to identify the factors affecting product and process innovativeness of small and medium enterprise in selected Addis Ababa sub cities. Your response is vital to the outcome of the study and you are requested to completely and objectively answer all questions. The research is going to be carried out based on your responses and other relevant data that could support it. It forms a major part of the research and the information you will enable the researcher to critically analyze why SME's are not active in innovation. Your cooperation to respond genuinely is very important to this study because it represents thousands of other SME's who are not included in the sample. Please answer all questions. Space is provided at the end of the questionnaire for you to add further explanations or comments. I would promise that all information you provide would be strictly confidential.

Please tick (✓) or provide your own answers where applicable.

Thank you in advance for your indispensable cooperation to spare invaluable time and energy to complete these questionnaires

Name: Sileshi Talegeta MBA student at AAU **Telephone**:

Part 1. General information and demographic background of SME's Managers or owners

1.1. Gender ☐ Male ☐ Female

1.2. Education ☐ Does read & write ☐ **Primary school** ☐ **Secondary school**
☐ **Diploma & degree** ☐ **Master & above**

1.3. What is your position in the enterprise? ☐ Manager ☐ Owner

1.4. Enterprise is established as? ☐ Sole ownership ☐ Partnership ☐ In cooperative

1.5. Currently in which enterprise scale you are engaged? ☐ Small ☐ Medium

1.6. The sectors you are engaging? ☐ Garment ☐ Metal and woodwork ☐ Construction

1.7. How long have been you engaged with the enterprise?

☐ 0-2years ☐ 3-5 years ☐ 5-7 years ☐ above 7 years

Part 2. SME's Manger/ owner opinion /views regarding barriers of innovation

Term : Product innovation is the introduction of a new or significantly improved good or service. The innovation (**new**) must be **new to your enterprise**.

Process innovation is the implementation of a new or significantly improved production process, distribution method, or support activity for your goods or services. The innovation (**new**) must be **new to your enterprise**.

2.1. Did your enterprise introduce technological innovation? Yes ☐ No ☐

2.2. If your enterprise is innovator, did it introduce?

Product innovations ☐ **Yes** ☐ **No** **Process innovation** ☐ **Yes** ☐ **No**

2.3. If your enterprise had no innovation, even if enterprise introduced innovation please indicate why it has not been necessary or possible to innovate or expand innovation?

No need due to prior innovation	☐ **Yes**	☐ **No**
No need due to market condition	☐ **Yes**	☐ **No**
Factors constraining innovation	☐ **Yes**	☐ **No**

This survey attempts to get your opinions of the barriers to product and process innovation your enterprises are facing currently. Please show the extent to which you think innovation barriers affect enterprise innovativeness. What is interested in here is a number that best shows your views about enterprises innovation barriers by putting this (✓) in the box on the following table provided.

KEY: 3 = **H**igh **2** = **M**edium **1**= **L**ow **0 = Not** experienced (**Not existed so far the services)**

2.4. To what extent are your enterprise **product and process** innovation activities obstacle by **government policy** and **Regulation? [*Please** put a check **Mark (✓)** in the box*]

	Likert scale items	**3**	**2**	**1**	0
11.	Strategies of government is appropriate for enterprise technological innovation				
12.	Government technological innovation policies is encouraging				
13.	Patent is protected for technological innovators				
14.	Enterprise innovation activities helped through government R&D funding				
15.	Regulatory measures ensure financial resources for innovation				
16.	Enterprise share new technologies experience with the help of government				
17.	Enterprise has supported through access for doing & expanding innovation by gov't				
18.	Enterprise accessed & used government loans service for innovation projects activities				
19.	Tax system is modified with the view to promote enterprise technological innovation				
20.	Gov't provide equal support for all enterprise related to innovation				

2.5. To what extent are your enterprise **product and process** innovation activities obstacle by **lack of technological** and **market information?[***please put a check **Mark(✓)** in box*]

	Likert scale items	**3**	**2**	**1**	0
21.	Has access & utilize up-to-date technological ***information*** (exposure to innovation jour and articles)				
22.	Enterprise are accessed and utilized up to date technology ***materials***				
23.	Adequate information technology transfer institutions are available for enterprise				
24.	Enterprise easily access & utilize the internet services while they need technological innovation information				
25.	Enterprise has enough knowledge of markets & their demand important for innovation				
26.	Enterprise seek new technology markets to serve and satisfying existing clients				
27.	Enterprise participates in conferences, trade fairs and exhibitions to share technological innovation information				

2.6. To what extent are your enterprise **product and process** innovation activities obstacle by **inadequate research and development? [***please put a check **Mark(✓)** in the applicable box*]

	Likert scale items	3	2	1	0
28.	Enterprise has organized R&D office & equipped staffs ready to innovation				
29.	Enterprise has adequate engagement on R&D towards innovation				
30.	Enterprise believe R&D enable to innovate new technology inline with user demands				
31.	Enterprise has purchased and used new technology investigation of R&D of private organizations				

2.7. To what extent are your enterprise **product and process** innovation activities obstacle by **high cost? [***please put a check **Mark(✓)** in the applicable box***]**

	Likert scale items	**3**	**2**	**1**	0
32.	Enterprise hire or purchase the necessary skill or equipment which is important to innovation				
33.	Too high innovation costs is tolerated by enterprise				
34.	Cost of acquiring external competence which is important to innovation are possible by enterprise				
35.	Enterprise encourage staff to devote time and resources to innovation projects				
36.	Enough budget is assigned to innovation activities by enterprise				
37.	Enterprise innovation is on-going basis based on customer requirements				
38.	Risk is taken by enterprise while the infeasibility of the innovation project is possible				

2.8. To what extent are your enterprise **product and process** innovation activities obstacle by **Organizational culture? [** *please put a check **Mark(✓)** in the applicable box***]**

	Likert scale items	**3**	**2**	**1**	**0**
39.	Enterprise believe as anyoneof the worker could be creative and innovative				
40.	Employees are empowered to come with new ideas in the enterprise				
41.	Enterprise is aware of constant change env't & innovation as key to this situation				
42.	Enterprise has encourage synergies of different resources towards innovation				
43.	Enterprise managers or owners play significant role in promoting innovation				
44.	Supervisors spend a good deal of time listening to employees' ideas and support for new ideas development				
45.	Enterprise enables staffs to update with best practice learning (benchmarking exercise) related to innovation				
46.	Enterprise see opportunities for innovation where others see problems				

2.9. To what extent are your enterprise **product and process** innovation activities obstacle by **Size of enterprise? [***please put a check **Mark(✓)** in the applicable box***]**

	Likert scale items	**3**	**2**	**1**	0
47.	Enterprise didn't facing problem of innovation due to being small or medium				
48.	Internal funds are available and assigned for innovation activities no matter size				
49.	Enterprise has well engaged on innovation with help of efficient R&D activity no matter the size				

2.10. To what extent are your enterprise **product and process** innovation activities obstacle by **lack of skilled personnel? [** ***please*** *put a check* ***Mark(✓)*** *in the applicable box***]**

	Likert scale items	**3**	**2**	**1**	**0**
50.	Enterprise has adequate number of trained personnel (human resources capabilities) needed for successful innovation projects				
51.	Enterprise has individuals with creative and innovative ideas				
52.	Enterprise has enough managerial know-how to effectively and efficiently manage innovation processes				
53.	Within enterprise qualified, experienced and technically skilled personnel are available for innovation				
54.	Within the market qualified, experienced and technically skilled personnel are available for innovation				

2.11. To what extent are your enterprise **product and process** innovation activities obstacle by **lack of finance? [*please* *put a check* ***Mark(✓)*** *in the applicable box***]**

	Likert scale items	**3**	**2**	**1**	**0**
55.	Enough funds are available within your enterprise to carryout innovation projects				
56.	Enterprise has access to long term loans from banks to innovation projects				
57.	Funds are available from sources outside your enterprise for innovation				
58.	Investors (banks, venture capitalists, etc.) are encouraging innovative firms through financing				
59.	Collateral requirements of banks & financial institutions are encouraging innovation				

2.12. To what extent are your enterprise **product and process** innovation activities obstacle by **lack of cooperation? Innovation co-operation** is active participation with other firms or organizations on innovation activities.**[***please put a check* ***Mark(✓)*** *in box***]**

	Likert scale items	**3**	**2**	**1**	0
60.	Enterprise has no difficulty in finding cooperation partners for innovation				
61.	Enterprise has good cooperation with institutions i.e. universities, non - university, and business development service provider regarding innovation				
62.	Enterprise can access expertise for innovation from other firm and scaling up innovation				
63.	Enterprise establish relationship with technical, commercial R&D enterprises and Industrial associations				
64.	Enterprise has done closely with federal government, private and non-profit research institutes on innovation issues				

2.13. Rank those barriers to **product and process** innovation according to the extent your enterprise is facing? **[***please put a check **Mark indicating their rank (1-9)*** in the box**]**

- ☐ Lack of finance
- ☐ Government policy & regulation
- ☐ Lack of technological & market information
- ☐ Inadequate Research &Development
- ☐ High Cost of innovation
- ☐ Size of enterprise
- ☐ Lack of skilled personnel
- ☐ Organizational culture
- ☐ Lack of cooperation

Part 3. Open ended questions for SME's managers and/or Owners

3.1. Why are SME's firms not actively engaging in product & process innovation? (What, according to you, are ***three of the most important factors*** for successful enterprises innovation?)

_____

3.2. What are **those internal factors** which hinder your organization product and process innovativeness so far? **You can give more than one answer**

- ☐ Inadequate R and D
- ☐ Organization culture
- ☐ Lack of cooperation
- ☐ Size of enterprise
- ☐ Lack of finance
- ☐ Lack of skilled personnel
- ☐ **If other please specify**

_____

Of those internal factors affecting your enterprise product and process innovation rank three of them according their extent they hinder?

3.3. What are those **external factors** hindering your organization product and process innovativeness so far? **You can give more than one answer.**

- ☐ High cost of innovation
- ☐ Lack of technology & market information
- ☐ Government policy & regulation
- ☐ **If others please specify**

Of those ***external factors affecting your enterprise*** product and process innovation rank three of them according their extent they hinderer?

3.4. List those factors affecting technological innovation of SMEs other than discussed above?

3.5. What is suggestion to overcome the problem of barriers to technological innovation your enterprise is facing?

Thank you again for your cooperation to complete this questionnaire!

Sileshi Talegeta

ii. Interview guide

Addis Ababa University

Masters of Business Administration (MBA) program

Interview guide questions for Small and Medium Enterprise's (SME's) manufacturing and construction work facilitators on factors affecting technological(product and process) innovation of SME's in selected Addis Ababa sub cities.

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1. Why are SME's firms not actively engaging in product and process innovation? Please indicate why it has not been necessary or possible to innovate? What, according to you, are ***the most* i**mportant factors constraining innovation of SME's enterprise?

2. What are those ***internal factors*** hindered SME's product and process innovation so far? (What, according to you, are three of the most important factors ***constraining*** enterprise innovation?

3. What are those ***external factors*** hindered SME's product and process innovation so far? (What, according to you, are three of the most important factors ***constraining*** enterprise innovation?

4. List those factors affecting product and process innovation of SME's other than discussed or touched above?

5. What is ***your suggestion*** to overcome the problem of barriers to product and process innovation SME's at industry facing?

Thank you again for your cooperation to complete this interview.

Sileshi Talegeta

አዲስ አበባ ዩኒቨርሲቲ

የቢዝነስና ሕዝብ አስተዳደር ት/ቤት

ማስተርስ ኦፍ ቢዝነስ አድሚንስትሬሽን

በአዲስ አበባ የአነስተኛ እና መካከለኛ ኢንተርፕራይዞችን የፈጠራ ክህሎት ላይ ተፅዕኖ የሚያደርጉ ምክንያቶችን ለማጥናት የተዘጋጀ መጠይቅ፡፡

የተከበሩ የጥናቱ ተሳታፊ፡

ይህ መጠይቅ የተዘጋጀው በአዲስ አበባ ከተማ በተመረጡ ክፍለ ከተሞች ውስጥ የሚገኙ የአነስተኛ እና መካከለኛ ኢነተርፕራይዞችን **የፈጠራ ክህሎትን የሚገድቡ ምክንያቶችን ለማጥናት ነው**፡፡ ጥናቱም የሚካሄደው በአዲስ አበባ ዩኒቨረስቲ ማስተርስ ኦፍ ቢዝነስ አድሚንስትሬሽን የማስተርስ ዲግሪ **በከፊል ማሟያ እንዲሆን** ነው፡፡

የጥናቱም ዓላማ በአዲስ አበባ በተመረጡ ክፍለ ከተሞች ውስጥ የሚገኙ የአነስተኛ እና መካከለኛ ኢነተርፕራይዞችን የፈጠራ ክህሎትን የሚገድቡ ምክንያቶችን ለመለየት ነው፡፡ የሚሰጡት መልስ ለጥናቱ ውጤት በጣም አስፈላጊ ስለሆነ ይህንኑ ተገንዝበው ትክክለኛውን **መልስ ለሁሉም ጥያቄዎች እነዲሰጡ** ስል ጥናቱን የማካሄደው ግለሰብ በአክብሮት እጠይቀዎታለሁ፡፡የሚሰጡት ምላሽ ጥናቱን ከሚያካሄደው ሰው በስተቀር ሚስጥራዊነቱ የተጠበቀ መሆኑንም ይወቁ፡፡

እባክዎን በተሰጠው ሳጥን ውስጥ በሚፈልጉት ምርጫ ትይዩ ይህን (✓) ምልክት በማድረግ መልሶዎን ይስጡ!

ስለሚያደርጉት ትብብር በቅድሚያ አመሰግናለሁ፡፡

ጥናቱን የሚያካሄደው፡ ***ሰለሺ ታለሬታ*** **አድራሻ፡**

ክፍል 1፡ አጠቃላይ እና ዲሞግራፊክ መረጃ ለአነስተኛ እና መካከለኛ ኢንተርፕራይዞች ባለቤቶች ወይም አስተዳደሮች

1.1. ፆታ ☐ ወንድ ☐ ሴት

1.2. የትምህርት ደረጃ ☐ማንበብና መጻፍ ☐ አንደኛ ደረጃ ☐ ሁለተኛ ደረጃ ☐ዲፕሎማ እና ዲግሪ ☐ማስተርስ እና ከዚያ በላይ

1.3. የስራ ድርሻዎ ወይም ሀላፊነትዎ ? ☐ አስተዳደር ☐ ባለቤት

1.4. የኢንተርፕራይዙ ህጋዊ አደረጃጀት? ☐ የግል ☐ የቡድን ☐ የህብረት ስራ ማህበር

1.5. በአሁኑ ሰዓት በየትኛው የኢንተርፕራይዝ ደረጃ ላይ የተሰማራችሁት?☐ አነስተኛ ☐ መካከለኛ

1.6. በምን የስራ ዘርፍ ተሰማርተው ይገኛሉ? ☐በአልባሳት ☐ብረታብረት እና እንጨት ☐በግንባታ

1.7. ለምን ያህል ጊዜ በኢንተርፕራይዙ ውስጥ ቆይተዋል?☐0-2 ዓመት ☐3-5ዓመት ☐ 5-7ዓመት☐ ከ7 በላይ ዓመት

ክፍል 2፡ ክህሎትን ስለሚገድቡ ምክንያቶች የአነስተኛ እና መካከለኛ ኢንተርፕራይዝ አስተዳደር ወይም ባለቤት አስተያየት ይመለከታል

መግለጫ፡

የምርት ፈጠራ ፈጥረዋል የሚባለው፡ አዲስ *ምርት ወይም አገልግሎት ለመጀመሪያ ግዜ ድርጅቱ* በፈጠራ መልክ ያቀረበ እና የተጠቀመ ሲሆን፡፡

የአመራረት ወይም አቅርቦት ሂደት ፈጠራ ፈጥረዋል የሚባለው፡ አዲስ *ወይም የተሻሻለ የአመራረት ወይም አቅርቦት ሂደት* ወይም *አሰራር ዘዴ ለመጀመሪያ ግዜ ድርጅቱ* በፈጠራ መልክ ያቀረበ እና የተጠቀመ ሲሆን፡፡

2.1. እስካሁን ድርጅትዎ ፈጠራ ላይ? ☐ ተሰማርቷል ☐ አልተሰማራም

2.2. <u>በፈጠራ ስራ ላይ ተሰማርተው ከሆነ</u> ምን ግኝት(ፈጠራ) አስተዋውቀዋል(ወጤት አስገኝተዋል)?

አዲስ ምርት ወይም አገልግሎት	☐ አዎ	☐ አይደለም
አዲስ የአመራረት ወይም አቅርቦት ሂደት ወይም አሰራር ዘዴ	☐ አዎ	☐ አይደለም

2.3. <u>ድርጅትዎ በፈጠራ ላይ ያልተሰማራ ከሆነ</u> ደግሞም ተሰማርቶ ከሆነም እባክዎ ከሚከተሉት ምክንያቶች ፈጠራ ውስጥ እንዳትገቡ ወይም እዳታሳድጉት ያደረጋችሁን ይጥቀሱ?

በቀደመው ፈጠራ ምክንያት ፈጠራ ስለማያስፈልግ ነው	☐ አዎ	☐ አይደለም
የገበያው ሁኔታ ፈጠራ ውጤቶችን ስለማያበረታታ ነው	☐ አዎ	☐ አይደለም
የፈጠራ ክህሎትን በሚገድቡ ምክንያቶች ነው	☐ አዎ	☐ አይደለም

ይህ ጥናት የሚያተኩረው በድርጅትዎ ውስጥ ክህሎትን ስለሚገድቡ ምክንያቶች ማለትም በምርት እና አሰራር ዘዴ ፈጠራ ላይ ያለዎትን አመለካከት ለማወቅ ነው፡፡እባክዎ ከተዘረዘሩት ምርጫዎች ዉስጥ በምን መጠን የድርጅትዎ የፈጠራ ክህሎት ተገድቦ (ተፅዕኖ ደርሶበት) እንደሆነ ከስር በተሰጠው የልኬት መጠን በሚፈልጉት ምርጫ ሳጥን ውስጥ ትይዩ ይህን ምልክት (✓)በማድረግ መልሶዎን ይስጡን፡፡

<u>መግለጫ</u>፡ 3 = በከፍተኛ **2** = በመካከለኛ **1**= በዝቅተኛ **0 = ምንም ጥሩ ተፅዕኖ አላደረገብኝም/ የለውም**

2.4. በምን ያህል መጠን **የመንግስት ፖሊሲ ወይም ስትራቴጂ እና ድጋፍ እጥረት** በድርጅትዎ የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
11.	የመንግስት ስትራቴጂ ለድርጅቱ የፈጠራ ስራ ተስማሚ እና አመቺ ነው				
12.	ድርጅቱ በመንግስት የፈጠራ ፖሊሲ ይበረታታል				
13.	የስራ ፈጠራ መብት በመንግስት በቂ ጥበቃ ይደረግለታል				
14.	የመንግስት የጥናት እና ምርምር ፈንድ የድርጅቱን የፈጠራ ስራ ያግዛል				
15.	የመንግስት ደንቦች እና አዋጆች ለፈጠራ ስራ የገንዘብ ድጋፍ እና አቅርቦት እንዲያገኙ ያመቻቻሉ				
16.	መንግስት አዳዲስ የፈጠራ ውጤቶችን እና ግኝቶችን ድርጅትዎ ልምድ እንዲቀስም የልምድ ልውውጦችን ያመቻቻል				
17.	ድርጅትዎ ፈጠራ እንዲያካሂድ እና አንዲያስፋፋ በመንግስት አስፈላጊ አቅርቦት ይደረግለታል				
18.	ድርጅትዎ የመንግስትን ብድር አገልግሎት ለፈጠራ ስራ ማግኘት እና መጠቀም ይችላል				
19.	የሀገሪቱ ቀረጥ(ታክስ) ደንብ ላይ የድርጅትዎን ፈጠራን ለማበረታታት ማሻሻያ ተደርጓል				
20.	መንግስት ለሁሉም ድርጅቶች ፈጠራን በተመለከተ ተመጣጣኝ እና እኩል የሆነ ድጋፍ እና ማበረታቻ ያደርጋል				

2.5. በምን ያህል መጠን **የቴክኖሎጂ እና ገበያ መረጃ እጥረት** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
21.	ድርጅትዎ ዘመናዊ የሆነ ቴክኖሎጂ *መረጃ*አቅርቦት የሚያገኝ እና የሚጠቀም ነው				
22.	ድርጅትዎ ዘመናዊ የቴክኖሎጂ *መሳሪያዎችን* አቅርቦት እና ተጠቃሚነት ያገኛል				
23.	ለድርጅትዎ እና ለሌሎች ድርጅቶች በቂ *መረጃ* ቴክኖሎጂ ሽግግርን የሚያመቻቹ ተቋማቶች አሉ				
24.	ድርጅትዎ የቴክኖሎጂ ፈጠራ መረጃ ለማግኘት የኢንተርኔት አገልግሎት ተጠቃሚ ነው				
25.	ድርጅቱ ለፈጠራ የሚጠቅም ስለደንበኞች ፍላጎት ወቅታዊና በቂ የሆነ መረጃ አለው				
26.	ድርጅቱ አዲስ እና ነባር የሆኑ የአዳዲስ ቴክኖሎጂ ፈጠራ ገበያ ተጠቃሚዎችን እየተጠቀመ ለፈጠራ ይበረታታል				
27.	ድርጅትዎ በተለያዩ ኮንፈረንሶች፡ኤግዚቢሽኖች እነዲሁም የምርት እና ቴክኖሎጂ መረጃ ማስተዋወቂያዎች ላይ ልምድ ለማግኘት ይሳተፋል				

2.6. በምን ያህል መጠን **በቂ ያልሆነ የጥናት እና ምርምር መረጃ** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
28.	ድርጅቱ የተቀናጀ ጥናት እና ምርምር ክፍል እና ለፈጠራ ዝግጁ የሆኑ ሰራተኖች አሉት				
29.	ድርጅቱ በቂ ጥናት እና ምርምር በማድረግ ለፈጠራ ይበረታታል				
30.	የድርጅቱ ጥናት እና ምርምር ድርጅቱን የአዲስ ቴክኖሎጂ ፈጠራን ከደንበኞች ፍላጎት ጋር እንዲያገናኝ ያስችላል ተብሎ ይታመናል				
31.	ድርጅቱ የግል ጥናት እና ምርምር ተቋማትን የአዲስ ቴክኖሎጂ ፈጠራ ሀሳብን በመግዛት ይጠቀማል				

2.7.በምን ያህል መጠን **ከፍተኛ ወጪ** በድርጅትዎ የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	0
32.	ድርጅቱ ብቁ እና ለፈጠራ አስፈላጊ የሆኑ ክህሎቶችን እና አዳዲስ እቃዎችን በመግዛት እና ቀጥሮ ይጠቀማል				
33.	በጣም ውድ የሆኑ የፈጠራ ወጭዎች በድርጅቱ በበቂ ሁኔታ ይሸፈናሉ				
34.	ከውጭ ለፈጠራ በጣም አስፈላጊ የሆኑ ክህሎቶችን ድርጅቱ ወጪ በመመደብ ይቀጥራል				
35.	ድርጅቱ ሰራተኞቹን በቂ ሰዓት እና ጉልበት በመመደብ ፈጠራ ስራ ውስጥ በደንብ እዲሰማሩ ያበረታታል				
36.	ድርጅትዎ አስፈላጊ የሆነ በጀት ለፈጠራ ስራ በየግዜው ይመድባል				
37.	የድርጅቱ ፈጠራ ሳይቋረጥ በየግዜው የደንበኞችን ፍላጎት መሰረት በማድረግ ይከናወናል				
38.	ድርጅቱ የፈጠራ ውጤት አለመሳካት አደጋ በሰራተኞች ላይ ሲከሰት በቀላሉ ተቀብሎ እንደገና ፈጠራ ስራውን ያስቀጥላል				

2.8. በምን ያህል መጠን **የድርጅትዎ አሰራር(culture)** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
39.	ድርጅትዎ ማንኛውም የድርጅቱ ሰራተኛ የፈጠራ ብቃት አለው ብሎ ያምናል				
40.	የድርጅቱ ሰራተኞች አዳዲስ የፈጠራ ሃሳብ እንዲያፈልቁ ይበረታታሉ				
41.	ድርጅቱ ተለዋዋጭ የገበያ ሁኔታ እንዳለ አውቆ ተወዳዳሪ ለመሆን የፈጠራ ስራ አስፈላጊ እንደሆነ ያምናል				
42.	ድርጅትዎ የተለያዩ ግብዓቶችን በማቀናጀት እና በመስራት የፈጠራ ስራውን ለማሳለጥ ይሰራል				
43.	የድርጅቱ *ባለቤት ወይም አስተዳዳሪ* የፈጠራ ስራን ለማሳደግ ሚና ይጫወታል				
44.	የድርጅቱ ስራ ሃላፊዎች የሰራተኞችን የፈጠራ ሃሳብ ለማዳመጥና ለማገዝ ጊዜ ሰጥተው ስራቸውን ያከናውናሉ				
45.	ድርጂቱ ሰራተኞቹን በአዳዲስ እና በሌሎች ድርጅቶች የስራ ልምድ በመጠቀም ለፈጠራ ራሳቸውን እንዲያሻሽሉ ያደርጋል				
46.	ድርጅቱ ለአዳዲስ የፈጠራ ሀሳብ እድሎች ራሱን ክፍት ያደርጋል ሌሎች እንደ ድክመት ሲመለከቱት				

2.9. በምን ያህል መጠን **የገንዘብ እጥረት** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
47.	የፈጠራ ስራ ለማካሄድ በቂ የሆነ ገንዘብ ድርጅትዎ አለው				
48.	ድርጅትዎ የረጅም ጊዜ ብድር ለፈጠራ ስራ ሲያስፈልገው ከባንኮቹ ያገኛል				
49.	ድርጅቱ ከሚመድበው ውጭ ለፈጠራ ስራ በፈንድ መልክ ከሌሎች ድርጅቶች ያገኛል				
50.	ባለሀብቶች የፈጠራ ስራ ላይ የተሰማሩ ድርጅቶችን የገንዘብ ድጋፍ በማድረግ ይተባበራሉ				
51.	የባንኮች እና የገንዘብ ተቋማት የጋራ ዋስትና አሰራር (collateral requirement) ለፈጠራ ስራ አበረታች ነው				

2.10. በምን ያህል መጠን **የድርጅትዎ አቅም** ወይም **ስፋት** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	**0**
52.	የድርጅትዎ ስፋት ወይም አቅም የፈጠራ ስራ ላይ ተፅዕኖ አላደረገም				
53.	የድርጅትዎ አቅም ወይም ስፋት የድርጅትዎን *የውሰጥ ፈንድ* ለፈጠራ ስራ የሚመደበውን ተፅዕኖ አላደረገበትም				
54.	ድርጅትዎ ባለው ስፋት ሳይገደብ *በበቂ ሁኔታ* እና *በጥራት ጥናት እና ምርምር* በማድረግ ፈጠራ ላይ ተሰማርቷል				

2.11. በምን ያህል መጠን **የሰለጠነ የሰው ኃይል እጥረት** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	0
55.	ድርጅትዎ ለውጤታማ ፈጠራ ስራ በቂ የሆነ እና የሰለጠነ የሰው ሀይል አለው				
56.	ድርጅትዎ አዳዲስ የፈጠረ ሃሳብ ሊያመነጩ የሚችሉ ብቁ የሆኑ ሰራተኞች አሉት				
57.	ድርጅትዎ የሚሰራውን የፈጠራ ስራ በብቃት እና በጥራት ለመቆጣጠር የሚችል አስተዳደራዊ የሰው ሀይል አለው				
58.	በድርጅትዎ ውስጥ ለፈጠራ ስራ የሰለጠኑ፡ ልምድ ያካበቱ እና የሙያ ብቃት ያላቸው ሰራተኞች አሉ				
59.	በገበያ ውስጥ ለፈጠራ ስራ የሰለጠኑ፡ ልምድ ያካበቱ እና የሙያ ብቃት ያላቸው ሰራተኞች አሉ				

2.12. በምን ያህል መጠን **በትብብር አብሮ ከሌሎች ጋር አለመስራት** የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ላይ ተፅዕኖ አድርጓል?

የፈጠራ ትብብር ማለት ድርጅትዎ በፈጠራ ስራ ላይ ንቁ ተሳትፎ ከሌሎች ድርጅቶች ጋር የሚያደርገው ትብብር ነው::

	የልኬት መጠን ዝርዝሮች	**3**	**2**	**1**	0
60.	ድርጅትዎ ሌሎች በትብብር ፈጠራን መስራት የሚፈልጉ ድርጅቶችን በመፈለግ አብሮ ይሰራል				
61.	ድርጅትዎ ጥሩ የሆነ ትብብር ከተቋማት(ዩኒቨረሲቲ፣ዩኒቨረሲቲ ካልሆኑ፣ ንግድ ስራን ማሳደግ አገልግሎት ሰጪዎች ጋር) ፈጠራን በተመለከተ አለው				
62.	ድርጅትዎ የሌሎች ድርጅቶችን የፈጠራ ባለሙያውች በማግኘት ፈጠራውን ያሳድጋል				
63.	ድርጅትዎ ከሙያተኞች፣ ከጥናት እና ምርምር አገልግሎት ሰጪዎች እና የኢንዱስትሪ ማህበራት ጋር በፈጠራ ስራ ላይ ግንኙነት አለው				
64.	ድርጅትዎ በቅርበት በፈጠራ ጉዳይ ላይ ከፌደራል መንግስት፣ከግል እና አትራፊ ካልሆኑ ጥናት እና ምርምር ተቋማት ጋር ይሰራል				

2.13. ከሚከተሉት የድርጅትዎን የምርት እና የስራ ሂደት ፈጠራ ተፅዕኖ አድራጊዎች ውስጥ ***በፈጠሩት ጥሩ ያልሆነ ተፅዕኖ*** መጠን በደረጃ ያአስቀምጧቸው? (እባክዎን በተሰጠው ሳጥን ውስጥ ***<u>የሚፈልጉትን ምርጫ በደረጃ</u>*** **<u>(1 - 9)</u>** ያስቀምጧቸው)::

- ⇨ **የገንዘብ እጥረት**
- ⇨ **የመንግስት ፖሊሲ** ወይም **ስትራቴጂ እና ድጋፍ እጥረት**
- ⇨ **የቴክኖሎጂ እና ገበያ መረጃ እጥረት**
- ⇨ **በቂ ያልሆነ የጥናት** እና **ምርምር መረጃ**
- ⇨ **የፈጠራ ከፍተኛ ወጪ**
- ⇨ **የድርጅትዎ አቅም** ወይም **ስፋት**
- ⇨ **የሰለጠነ የሰው ኀይል እጥረት**
- ⇨ **የድርጅትዎ አሰራር (culture)**
- ⇨ **በትብብር አብሮ ከሌሎች ጋር አለመስራት**

ክፍል 3 :<u>ማብራሪያ የሚጠይቅ ለአነስተኛ እና መካከለኛ ድርጅቶች ባለቤቶች ወይም አስተዳደሮች የተዘጋጀ መጠይቅ</u>::

3.1. ድርጅትዎ እስከ አሁን ድረስ የምርት እና የስራ ሂደት ፈጠራን በበቂ እንዳያካሄድ ተፅዕኖ ያደረጉ ምን ምክንያቶች ናቸው? (እንደእርሶ አስተያየት በጣም ***ወሳኝ የሆኑትን ሦስት ምክንያቶችን*** በተብራራ መንገድ ይጻፉ)::

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3.2. በድርጅታችሁ **ውስጥ (*internal factors*)** የምርት እና የስራ ሂደት ፈጠራ በበቂ እንዳይካሄድ ተፅዕኖ የፈጠሩት **ምክንያቶች(ችግሮች)** ምንድን ናቸው? **(ከአንድ በላይ** መልስ መስጠት ይችላሉ) የሚፈልጉትን ምርጫ ውስጥ ይህን (✓) ምልክት ያድርጉ::

☐ በቂ ያልሆነ የጥናት እና ምርምር መረጃ እጥረት ☐ የድርጅትዎ አሰራር ☐ የድርጅትዎ አቅም ወይም ስፋት

☐ የገንዘብ እጥረት ☐ በትብብር አብሮ ከሌሎች ጋር አለመስራት ☐ የሰለጠነ የሰው ኀይል እጥረት

☐ **ሌላ ካለ እባኮን ይግለጡት**

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ከላይ ከተጠቀሱት በድርጅታችሁ ***የውሰጥ ምክንያቶች(ችግሮች)*** የምርት እና የስራ ሂደት ፈጠራን በሰፊው እንዳያካሄዱ ተፅዕኖ ካደረጉት ውስጥ ***ከአንድ እስከ ሦስት*** በደረጃ ያስቀምጡ?

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2._____
3._____

3.3. ከድርጅታችሁ **ቁጥጥር *ውጭ (External factors)*** የምርት እና የስራ ሂደት ፈጠራን በሰፊው እንዳታካሄዱ ተፅዕኖ የፈጠሩ **ምክንያቶች(ችግሮች)** ምንድን ናቸው? **(ከአንድ በላይ መልስ** መስጠት ይችላሉ የሚፈልጉትን ምርጫ ውስጥ ይህን (✓) ምልክት ያድርጉ)

☐ የመንግስት ፖሊሲ ወይም ስትራቴጂ እና ድጋፍ እጥረት
☐ የቴክኖሎጂ እና ገበያ መረጃ እጥረት
☐ ከፍተኛ ወጪ
☐ ሌላ ካለ እባኮዎን ይግለጡት

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ከላይ ከተጠቀሱት ከድርጅታችሁ **ቁጥጥር *ውጭ (External factors)* *ምክንያቶች (ችግሮች)*** የምርት እና የስራ ሂደት ፈጠራን በሰፊው እንዳታካሄዱ ተፅዕኖ ካደረጉት ውስጥ ***ከአንድ እስከ ሦስት*** በደረጃ ያስቀምጡ?

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3.4. ከላይ **ከተጠቀሱት ውጭ** የአነስተኛ እና መካከለኛ ድርጅቶችን የምርት እና የስራ ሂደት ፈጠራን ተፅዕኖ የሚያደርጉ ምክንያቶችን ጥቀስ?

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3.5. የድርጅትዎን የምርት እና ስራ ሂደት ፈጠራ **በውስጥ** እና **ከውጭ (ከቁጥጥር *ውጭ*)** ተፅዕኖዎች ለመቋቋም ድርጅትዎ ምን ማድረግ አለበት ብለው ያስባሉ?

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ስላደረጉልኝ ትብብር አመሰግናለሁ!

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b. List of tables

Table 4.4: The effect of **government** (gov't) **policy and regulation** on SMEs industry and Small & Medium enterprises specific technological innovation

		SMEs industry						Small	Medium
								Mean	Mean
		NE(0)	L(1)	M(2)	H(3)	Total	Mean		
Q11.Appropriateness of government strategies	**Fr**	2	34	74	42	152	**2.0263**	**2.0179**	**2.0500**
	Per	1.3	22.4	48.7	27.6	100			
Q12. Government innovation policies encouraged	**Fr**	12	30	**47**	**63**	152	**2.0592**	**1.9643**	**2.3250**
	Per	7.9	19.7	30.9	41.4	100			
Q13. Innovation has Patent protection	**Fr**	34	67	39	12	152	**1.1908**	**1.1161**	**1.4000**
	Per	22.4	44.1	25.7	7.9	100			
Q14.Enterprise helped via government R&D funding	**Fr**	58	47	33	14	152	**1.0197**	**0.9911**	**1.1000**
	Per	38.2	30.9	21.7	9.2	100			
Q15. Regulation ensure financial support for innovation	**Fr**	48	55	31	18	152	**1.1250**	**1.0893**	**1.2250**
	Per	31.6	36.2	20.4	11.8	100			
Q16. Share new tech. experience with help of government	**Fr**	20	54	48	30	152	**1.5789**	**1.5089**	**1.7750**
	Per	13.2	35.5	31.6	19.7	100			
Q17. Support for doing & expanding innovation by gov't.	**Fr**	36	67	33	16	152	**1.1908**	**1.0982**	**1.4500**
	Per	23.7	44.1	21.7	10.5	100			
Q18. Enterprise has access & used gov't loans services for innovation.	**Fr**	42	63	40	7	152	**1.0789**	**0.9911**	**1.3250**
	Per	27.6	41.4	26.3	4.6	100			
Q19. Tax system is modified to promote innovation	**Fr**	62	48	32	10	152	**0.9342**	**0.8304**	**1.2250**
	Per	40.8	31.6	21.1	6.6	100			
Q20. Gov't provides equal support for all enterprise related to innovation	**Fr**	30	73	33	16	152	**1.2303**	**1.1250**	**1.5250**
	Per	19.7	48	21.7	10.5	100			
Grand							**1.3434**	**1.2732**	**1.5400**

Source: Survey result, 2012 NE-Not Experienced L-Low M-Medium H-High

Table 4.5: Effect of **lack of technological and market information** on SMEs industry and enterprises specific technological innovation

		SMEs Industry						Small	Medium
								Mean	Mode
		NE(0)	L(1)	M(2)	H(3)	Total	Mean		
Q21.Ent.has access & utilize up to date tech.inf.	**Fr.**	10	70	62	10	152	1.4737	**1.3839**	**1.7250**
	Per.	6.6	46.1	40.8	6.6	100			
Q22.Ent. accessed & utilized up to date tech. materials	**Fr.**	21	70	45	16	152	1.3684	**1.2946**	**1.5750**
	Per.	13.8	46.1	29.6	10.5	100			
Q23.Availability of tech. transfer institution for Ent.	**Fr.**	60	59	28	5	152	0.8553	**0.7857**	**1.0500**
	Per.	39.5	38.8	18.4	3.3	100			
Q24.Ent. access and usage of internet svs for tech. inno inf.	**Fr.**	61	50	31	10	152	0.9342	**0.8393**	**1.2000**
	Per.	40.1	32.9	20.4	6.6	100			
Q25. Ent. has knowledge of mkt & their dd important to inno	**Fr.**	28	53	59	12	152	1.3618	**1.3304**	**1.4500**
	Per.	18.4	34.9	38.8	7.9	100			
Q26.Ent. seek new tech. mkts to serve & satisfy existing clients	**Fr.**	19	88	38	7	152	1.2171	**1.0982**	**1.5500**
	Per.	12.5	57.9	25	4.6	100			
Q27. Ent. participate in Conf.& exhibitions to share tech. inno inf.	**Fr.**	18	48	65	21	152	1.5855	**1.4821**	**1.8750**
	Per.	11.8	31.6	42.8	13.8	100			
Grand							**1.2565**	**1.1734**	**1.4892**

Source: Survey result, 2012 NE-Not Experienced L-Low M-Medium H-High

Table 4.6: Inadequate Research and Development effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
		NE(0)	L(1)	M(2)	H(3)	Total	Mean	Mean	Mean
Q28. Enterprise has organized R&D office & equipped staffs	**Fr**	60	58	29	5	152	0.8618	**0.7500**	**1.1750**
	Per	39.5	38.2	19.1	3.3	100			
Q29. Enterprise engage on R&D to made innovation	**Fr**	57	44	32	19	152	1.0855	**0.9107**	**1.5750**
	Per	37.5	28.9	21.1	12.5	100			
Q30. Enterprise believe R&D enable to innovation new technology	**Fr**	12	46	74	20	152	1.6711	**1.6250**	**1.8000**
	Per	7.9	30.3	48.7	13.2	100			
Q31. Enterprise used new tech. inno finding of R&D of private org	**Fr**	70	50	20	12	152	0.8289	**0.7143**	**1.1500**
	Per	46.1	32.9	13.2	7.9	100			
Grand							1.1118	**1.000**	**1.4250**

Source: Survey result, 2012 **NE-Not Experienced** **L-Low** **M-Medium** **H-High**

Table 4.7: The effect of **high cost of innovation** on SMEs at industry level and specifically to Small and Medium enterprises to engage in technological innovation

		SMEs industry(152)						Small	Medium
		NE(0)	L(1)	M(2)	H(3)	Total	Mean	Mean	Mean
Q32. Ent. hire or puch. necessary skill or equipment for inno	**Fr**	27	75	38	12	152	**1.2303**	**1.0625**	**1.7000**
	Per	17.8	49.3	25	7.9	100			
Q33.Too high inno cost is tolerated by ent.	**Fr**	40	72	26	14	152	**1.0921**	**0.9554**	**1.4750**
	Per	26.3	47.4	17.1	9.2	100			
Q34. Cost of aquiring external competence is poss. by ent.	**Fr**	76	45	22	9	152	**0.7632**	**0.7589**	**0.7750**
	Per	50.0	29.6	14.5	5.9	100			
Q35. Ent. encourage staff to devote time & resources to inno.	**Fr**	34	38	46	34	152	**1.5263**	**1.5000**	**1.6000**
	Per	22.4	25.0	30.3	22.4	100			
Q36. Ent. budget enough money for inno activities	**Fr**	77	50	21	4	152	**0.6842**	**0.5179**	**1.1500**
	Per	50.7	32.9	13.8	2.6	100			
Q37. Ent. inno is ongoing bases in line with customer needs	**Fr**	59	60	17	16	152	**0.9342**	**0.7679**	**1.4000**
	Per	38.8	39.5	11.2	10.5	100			
Q38. Risk is taken by enterprise while failure is possible	**Fr**	41	73	22	16	152	**1.0855**	**0.9375**	**1.5000**
	Per	27.0	48	14.5	10.5	100			
Grand							**1.0451**	**0.9285**	**1.3714**

Source: Survey result, 2012 **NE-Not Experienced** **L-Low** **M-Medium** **H-High**

Table 4.8: Organization culture effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
								Mean	Mean
		NE(0)	(1)	M(2)	H(3)	Total	Mean		
Q39. Ent. believe anybody could create & inno	**Fr**	22	58	40	32	152	**1.5395**	**1.4643**	**1.7500**
	Per	14.5	38.2	26.3	21.1	100			
Q40.Ent. empower employee to come with new ideas	**Fr**	30	52	50	20	152	**1.3947**	**1.2857**	**1.7000**
	Per	19.7	34.2	32.9	13.2	100			
Q41. Inno is key to growth in constant changing env't	**Fr**	10	16	64	62	152	**2.1711**	**2.0625**	**2.4750**
	Per	6.6	10.5	42.2	40.8	100			
Q42. Ent. encourage synergies of d/t resources to inno	**Fr**	37	50	40	25	152	**1.3487**	**1.1696**	**1.8500**
	Per	24.3	32.9	26.3	16.4	100			
Q43. Ent.mgr or owner play significant role to promote inno	**Fr**	26	56	30	40	152	**1.5526**	**1.3661**	**2.0750**
	Per	17.1	36.8	19.7	26.3	100			
Q44. Supervisors spend time to listen employee ideas	**Fr**	39	45	43	25	152	**1.3553**	**1.2589**	**1.6250**
	Per	25.7	29.6	28.3	16.4	100			
Q45. Ent.update staff with best practices learning	**Fr**	56	51	26	19	152	**1.0526**	**0.8661**	**1.5750**
	Per	36.8	33.6	17.1	12.5	100			
Q46. Ent. see opp. for inno where other see problems	**Fr**	42	45	23	42	152	**1.4276**	**1.3214**	**1.7250**
	Per	27.6	29.6	15.1	27.6	100			
Grand							**1.4802**	**1.3493**	**1.8468**

Source: Survey result, 2012 **NE-Not Experienced L-Low M-Medium H-High**

Table 4.9: **Size of enterprise** effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
								Mean	Mean
		NE(0)	(1)	M(2)	H(3)	Total	Mean		
Q47. Ent. doesn't face problem of inno due to being S or M	**Fr**	22	70	35	25	150	**1.4145**	**1.3661**	**1.5500**
	Per	14.5	46.1	23.0	16.4	100			
Q48. Ent. assigned internal funds for inno no matter the size	**Fr**	15	76	29	32	152	**1.4932**	**1.4464**	**1.4900**
	Per	9.9	50.0	19.1	21.1	100			
Q49. Ent. engagement on inno with help of R&D no matter size	**Fr**	34	73	27	18	152	**1.1908**	**1.0446**	**1.5750**
	Per	22.4	48.0	17.8	11.8	100			
Grand							**1.3728**	**1.2857**	**1.5383**

Source: Survey result, 2012 **NE-Not Experienced L-Low M-Medium H-High**

Table 4.10: Lack of skilled personnel effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
		NE(0)	L(1)	M(2)	H(3)	Total	Mean	Mean	Mean
Q50. Ent.has adequate No. of trained personnel for inno	**Fr**	13	68	60	11	152	**1.4539**	**1.3929**	**1.6250**
	Per	8.6	44.7	39.5	7.2	100			
Q51. Ent. has individual with creative & inno ideas	**Fr**	31	86	28	7	152	**1.0724**	**0.9286**	**1.4750**
	Per	20.4	56.6	18.4	4.6	100			
Q52. Ent.has managerial know how to manage inno process	**Fr**	18	73	40	21	152	**1.4211**	**1.3214**	**1.7000**
	Per	11.8	48	26.3	13.8	100			
Q53. With enterprise qualified personnel are available	**Fr**	25	80	29	18	152	**1.2632**	**1.1518**	**1.5750**
	Per	16.4	52.6	19.1	11.8	100			
Q54. With mkt qualified personnel are available	**Fr**	12	44	81	15	152	**1.6513**	**1.6161**	**1.7500**
	Per	7.9	28.9	53.3	9.9	100			
Grand							**1.3723**	**1.2821**	**1.6250**

Source: Survey result, 2012 **NE-Not Experienced** **L-Low** **M-Medium** **H-High**

Table 4.11: Lack of finance effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
		NE(0)	L(1)	M(2)	H(3)	Total	Mean	Mean	Mean
Q55. Enough fund are available within your ent. to inno	**Fr**	38	76	28	10	152	**1.0658**	**0.9821**	**1.3000**
	Per	25.0	50.0	18.4	6.6	100			
Q56. Ent. has access to long term loans from banks to inno	**Fr**	100	42	6	4	152	**0.4342**	**0.3750**	**0.6000**
	Per	65.8	27.6	3.9	2.6	100			
Q57. Funds are available from sources outside enterprise	**Fr**	132	15	5	-	152	**0.1645**	**0.1429**	**0.2250**
	Per	86.8	9.9	3.3	-	100			
Q58. Investors are encouraging inno firms through financing	**Fr**	120	23	7	2	152	**0.2829**	**0.1964**	**0.5250**
	Per	78.9	15.1	4.6	1.3	100			
Q59. Collateral requirements of banks & fin. inst. are encouraging	**Fr**	84	41	18	9	152	**0.6842**	**0.5893**	**0.9500**
	Per	55.3	27.0	11.8	5.9	100			
Grand							**0.5263**	**0.4571**	**0.7200**

Source: Survey result , 2012 **NE- (Not Experienced)-0, L - (Low)-1, M - (Medium)- 2, H - (High)-3**

Table 4.12: Lack of cooperation effect on SMEs industry, and Small and Medium enterprises specific technological innovation

		SMEs industry(152)						Small	Medium
		NE(0)	L(1)	M(2)	H(3)	Total	Mean	Mean	Mean
Q60. Ent. has no d/lt in finding coop. partners for innovation	**Fr**	17	72	45	18	152	**1.4211**	**1.4286**	**1.4000**
	Per	11.2	47.4	29.6	11.8	100			
Q61. Ent. has good coop. with inst.& bus. dev't services provisions	**Fr**	36	94	10	12	152	**0.9868**	**0.9821**	**1.0000**
	Per	23.7	61.8	6.6	7.9	100			
Q62. Ent. access expertise from other firm related innovation	**Fr**	28	81	33	10	152	**1.1645**	**1.1250**	**1.2750**
	Per	18.4	53.3	21.7	6.6	100			
Q63. Ent. established r/ship with d/t association	**Fr**	32	78	30	12	152	**1.1447**	**1.0714**	**1.3500**
	Per	21.1	51.1	19.7	7.9	100			
Q64. Ent. done close with gov't, private & NGO inrelation to innovation	**Fr**	27	96	20	9	152	**1.0724**	**1.0804**	**1.0500**
	Per	17.8	63.2	13.2	5.9	100			
Grand							**1.1579**	**1.1375**	**1.2150**

Source: Survey result, 2012 **NE- (Not Experienced)-0, L - (Low)-1, M - (Medium)- 2, H - (High)-3**

Table 4.13: Enterprises manager or owner ranked barriers for SME's industry technological innovation

		1st Rank	2nd Rank	3rd Rank	4th Rank	5th Rank	6th Rank	7th Rank	8th Rank	9th Rank	Total or %	Grand T.sum	Mean	Mode
LF	**Fr**	100	18	6	8	4	-	4	2	10	152	340	2.2368	**1**
	Per	65.8	11.8	3.9	5.3	2.6	-	2.6	1.3	6.6	100			
GPR	**Fr**	6	11	18	12	15	25	26	14	25	152	874	5.7500	**7**
	Per	3.9	7.2	11.8	7.9	9.9	16.4	17.1	9.2	16.4	100			
LTMI	**Fr**	6	21	30	23	18	27	9	16	2	152	691	4.5461	**3**
	Per	3.9	13.8	19.7	15.1	11.8	17.8	5.9	10.5	1.3	100			
IRD	**Fr**	4	13	26	21	32	17	13	18	8	152	761	5.0066	**5**
	Per	2.6	8.6	17.1	13.8	21.1	11.2	8.6	11.8	5.3	100			
HCI	**Fr**	16	36	22	20	12	8	18	12	8	152	636	4.1842	**2**
	Per	10.5	23.7	14.5	13.2	7.9	5.3	11.8	7.9	5.3	100			
SE	**Fr**	2	16	11	17	17	23	21	29	16	152	881	5.7961	**8**
	Per	1.3	10.5	7.2	11.2	11.2	15.1	13.8	19.1	10.5	100			
LSP	**Fr**	9	19	15	27	25	13	21	17	6	152	740	4.8684	**4**
	Per	5.9	12.5	9.9	17.8	16.4	8.6	13.8	11.2	3.9	100			
OC	**Fr**	3	6	6	10	12	12	17	27	59	152	1071	7.0461	**9**
	Per	2	3.9	3.9	6.6	7.9	7.9	11.2	17.8	38.8	100			
LC	**Fr**	6	12	18	14	17	29	23	16	17	152	841	5.5329	**6**
	Per	3.9	7.9	11.8	9.2	11.2	19.1	15.1	10.5	11.2	100			

Source: Survey result, 2012 **1st= major barrier** **9th = least barrier**

Table 5: THE GLOBAL INNOVATION INDEX 2011

Index	Rank	Score (0–100)	SOURCE
Regulatory quality index (0–100) | 2009	118/125	17.72	World Bank, World Governance Indicators 2009
Tertiary school enrolment (% gross) | 2008	113/120	3.18	UNESCO Institute for Statistics, UIS online database (2000–10)
Gross expenditure on R&D (% of GDP) | 2007	76/100	3.02	UNESCO Institute for Statistics, UIS online database (2002–08)
Information and Communication Technologies (ICT) *use* index (0–10) | 2008	123/124	0.15	International Telecommunication Union, ICT Development Index Report 2010 (with data from 2008)
Information and Communication Technologies (ICT) *access* index (0–10) | 2008	121/124	13.33	International Telecommunication Union, ICT Development Index Report 2010 (with data from 2008)
Domestic credit to private sector (% of GDP) | 2008	94/114	2.96	International Monetary Fund; World Bank and OECD GDP estimates, World Bank World Development Indicators database (2000–09)
University/industry collaboration on R&D	92/122	35.13	World Economic Forum, Executive Opinion Survey 2010
Number of scientific and technical journal articles (per billion GDP, 2005 PPP$) | 2007	77/124	6.63	National Science Foundation and World Bank and OECD GDP estimates, World Bank World Development Indicators database
Recreation and culture (% total individual consumption)a | 2008	n/a		United Nations Statistics Division, National Accounts Official Country Data, United Nations database UNdata) (2003–09)
Creative goods exports (% of total goods exports) | 2008	96/120	2.79	UNCTAD Creative Economy Report, UNCTADStat (2003–08)
Venture capital per investment location: number of deals (per trillion GDP, 2005 PPP$)a | 2010	69/69	00.00	Thomson Reuters, World Bank and OECD GDP estimates, World Bank World Development Indicators database

Table 6: GII ranking of countries by region based on average factors

Region						
Northern America(USA, Canada)	**Europe &centeral Asia**	**East Asia & Pacific**	**Middle East & North Africa**	**Latin America& Caribbean**	**South Asia**	**Sub-Saharan Africa (including Ethiopia)**
56.45	42.96	42.50	34.45	31.43	29.92	26.92