

**PRODUCTION EFFICIENCY, FINANCIAL PERFORMANCE AND
IMPACT OF DAIRY ENTERPRISES IN HADIYA ZONE, ETHIOPIA**

PhD DISSERTATION

ABRIHAM ABABIYA MISEBO

AUGUST 2019

HARAMAYA UNIVERSITY, HARAMAYA

**Production Efficiency, Financial Performance and Impact of Dairy
Enterprises in Hadiya Zone, Ethiopia**

**A Dissertation Submitted to the School of Agricultural Economics and
Agribusiness, School of Graduate Studies**

HARAMAYA UNIVERSITY

**In Partial Fulfillment of the Requirements for the Degree of DOCTOR
OF PHILOSOPHY IN AGRICULTURAL ECONOMICS**

Abriham Ababiya Misebo

August 2019

Haramaya University, Haramaya

HARAMAYA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

I hereby certify that I have read and evaluated this Dissertation entitled “*Production Efficiency, Financial Performance and Impact of Dairy Enterprises in Hadiya Zone, Ethiopia*” prepared under my guidance by Abriham Ababiya Misebo. I recommend that it be submitted as fulfilling the dissertation requirement.

Prof. Jema Haji (PhD)

Chairman, Advisory Committee

Signature

Date

Endrias Geta (PhD)

Member, Advisory Committee

Signature

Date

Lemma Zemedu (PhD)

Member, Advisory Committee

Signature

Date

As a member of the Board of Examiners of the PhD Dissertation Open Defense Examination, I certify that I have read and evaluated the dissertation prepared by Abriham Ababiya Misebo and examined the candidate. I recommend that the dissertation be accepted as fulfilling the dissertation requirement for the degree of Doctor of Philosophy in Agricultural Economics.

Chairperson

Signature

Date

Internal Examiner

Signature

Date

External Examiner

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DEDICATION

*I would like to dedicate this dissertation to my beloved wife, **Roman Bekele**, for her sincere love and support throughout my life and to my beloved son, **Fikir Abriham**, the source of my pleasure.*

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this Dissertation is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this Dissertation. Any scholarly matter that is included in the Dissertation has been given recognition through citation.

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Name: Abriham Ababiya Misebo

Signature _____

Date: _____

School: Agricultural Economics and Agribusiness

BIOGRAPHICAL SKETCH

The author was born at Ambicho Kebele, Lemo Woreda, Hadiya zone of SNNPR, Ethiopia on June 16, 1988. He attended his elementary education at Ambicho Gode primary school and secondary education at Wachemo junior and senior secondary school. After successfully passing the entrance examination, he joined Haramaya University in 2007 academic year and graduated with B.Sc. Degree in Agribusiness Management on July 12, 2009.

The author had two years of progressive working experience in Hadiya zone marketing and cooperative department as a higher expert before he joined the School of Graduate Studies of Haramaya University in 2011 academic year as a graduate student for the Degree of Masters of Science in Agricultural Economics. He obtained his Master's degree in Agricultural Economics from Haramaya University in October 2013. He then joined Hadiya zone marketing and cooperative department after graduation and served as a head of Hadiya zone marketing and cooperative department until he re-joined the same university for his PhD study in Agricultural Economics in October 2015. He published two journal articles which were extracted from his M.Sc. thesis. Another one journal article extracted from his PhD dissertation is waiting for publication.

ACKNOWLEDGMENTS

The completion of this dissertation involved kindly contribution, support, and encouragement of many people. I am indebted to all who encouraged me in the process and gave me the courage when I was really in need. It is a pleasant aspect that I have now the opportunity to express my gratitude for them next to almighty God.

First and foremost, I would like to thank my God the Almighty for having given me the strength and wisdom and guiding to complete this onerous tough research undertaking. I also wish to express my special gratitude and appreciation to my advisors Prof. Jema Haji, Dr. Endrias Geta and Dr. Lemma Zemedu, for their critical comments and guidance that lie behind the forms and content of this work. Even when their schedules were tight, I was privileged to have lots of inspiring discussions in their respective offices and shared their professional experiences which let me overcome problems I faced regarding my study. Their immediate reactions, devotion, punctuality, and availability even in off-office hours highly impacted my academic life and they are role models during my study time.

I would like to extend my sincere appreciation and respect to Haramaya University, in general, and School of Agricultural Economics and Agribusiness in particular, for allowing me to pursue my PhD degree study and for the unreserved support and supply of pertinent materials during the study period. I am highly thankful to Hadiya zone administration for non-countable facilitations of logistics and budget for the successful accomplishment of this dissertation work. Next, I am thankful to Mr. Assefa Tilahun, Mr. Abera Sorago, Mr. Tadesse Hirgo, Mr. Fikrey Tesfay and all members of data collection team, sample enterprise managers, sample household heads, key informants and focus group participant for their incredible support in all aspects during the data collection time.

I would like to extend my deep sense of appreciation and respect to my beloved wife Roman Bekele and my son Fikir Abraham for their patience and love during the whole study time even they faced difficult times in my absence. I also thank my great brothers, sisters and friends for their encouragement throughout my study. Finally, it is always impossible to mention all; therefore, I would like to thank and heartily admire for everyone who has helped me one way or the other.

ABBREVIATIONS AND ACRONYMS

ADLI	Agriculture Development Led Industrialization
AEMFI	Association of Ethiopian Microfinance Institutions
ACS	Assumption of common support
ATE	Average Treatment Effect
ATT	Average Treatment Effect on the Treated
ATU	Average Treatment Effect on the Untreated
CSA	Central Statistics Agency
CIA	Conditional Independence Assumption
FeMSEDA	Federal Micro and Small Enterprises Development Agency
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitors
GEMINI	Growth and Equity through Microenterprises Investment and Institutions
GTP	Growth and Transformation Plan
ICTFD	Information and Communication Technology for Development
ILO	International Labor Organization
MoFED	Ministry of Finance and Economic Development
MoTI	Ministry of Trade and Industry
NGOs	Non-governmental Organizations
OECD	Organization for Economic Co-operation and Development
PSM	Propensity Score Matching
RMSEDA	Regional Micro and Small Enterprises Development Agencies
SFM	Stochastic Frontier Model
SPSS	Statistical Package for the Social Sciences
TVET	Technical Vocational Education and Training
UNDG	United Nations Development Group
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
USAID	United States Agency for International Development
WB	World Bank

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Production Efficiency, Financial Performance and Impact of Dairy Enterprises in Hadiya Zone, Ethiopia

ABSTRACT

Dairy enterprises are one of the most important sources of economic growth. This makes enterprises a major area of concern for government and nongovernment organizations with varieties of development objectives. However, studies in both academic and policymaking circles on the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation were limited. This study sought findings on production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya zone, Ethiopia. The study on the production efficiency estimation and financial performance were performed on 212 dairy enterprises at the enterprise level and the evaluation of impact of membership in dairy enterprises on employment creation and income generation was conducted at household level using 385 randomly selected households. The data were analyzed using descriptive statistics and econometric models including stochastic frontier model, profitability ratio analysis, multiple linear regression model and propensity score matching technique. The overall average technical efficiency, allocative efficiency, and economic efficiency scores of dairy enterprises obtained from stochastic frontier model were 60.18%, 59.92% and 36.16%. The major sources of technical efficiency differentials were education level, experience of the manager, access to training, access to market, sex of the manager and access to credit at different significant levels. Furthermore, the allocative efficiency of dairy enterprises was statistically and significantly determined by number of employees, experience of the manager and access to market. The result of the study also confirms that the economic efficiency of dairy enterprises was statistically and significantly determined by number of employees, access to training and access to market. According to result obtained from profitability ratio analysis 67% of dairy enterprises were found to be profitable whereas 33% of dairy enterprises were incurred loss. The result of multiple linear regression analysis showed that financial performance of dairy enterprises was positively and significantly determined by age of the enterprise educational level of the manager, number of employees, amount of initial capital, entrepreneurial skill, experience of the manager, access to training, access to market,

consultancy service and access to credit. Propensity score matching results showed that membership in dairy enterprise had a significant positive impact on members' employment creation and income generation. The result revealed that membership resulted in an average increment of household's annual employment creation by about four persons (33.98%) and income by Birr 12,339.00 (32.57%). The result further showed that the impact estimates were insensitive to unobserved selection bias. It is, therefore, essential to expand and strengthen development of dairy enterprises and the membership of households in dairy enterprises to increase employment opportunities and income. The government as well as other concerned bodies should give due attention to update and improve entrepreneurial skills by applying innovative training, ensuring experience and best practice sharing system, creating market access, facilitating sufficient consultancy service and credit access, monitoring and evaluation of all benefits generated and costs incurred as well as effective utilization of employees to ensure higher production efficiency levels and financial performance of dairy enterprises and their impact on employment creation and income generation.

Keywords: Dairy Enterprise, Production Efficiency, Financial Performance, Employment Creation and Income Generation.

1. INTRODUCTION

1.1. Background of the Study

In Ethiopia, agriculture accounts still highly dominate sector in terms of GDP about 42 percent, employs about 85 percent of the labor force and contributes around 90 percent of the total export earnings of the country. The sector is dominated by over 15 million smallholders producing about 95 percent of the national agricultural production. This shows that the overall economy of the country and the food security of the majority of the population depend on smallholder agriculture. The growth of the agricultural sector is taken as an engine and the last resort to take-off the national economy (CSA, 2018).

The government of Ethiopia implements multi-dimensional policies and strategies to ensure rapid and sustainable growth and development in the past three decades through enterprises development. Enterprises development is one of the most important sectors which plays a great role in diversifying activities and used as a bridge to transform the economy of the country from agriculture to industrialization. To realize the role of enterprises in the socio-economic development of the country, the government of Ethiopia introduced the first enterprise development strategy in 1997 to create a broad base, competitive and convenient sector for industry development. Accordingly, enterprises are classified based on capital and working labor engaged into two levels of development stages (micro and small) and five sectors (manufacturing, trade, construction, service, and agriculture).

The revised enterprises' development strategy was designed in 2011 in order to integrate the development of the sector with the country's five-year growth and transformation plan (GTP), hoped to bring about rapid economic growth and lift up the country to middle-income level. The enterprise development was integrated into the GTP as one of the pillars of the industrial development plan and taken as one of the best tools to implement the country's industrial development strategy. The revised enterprises' development strategy outlined the institutional setup from Federal to *kebele* and defined stakeholders entrusted with responsibilities of providing different supports for the development of the sector Federal Micro and Small Enterprises Development Agency (FeMSEDA, 2014).

The role of enterprises in employment and income generation is increasingly recognized and has become a major playing field for policymakers and donors with dual objectives of enhancing growth and reducing poverty. The enterprise sector has been considered by academicians and policymakers as an engine of economic growth, poverty reduction, and social development due to its effect on employment and income generation, import-substitution, springboard to entrepreneurship and industrialization, base for medium and large industries and distribution of their products through linkage and sub-contracting, and income distributions among different sections of the society. Enterprises play key role in stimulating other sectors of the economy such as manufacturing, trade, construction, service and agriculture by increasing productivity through providing inputs and creating demand for outputs Ministry of Finance and Economic Development (MoFED, 2016).

In developing countries, enterprises have a crucial role because of their potential contributions to improvement of the income distribution, employment creation, industrial development, rural development, and export growth (Zemenu and Mohammed, 2014). The developed, as well as developing countries, are taking extreme benefits from enterprises that enable them to accelerate their economy. Enterprises have played a critical potential role in poverty reduction and ensuring economic growth and development. However in Ethiopia, enterprises were found small when compared to those other African countries due to lack of access to markets, finance, working premises, supply of raw material, sufficient capital, business information, business premises, the acquisition of skills and managerial expertise, access to modern technology and regulatory environments (Hailay *et al.*, 2014; Semistatus and Rainer, 2014; Brenda and Gregory, 2015; Tariku, 2018; Tomas *et al.*, 2018).

The enterprises' sector is characterized by highly diversified activities which can create employment opportunities for a substantial segment of the population. They have been the primary sources of employment creation not only in developing countries but also in developed countries. It realizes a modest standard of living through curbing unemployment and facilitating the environment for new job seekers. This sector is also described as the national home of entrepreneurship. It provides the environment enabling entrepreneurs to exercise their talents to full extent and attain their goals. In all the successful economies, enterprises are seen as an essential springboard for growth and job creation (Fikirte and Endrias, 2015; Yaregal, 2018).

1.2. Statement of the Problem

The Ethiopian government recognizes the significance of this sector and showed its dedication to promote the enterprises' development by the Issuance of National Micro and Small Enterprises Strategy in 1997 and the Establishment of the FeMSEDA. In addition to this, the growth and transformation plan (GTP) of Ethiopia ensure that the promotion of enterprises as an important tool of poverty reduction and economic growth. Ethiopia's industrial development strategy also singled out the promotion of enterprises development as one of the important instruments to create productive and dynamic private sector. The promotion of this sector is justified on the grounds that enhancing growth with equity, creating long-term jobs, providing the basis for medium and large companies and promoting exports (FeMSEDA, 2014).

In Ethiopia, years have elapsed since enterprises were recognized as an important area of intervention by the private sector so that they would contribute their part to curb the socio-economic problems of the vast society. However, it is hardly possible to think that all enterprises are successful in serving the purpose they are intended for. This is largely true that their performance is dependent on a number of factors like, age of enterprise, educational level of manager, managerial skill, number of employs, amount of initial capital, access to training, access to market, and access to credit (Berihu *et al.*, 2014; Hailay *et al.*, 2014; Semistatus and Rainer, 2014; Brenda and Gregory, 2015; Fikirte and Endrias, 2015; Tariku, 2018; Tomas *et al.*, 2018).

In Ethiopia, various economic policies and strategies introduced by the government in the past to ensure sustainable economic growth have significantly reduced the level of poverty. Enterprises are the main source of rapid economic growth and the basic transformer of the structure of economic system from agriculture to industrialization. These makes enterprises a major area of concern for government and NGOs with the objectives of employment creation, income generation and income inequality reduction, import substitution, innovation etc. However, the intense studies in both academic and policy making circles about the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya zone were not addressed in the country in general and the study area in particular (Tariku, 2018; Yaregal, 2018).

Base on the national enterprise development strategy of 1997 and 2011 enterprises are organized in Hadiya zone in two levels of development stages (micro and small) and in five sectors (manufacturing, trade, construction, service and agriculture) to achieve their intended goals of establishment. According to the enterprise development office of the zone, their production efficiency is improved time to time due to closer support of stakeholders through credit facilitation, management and technical training for managers and operators, consultancy service, market linkage for inputs and products and by providing working premises and sheds to ensure the profitability of their business. This study was demitted to realize and synthesize the generalized facts about the production efficiency of the enterprises in the zone.

In the zone the production efficiency and financial performance of the dairy enterprises is assumed to be good as the enterprise development office suggestions, but the real actual production efficiency and financial performance status of the dairy enterprises were not measured so far. As indicated by different scholars in different parts of the country the production efficiency and financial performance of the enterprises are determined by different factors. This is largely true that their production efficiency and financial performance are dependent on a number of internal and external determinants like, managerial skill, amount of initial capital, access to market and access to credit. The enterprise development office also agreed with the existence of those factors in the zone, even if their significant level of influence was not yet studied.

The impact of dairy enterprises on employment creation and income generation in the zone is crucial case to look in to with common economic variables like, employment creation and income generation. The finance and economic development offices of the zone, generalized that dairy enterprises have feasible impact on poverty reduction through employment creation and income generation. They also played great role in the economy of the zone by stimulating other economic sectors by input output market linkage but still their impact on employment creation and income generation was not evaluated so far. Recognizing those facts the effort was made to fill the gap by conducting research on production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in the study area. Therefore, this study deals with production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya zone is the focus of the study.

In line with this, the study has answered the following research questions:

- i. Are the dairy enterprises efficient?
- ii. What are the sources of efficiency differentials among dairy enterprises?
- iii. How are the dairy enterprises performing financially?
- iv. What are the main factors affecting financial performances of dairy enterprises?
- v. Does membership in dairy enterprises have impact on employment creation and income generation of households?

1.3. Objectives of the Study

The general objective of this study was to evaluate the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya zone, Ethiopia.

The specific objectives of the study were:

- i. To estimate technical, allocative and economic efficiencies of dairy production enterprises;
- ii. To identify the determinants of efficiency differentials among dairy production enterprises;
- iii. To measure the financial performance of dairy production enterprises in the study area;
- iv. To identify factors affecting the financial performance of dairy production enterprises;
- v. To evaluate the impact of membership in dairy enterprises on employment creation and income generation of households in the study area.

1.4. Scope and Limitations of the Study

The study was undertaken in Hadiya zone, Southern Nations, Nationalities and Peoples Regional State (SNNPRS) of Ethiopia. The aim of the study was to evaluate the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya zone. The study was limited to estimate the efficiency by of enterprises by stochastic frontier model, measure the financial performance of enterprises based on profitability ratio and identify the factors affecting their financial

performance using multiple linear regression and evaluate their impacts using propensity score matching algorithm. Therefore the study is subject to the limitations of these models as the analytical tools to deal with the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation.

The study was limited to use cross-sectional data obtained from sampled 212 dairy enterprises for production efficiency evaluation, and measure of financial performance and 385 household heads for impact evaluation of dairy enterprises on employment creation and income generation because of the absence of base line data. The study was concerned with dairy enterprises established by the government and actually registered by Hadiya zone enterprises development office. Therefore, generalizations of the results of this study are possible after having the detailed understanding of the socio-economic as well as institutional characteristics of intended areas.

1.5. Significance of the Study

The enterprises are the engines of growth and development of the developing countries like Ethiopia where poverty and unemployment are prevalent. Effective functioning of enterprises is considered as one of the important strategies to meet out the poverty reduction policy of the government. Currently, there is a growing recognition that enterprises have great role in enhancing the income of the poor and thereby leading to poverty reduction in Ethiopia. Consequently, national policies and strategies that support this sector have been designed to help them to achieve the desired goal. The impetus for this study is, thus, to evaluate production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in the study area. The output of the study benefits enterprises, governments and NGOs that wish to undertake interventions in the area of enterprises.

Estimating the level of productive efficiency and financial performance is a key and crucial issue that helps much to improve the productive efficiency and financial performance. In addition to this, identifying the determinants of efficiency differentials among dairy enterprises and identifying different factors affecting the financial performance is vital and a thorough understanding of them is essential in order to formulate a better policy for

intervention with a view to bring a desired change in enterprises sector. Especially, to ensure the successful enterprises sector and to create broad base, competitive and convenient sector for industry development, identifying factors influencing productive inefficiency and financial performance of dairy enterprises enables policy makers on which factors to enhance the success status of enterprises to have feasible impact on employment creation and income generation. Hence, these results can be used by policy makers, government and NGOs to streamline intervention for dairy enterprises in the country in general and for the study area in particular. The study also provides important information to relevant stockholders that support dairy enterprises. It also provides the basis for any further research in the area while filling the knowledge gap prevailing in the study area.

1.6. Organization of the Dissertation

The Dissertation is organized into five chapters. The first chapter introduces the background, statement of the problem, objectives, limitations and significance of the study. The second chapter provides an overview of relevant definitions and concepts, theoretical analytical and empirical literatures. It presents review of literature where relevant materials related with the present study. The third chapter deals with the research methodologies applied in this study. It starts by describing the study area, sampling methods and description of population, data collection methods and types of data and methods of data analysis. It presents definitions and working hypotheses of dependent and independent variables. Fourth chapter is about the result and discussion of the study. The descriptive and econometric analysis results of the study are discussed in this section. Finally, the fifth chapter narrates the summary, conclusions and recommendations of the study.

2. LITERATURE REVIEW

This chapter presents definitions of basic and concepts, review of theoretical as well as analytical literature and empirical studies in the areas of production efficiency estimation, measurement of financial performance of enterprises and impact evaluation of enterprises development on employment creation and income generation. The theoretical review provides the background that supports investigation and offers justification of the research problem and used to construct theoretical framework used in the study. The empirical literature provides evidence from past studies related to the subject and the gaps to be filled by this study. The review also provides insights on key variables and analytical models used in examining and identifying the determinants of efficiency differentials among dairy enterprises, identifying factors affecting the financial performance and impact of enterprises on employment creation and income generation of dairy enterprises in Ethiopia and elsewhere.

2.1. Definitions and Concepts

2.1.1. Definitions and Concepts of Enterprises

Enterprise: There is no universally accepted definition of enterprises. Different countries have defined enterprises based on different conditions. Among the criteria used to define enterprises, the most common and widely used ones include the number of paid up employees by the sector and amount of paid-up capital. Ethiopia has defined micro enterprises as enterprises with a total asset of less than Birr 20,000 and small enterprises as enterprises with a total asset of Birr 500,000 or less (MoT, 1997). In this definition, the only base used is the total asset unlike international organizations' definition base. To align the definition with at least some countries and international organizations, the country has revised the definition of micro and small enterprises in 2011. In the new definition, some of the attributes used by other countries and international organizations are addressed. In addition, the definition has segregated sectors as service and manufacturing. However, there is still confusion among different governmental organizations (e.g. MoT, FeMSEDA, and CSA in defining enterprises).

The FeMSEDA, put definition of micro and small enterprises and categorize them from support provision perspective which contempt medium enterprises. According to FeMSEDA (2011) on its revised enterprises strategy document defines: micro enterprises are those business enterprises with a paid-up capital of less than Birr 100,000 and occupy up to 6 workers and excluding high tech consultancy firms and other technology establishments, small enterprises are those business enterprises with a paid-up capital of above Birr 100,000 and not exceeding birr 500,000, and employs 6-30 workers and excluding high tech consultancy firms and other technology establishments, large and medium enterprises are those with more than birr 500,000 in paid-up capital.

The enterprises are categorized into different scales of operations based on the size and nature of employment that was in use classifies enterprises into different size categories based on number of workers as criteria. For example, according to the CSA (2015) a micro enterprise is one with fewer than 10 workers, small enterprises occupies from 10-50 workers, medium and large enterprises handle over 50 workers. Cottage and handicraft industries are those establishments performing their activities by hand using non-power driven machines. The informal sector is defined as household type establishments or activities which are non-registered companies or cooperatives operating with less than 10 persons.

For the ease of consistency and comparability of various data, this study has adopted the definition given by FeMSEDA and CSA inter-connectively based on paid up capital and number of workers. This is because to have uniform and consistent definition at least between different enterprises and to make accessibility of uniform data for the sector easily. It helps to triangulate the investigated results with the enterprises policies and strategies that support their achievements according to their intended goals. Accordingly, the operational definition of enterprises for this study is; micro enterprises are those business enterprises with a paid up capital of less than Birr 100,000 and excluding high-tech consultancy firms and technology establishments and occupy up to 10 workers; small enterprises are those business enterprises with a paid-up capital of above Birr 100,000 and not exceeding Birr 500,000, and excluding high tech consultancy firms and other technology establishments and employs 10-50 workers in the enterprises.

2.1.2. Definition and Concept of Production Efficiency Estimation

Efficiency: It is concerned with producing goods and services with the optimal combination of inputs to produce maximum output for the minimum cost. To be productively efficient the one must be producing on its production possibility frontier (it is impossible to produce more of one good without producing less of another), that means it is producing at the lowest point on the average cost curve (marginal cost equals to average cost). Efficiency is considered as one of the most important issues in agricultural production economics. It is measured by comparing the actually attained value of the objective function against what is attainable at the production frontier. The analysis of production and resource use in the enterprises dairy sector has more significance in agricultural policy frameworks that seek to increase the milk production by encouraging optimal resource utilization. Improving technical, allocative and economic efficiencies are an important factor of productivity growth in a developing country like Ethiopia. According to Hassanpour (2012) and Masuku (2014) stated that the analysis of technical and allocative efficiencies under the current technological change in agriculture helps policy makers to formulate adequate and appropriate, extension services, pricing, marketing, and credit, input distribution and land allocation policies.

It can be summarized as the attainment of a production goal without waste. The fundamental idea underlying all efficiency measures, however, is that of the quantity of goods and services per unit of input. Consequently, a production unit is said to be efficient, the frontier measure of efficiency implies that efficient enterprises are those operating on the production frontier. The amount by which an enterprise lies below its production frontier is regarded as the measure of inefficiency. The technical, allocative and economic efficiencies, defined as follows are measured in relation to the production function frontier.

Technical efficiency (TE): Farrell (1957) provided two definitions for TE: i) the ability of firms to produce the maximum feasible output with a given bundle of inputs (output-oriented) or ii) the ability of firms to use minimum inputs to produce a given level of outputs (input-oriented). The basic approach to measure the level of efficiency is to estimate a frontier that envelops all of the input/output data with those observations that lie on the frontier described as technically efficient. Any firm or farm that lies below the frontier is considered to be inefficient (Fraser and Cordina, 1999). In economic theory, a

production function is described in terms of maximum output that can be produced from a specified set of inputs, given the existing technology available to the farm. When the farm produces at the optimal production frontier, it is considered efficient. The most common assumption is that the goal of the producer is profit maximization; however, it is believed that the objectives and goals of the producer are intertwined with farmers' psychological make-up. Technical efficiency is achieved when a high level of output is realized given a minimum level of inputs. It is therefore concerned with the efficiency of the input to output transformation.

It can be concluded as the ability of the enterprises to maximize output for a given set of resource inputs. It is enterprise's ability to produce on the maximum possible frontier. The production frontier can be viewed as composed of those parts of an enterprise's production functions that yield maximum output for a given set of inputs. It is possible that an enterprise with its scale of operation may not be able to reach the frontier, that is, the production function for the enterprise. On the other hand, there may be enterprises whose outputs are closer to the frontier, given their levels of inputs. The notion of how close the individual production plans are to the maximum levels, as defined by the frontier and given input levels, is the measure of technical efficiency for each enterprise.

Allocative efficiency (AE): It is the success of a technically efficient decision-making unit in minimizing the cost of production for a given set of input prices through substitution or reallocation of inputs. Allocative efficiency can be residually calculated as the ratio of economic efficiency to technical efficiency. It is the ability of the firm to allocate an input bundle or produce a given level of output by minimizing the level of cost. Thus, the allocatively efficient level of production is where the farm operates at the least-cost combination of inputs. Allocative efficiency can also be defined as the ratio between total costs of producing a unit of output using actual factor proportions in a technically efficient manner, and total costs of producing a unit of output using optimal factor proportions in a technically efficient manner (Necmi, 2016). Thus for the farm to maximize profit, under perfectly competitive markets, it is required that the extra revenue (marginal value product) generated from the employment of an extra unit of a resource must be equal to its unit cost (marginal cost = unit price of input).

It is summarized as ability to use the inputs at its disposal in optimal proportions given their respective prices and the available production technology. It is the enterprise's ability to produce a given level of output using the cost minimizing input ratios. Departure from this optimal condition can be explained by underutilization or overutilization of inputs resulting from the failure to minimize cost exactly because of some institutional, structural or managerial problems and uncontrolled random exogenous shocks such as uncertainty in input and output prices, quality of inputs, etc.

Economic efficiency (EE): It is also known as cost or overall efficiency. It is defined as the ratio of the minimum production cost observed in the sample to the actual production cost of the decision-making unit investigated. In economic theory of the firm, economic efficiency is divided into technical efficiency and allocative efficiency. A producer is said to be technically efficient if production occurs on the boundary of the producer's production possibilities set. That means technical efficiency is the extent to which the maximum possible output is achieved from a given combination of inputs. On another note, a producer is said to be allocatively efficient if production occurs in a region of the production possibilities set that satisfies the producer's behavioral objective (Necmi, 2016). Technical efficiency is the ability of a firm to produce a given output using the smallest set of inputs. It is attained when the best available technology is used to produce maximum output possible. Allocative efficiency is the ability of the firm to allocate an input bundle or produce a given level of output in the cost minimizing way.

Economic efficiency is the product of technical efficiency and allocative efficiency. An economically efficient input-output combination would be on both the frontier function and the expansion path. Alternatively, economic efficiency can be defined as the ability of a firm to produce a given output at minimum cost. If a firm has achieved both technically efficient and allocatively efficient production levels, it is economically efficient (Necmi, 2016). It is the product of technical and allocative efficiency (overall efficiency). Economic efficiency occurs at the lowest point on the firm's average costs curve or the potential increase in revenue (revenue efficiency) that an enterprise could apply in order to operate at the point of technical and allocative efficiency. It is the enterprise's ability to produce a predetermined quantity of output at minimum cost given the available technology by minimizing waste and inefficiency. The principles of economic efficiency are based on the concept that resources are scarce.

2.1.3. Definition and Concept of Financial Performance Measurement

Performance: It is defined as act of performing or doing something successfully; using resources as distinguished from merely possessing it. Performance is an act of performing, implementing, achieving, and fulfilling of the given tasks that needs to be measured against defined sets of precision, money, fullness and timing. In finance, it refers to the measurements of the company's policies, activities and operational results in financial terms. It is used to check a company's success, compliance and financial position. These results are reflected in the firm's return on investment, assets, equity, capital employed and profitability (Farah *et al.*, 2016).

The performances of enterprises are measured in terms of the or simply in terms of output terms such as quantified objectives or profitability. Performance has been the subject of extensive and increasing empirical and conceptual investigation in the small business literature. The issues that remain unresolved are the goals against which performance should be assessed and from whose perspective the goals should be established. The most commonly adopted definition of performance is financial growth with adequate profits. Other definitions of performance are equally applicable. For example, some entrepreneurs regard performance as the job satisfaction they derive from achieving desired goals. However, financial growth due to increasing profits has been widely adopted by most researchers and practitioners in business performance models (Farah and Nina, 2016).

Performance measurement: Is a process for collecting and reporting information regarding the performance of an individual, group or organizations. It can involve looking at process/strategies in place, as well as whether outcomes are in line with what was intended or should have been achieved. Among the most frequently used measures are profitability, survival, and growth in employees. In this study profitability is opted to measure performance of these enterprises. This is mainly because of the following three reasons. First, this study clearly indicates these enterprises are more focusing on profitability than other modes of performance measures. Second, the enterprises were not applying balanced score card to measure their overall performance. Third, as recommended by and Farah *et al.* (2016); Didin *et al.* (2018) and Tomas *et al.* (2018) a profit has been widely adopted by most researchers and practitioners in business performance measures models.

Financial performance measurement: Can be defined as the art and science of managing money; and finance in its broader sense is concerned with the process, institution, markets and instruments involved with the transfer of money. Financial performance refers to the act of performing financial activity. In broader sense, financial performance refers to the degree to which financial objectives being or has been accomplished. It is the process of measuring the results of enterprise's financial policies and operations in monetary terms. It is used to measure enterprise's overall financial health over a given period of time and can also be used to compare similar enterprises across the same sectors. This is an area that requires knowledge, skills and experience and whose goals include: maximizing profits, sales, capturing a particular market share, minimizing staff turnover and internal conflicts, survival of the firm, and maximizing wealth (Didin *et al.*, 2018).

Generally looks at enterprises' financial ratios. Financial performance is an accounting summary that details an organization's revenues, expenses and net income. It is also referred to as statement of profit and loss or statement of income; and it may be prepared on a monthly, quarterly or annual basis. As part of business management, financial performance measurement can be one of the biggest challenges faced by businesses in the enterprises sector, especially with regard to their survival, if management is not trained on how to manage finance and measure performance. Financial performance measure principally reflects business sector outcomes and results that shows overall financial health of the sector over a specific period of time. It indicates that how well an entity is utilizing its resources to maximize the shareholders profitability (Farah *et al.*, 2016). Financial performance measure includes analysis and interpretation of financial statements in such a way that it undertakes full diagnosis of the profitability of the enterprises.

2.1.4. Definition and Concept of Impact Evaluation

Impact: Effect /change of something with and without intervention on the outcome of the beneficiary. According to the conclusion of UNDP (2014), impact is a multi-dimensional concept. This might include changes in knowledge, skill, behavior, health or living conditions for children, adults, families or communities. It is positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly. The results or effect that is caused by or attributable to a project or program and it can be intended or unintended and positive or negative. All the changes which are

expected to happen due to the implementation and application of a given policy intervention, the perceived changes in the lives of the people.

An enterprise can have social impact in several ways. The first two are fundamental: Product impact is the social impact of the goods or services produced by the enterprise (e.g., providing anti-malaria bed nets, clean water, financial services, or efficient energy). Operational impact is the impact of the enterprise's management practices on its employees' health and economic security, its effect on jobs or other aspects of the well-being of the community in which it operates, or the environmental effects of its supply chain and operations (Paul *et al.*, 2016).

Impact evaluation: Impact evaluation is an assessment of how the intervention being evaluated affects outcomes, whether these effects are intended or unintended. The proper analysis of impact requires a counterfactual of what those outcomes would have been in the absence of the intervention. There is an important distinction between monitoring outcomes, which is a description of the factual, and utilizing the counterfactual /what would have happened had the intervention never taken place to attribute observed outcomes to the intervention. Impact evaluation is assessing the changes that can be attributed to a particular intervention, such as a project, program or policy, both the intended ones, as well as ideally the unintended ones (Paul *et al.*, 2016). In contrast to outcome monitoring, which examines whether targets have been achieved, impact evaluation is structured to answer the question: how would outcomes such as participants' well-being have changed if the intervention had not been undertaken? This involves counterfactual analysis, that is, a comparison between what actually happened and what would have happened in the absence of the intervention. Impact evaluations seek to answer cause-and-effect questions. In other words, they look for the changes in outcome that are directly attributable to a program (Karen, 2014).

Impact evaluation helps people answer key questions for evidence-based policy making: what works, what doesn't, where, why and for how much? It has received increasing attention in policy making in recent years in the context of both developed and developing countries. It is an important component of the armory of evaluation tools and approaches and integral to global efforts to improve the effectiveness of aid delivery and public spending more generally in improving living standards. Originally more oriented towards

evaluation of social sector programs in developing countries, notably conditional cash transfers, impact evaluation is now being increasingly applied in other areas such as the agriculture, energy and transport (Paul *et al.*, 2011). There are two main reasons to measure impact. First, measuring and communicating the value of social outcomes helps demonstrate the importance of the organization's work to staff, clients, customers, funders, investors, government agencies, and the community at large. Second, evaluating past endeavors and assessing how well the organization is achieving its objectives can inform planning and strategizing. This approach encourages organizations to focus on continuous improvement of their management skills and to formulate assumptions and expectations, possibly making the organization more attractive to clients or customers and helping win new contracts. Organizations that measure impact are not only able to make a stronger case for additional funding; they are also able to focus their efforts on what really makes a difference. Doing so helps them plan more strategically and allocate resources more effectively (Karen, 2014).

2.1.5. Definition and Concept of Enterprises Development

Enterprises development: Enterprise development is an activity that assists or accelerates organization, development, sustainable support to create successful businesses and is evidenced in the form of an enterprise development contribution. This is commonly accomplished through the expansion of the beneficiary's financial and operational capacity which in turn contributes to economic growth (Muzenda, 2014). Enterprise development is defined as the act of investing time and capital in helping people establish, expand or improve businesses. Enterprise development helps people to earn a living; it helps them out of poverty; and it leads to long-term economic growth for themselves, their families and their communities. According to different scholars' research foundation results, justification for the development of the enterprises in developing countries is largely due to its multifaceted merits for socio-economic development of countries.

First, it is accepted that the enterprise sector has great potential to generate maximum socio-economic benefits to the country with low level of investment. The enterprise sector requires less capital per unit and relatively less infrastructure. In most developing countries the shortage of capital is the major barrier for promoting an investment culture. Secondly, it absorbs relatively more labor per unit of capital employed. The relatively labor intensive

nature of the sector, coupled with regional dispersions of cottage and small scale industrial enterprises, enables them to create substantial employment opportunities. Thirdly, the enterprises have great potential to mobilize and divert financial resources in the economy, which would otherwise have been used for consumption purposes to useful investment purposes in rural areas. A substantial portion of the investment cost is financed by domestic sources, mainly from their personal savings or informal borrowings. Fourthly, the development of enterprises can be an aid to promote balanced regional development. The promotion of enterprises sector forms an integral part of poverty reduction and regional development programs implemented by the government and NGOs. And also, the enterprise sector provides high value addition in view of its greater utilization of indigenous machinery, equipment, and raw materials. Fifthly, it nurtures entrepreneurial talents and forms good ground for training employees. The majority of employees recruited by enterprises are entry level employees who are lacking skills. Enterprises provide good ground for them for training on the job. Finally, enterprises can play a complementary role to large industries through subcontracting, thus facilitating the linkage between the formal and the informal sector. So, a well-organized enterprises sector provides the foundation for the growth of entire socio-economic system (Gangi and Timan, 2013; ILO, 2014; CSA, 2015).

In developing countries, enterprises comprise the vast majority of the small business sector, a result of the relative lack of formal sector jobs available for the poor. Enterprises in developing countries, then, tend to be the most frequent size of business. There is mounting evidence that enterprises have tremendous roles to play in the economies of developing countries, particularly in urban areas. The main explanations for this is that they are easily started and operated with little capital, less skill and low technology, compared to their medium and large scale counterparts. In many developing countries, the bulk of the population is characterized as having limited financial capacity and, limited knowledge and skills. Access to modern technology is also very limited. As a result, people engage in businesses that they can afford to carry out with the meager resources they have. In this regard, therefore, enterprises play an important part as they provide employment opportunity and income to the vast majority of poor people in developing countries (Wolday, 2015).

In most developing countries, enterprises constitute the vast majority of firms, generating a substantial share of both overall employment and output. Given their significant economic role, one might expect enterprises growth to drive overall increases in output and income levels. In many cases, however, their largest economic contribution appears to be one of maintaining rather than generating new employment and income for the poor. At an aggregate level, enterprises and demonstrate impressive growth, especially when compared with larger firms. However, many individual enterprises grow slowly or not at all in some cases, due to a conscious decision on the part of the business owner. Overall growth rates are often fueled by the rapid expansion of a narrow group of highly performing enterprises. In developing as well as in developed countries, there appears to be a small group of enterprises that outperform their peers and drive aggregate employment and productivity growth for the small business sector (Assefa, 2014).

According to ILO (2014), enterprises are known to contribute to over 55% of GDP and over 65% of total employment in high income countries. They also account for over 60% of GDP and over 70% of total employment in low-income countries. The share of informal sector/enterprises employment outside agriculture to the total non-agricultural employment accounts for nearly half or more in all regions of the developing countries and, about 72% in sub-Saharan Africa. The contribution of the enterprises is also important at the macroeconomic level as they contribute to innovations, jobs and economic growth. In Thailand, for instance, small firms create employment opportunities for 60% of the workforce and contribute 50% to the GDP. This contrasts with the case in other developing countries where agriculture accounts for the largest part of GDP.

2.1.5.1. Enterprises development in Ethiopia

In its commitment to the socio economic development of the country, the Government of Ethiopia has given greater focus for the development of the enterprises sector. In order to realize this, the Government of Ethiopia has designed the first Enterprises Development Strategy in 1997. The FeMSEDA was established by the proclamation No. 33/1998 as amended by proclamation No. 104/2004 of the council of ministers with the objective to encourage, coordinate and assist institutions that provide support to the development and expansion of enterprises in Ethiopia. The 1997 enterprises development strategy was intended to create coherence with the other economic sectors and outline duties and

responsibilities of all the stakeholders at all level from federal to *kebele* level. The revised enterprises development strategy was designed in 2011 in order to integrate the development of the sector with the country's 5 year (2011-2015 E.C) GTP, hoped to bring about rapid economic growth and lift up the country to middle income level. The enterprises development was integrated in the GTP as one of the pillars of the industrial development plan and taken as one of the best tools to implement the country's industrial development strategy.

When enterprises are established in the industry and service sectors to obtain a business license and register legally in accordance with the existing Ethiopian Business Licensing Categories. In order to achieve the objectives of the micro and small enterprise development policy and strategy and in line with the growth and transformation plan (2010/11-2014/15), special support shall be given to those enterprises that are engaged in the manufacturing sector and that produce items for export or to substitute imports. Particular attention shall be given to subsectors, activities and enterprises to be established in the manufacturing, construction, trade, services and agricultural sectors that have a propensity to create large scale employment (MoUDH, 2016).

The primary objective of the national enterprises development strategy framework is to create an enabling environment for enterprises. In addition to this basic objective of the national enterprises development strategy framework, the MoTI has developed a specific objective which includes, facilitating economic growth and bring about equitable development, creating long-term jobs, strengthening cooperation between enterprises, providing the basis for medium and large scale enterprises, promoting export, and balancing preferential treatment between enterprises and bigger enterprises (Amare and Raghurama, 2017). The strategy outlines the policy framework and the institutional environment for promoting and fostering the development of enterprises and stimulating the entrepreneurial drive in the country.

In Ethiopia, it is possible to show the development of enterprises in the country from a historical perspective. Following the country's shift to a market economy, the current government as well as NGO's and donors have shown interest in the sector. Accordingly, attempts have been made by various government institutions to define enterprises. To encourage, coordinate and assist institutions which provide support to the development and

expansion of enterprises, the government of Ethiopia ensures the proper institutional coordination for enterprises support functions (FeMSEDA, 2014).

To achieve the above objectives, FeMSEDA is expected to provide support to the Regional Micro and Small Enterprises Development Agencies (RMSEDA) by provide: leadership by delivering ‘training the trainers’ programmes to equip regional agencies, business associations, and other professionals to deliver entrepreneurship training and facilitation services; studying the problem of identifying viable markets for enterprises and addressing product quality issues; disseminating information to enterprises; and advising government on enterprises policies and strategies. FeMSEDA also operates skills and technology training facilities, much like incubators, where training is offered in woodworking, metalworking, garments making and handicrafts. It also provides a marketing outlet for enterprises products in its sales and display center and organizes enterprises product exhibitions at national and local trade fairs (Berihu *et al.*, 2014).

According to MoUDH (2016), enterprises predominantly prevail in small towns while medium and large-scale enterprises dominate bigger towns and cities. The enterprises sector is particularly important for low-income, poor, youth and women groups. Consequently, the vast majority of the urban poor earn their living through enterprises. In Ethiopia, like in any other developing countries, medium and large-scale manufacturing or service giving sectors and state bureaucracies could not create enough jobs to absorb the ever increasing labor force, especially in urban areas. The enterprises are the key instruments of job creation in urban centers, whilst job creation is the centerpiece of the country’s development plan. The role of enterprises as the principal job creators is not only promoted in low income countries but also in high income countries including the United States of America. In such situations, enterprises may be reported to all people in both urban and rural areas as source of livelihood.

2.1.5.2. Achievements of enterprise development in Ethiopia

As a result of the comprehensive support extended from the government and concerted effort of the major stakeholders, the development of the sector is bearing fruit. This is justified through performance of the sector in the first 4 years of the GTP. During the plan period 2011-2014 the sector was able to; generate 6,671,012 jobs, exceeding the goal set

for the total GTP period (3 million jobs) and reduces unemployment rate from 20.4% in 2009/10 to 16.5% in 2014, generate birr 25.62 billion through domestic market linkage, exceeding the goal set for the total GTP period (birr 10 billion), generate 65,375,026 USD through foreign market linkage, exceeding the goal set for the total GTP period (46,166,142 USD), the success of the strives in the development of sector is also reflected in the transfer of 3,141 enterprises to medium and large enterprises level. In order to realize this, the government has; facilitated credit amount birr 9.87 billion, facilitated saving amount birr 11.037 billion, provided working premises 16,753 shades and 567 buildings, provide technical and management training for 5,087,358 enterprises managers and operators (FeMSEDA, 2014).

According to the CSA report on survey of small scale manufacturing industries (2015), there are 39,027 small scale manufacturing industries. Of these, about 51% (100% in case of rural areas) are grain mill. The other important industrial groups are manufacturing of furniture (14%), manufacturing of wearing apparel (10%), manufacture of fabricated metal products (10%) and manufacture of food products (7%). The remaining is shared by publishing and printing, manufactures of wood and wood products, other non-metallic mineral products, textile, luggage, handbags, footwear, etc. In terms of employment, they engaged a total of 129,592 persons, of which 88% are male. Permanent paid employees and unpaid family workers respectively account for 48% and 40% the rest being seasonal and temporary workers (6.6%), unpaid apprentices (3.4%) and paid apprentices (2.3%). enterprises are known to face a host of problems at various stages in their life span.

Another survey report by the CSA (2015) on urban informal sector indicates that there were 997,380 persons engaged in the informal sector in urban areas, 81% of which are informal sector operators while the remaining 20% are persons employed in the informal sector. In terms of sex, a large majority (60%) are female. About 46% of the totals are engaged in manufacturing while 38% are in trade, hotels and restaurants. The informal sector is dominated by sole ownership, accounting for 99% of the total establishments. The report stated that the source of initial capital for 89% of the total urban informal sector establishments was own savings (45%), borrowed from friends (23.92%) and assistance from friends (20%). According to the same report, the top three problems faced by urban informal sector operators during start up stage are: lack of sufficient capital (38%) inadequate skill (10%) and lack of premises (6%). Informal sector operators also face

problems after starting their operation; once again shortage of working capital came up as the most important problem cited by 30% of the establishments; while limited market and health problems became the second and third obstacles with 30% and 6% of establishments identifying them as their key problems.

Recognizing the role of enterprises in the socio-economic development of the country and giving special attention to the sector, enterprises policy and strategy is prepared and imprinted (MoUDH, 2016). According to enterprises development strategy of Ethiopia, designed to ensure the sustainability of the development achieved in all economic sectors of the country, the main focus of the government is creating job opportunities through enterprises development, to reducing unemployment and reduce poverty and enhancing enterprises to be base for industrial development in the country. The sector is crucially important to the economic and social development of the country in the sense that it generates broader job opportunities and assist to alleviate poverty and facilitates rural and urban economic linkage and boost the economy as well as promotes entrepreneurship culture and enhance self-employment and serves as fertile ground for the emerging of medium and large industries.

According to NBE (2018), during 2017/18 alone, a total of 144,107 new micro and small enterprises were established which employed about 187.9 thousand people. These enterprises received more than Birr 8.6 billion in loans. In terms of regional distribution, 28.2 percent of the newly established enterprises were located in Amhara followed by Oromia 24.2 percent, Tigray 21.9 percent, SNNPR 16.2 percent and Addis Ababa 6.6 percent. With respect to total loans, enterprises in Amhara received 28.7 percent, Addis Ababa 21.5 percent, Tigray 17.3 percent, Oromia and SNNPR each 11.6 percent and Somalia 5.8 percent. From the total jobs created by the newly established enterprises, about 42.1 percent was in Oromia, 20.2 percent in Amhara, 20 percent in SNNPR, 9.4 percent in Tigray and 3.5 percent in Addis Ababa.

2.2. Theoretical Framework

2.2.1. Theory of Enterprises Development

There are two main theories in relation to enterprises development. Those are classical and modern theories of enterprises development. The classical theories are also known as the anti-enterprises. The classical theories include the works of Hoselitz (1959), Staley and Morse (1965) and Anderson (1982). The modern theories, on the other hand, include the works of Berry and Mazumdar (1991) and Levy (1991). The classical theories predict that advantages of enterprises will diminish over time and large enterprises will eventually predominate in the course of economic development marked by the increase in income.

The anti-enterprises have questioned the efficacy of enterprises in promoting growth and reducing poverty. First, they argue that large enterprises may exploit economies of scale and more easily undertake the fixed costs associated with research and development, boosting productivity. They argue further that some researchers found that small businesses are neither more labor intensive nor better at creating jobs than large firms. Enterprises do not possess a comparative advantage in technological innovation or in creating budding entrepreneurs. Furthermore, the net job creation of enterprises is not necessarily higher and is frequently lower than for larger enterprises. The lion's share of job creation disproportionately resides in large enterprises. Larger employers offer better jobs in terms of wages, benefits, working conditions, opportunities for skill enhancement, and job security (Hallberg, 2001).

The modern theories are also known as the pro-enterprises. In contrary to classical theorists, modern theorists argue that: enterprises enhance competition and entrepreneurship and thus have economy wide benefits in efficiency, innovation and productivity growth. As stated by Seleshi (2001), in addition to their contribution to the development of the overall economy, enterprises have the following peculiar characteristics, which qualify for their encouragement: they are complementary to medium and large industrial enterprises (they are a springboard for higher level development), they are more flexible in adopting to changes in and diversification of demand, they are more prepared to adopt technological innovation, they are affected less by economic fluctuations

due to their structure, they produce more and offer a more diversified range of products with less investment, they create employment with lower investment costs, they mitigate effects of a skewed income distribution pattern, they contribute to inter-regional balance, they encourage, channel and mobilize individual savings, they are the home of entrepreneurship development and they are one of the main guarantees of democratic society and liberal economy.

The theory postulates that a prerequisite for the development of enterprises is that there is a market for their products and services. Therefore, the enterprise sector will tend to develop a cyclical relationship with the economy as a whole. However, enterprises were also developing in competition with other formal sector, and their development was constrained by formal sector monopolies. Structural adjustment and other policies that limit such monopolies, and attempt to create more competition, will therefore be advantageous to the enterprises, because this may allow them to capture market shares from the economy. Proponents of structural adjustment and stabilization policies tend to base their arguments on this theory. Empirical studies based on the theory tend to focus on the upper end of the enterprise sector, particularly the manufacturing enterprises, more resourceful and successful enterprises, which have a potential to grow into the formal economy (Christopher *et al.*, 2006).

The classical theories seem to get less supports as many international aid agencies, including the World Bank, since the 1980s have been giving direct or indirect supports to enterprises to accelerate economic growth and to reduce poverty in least developed countries. The World Bank gives three core arguments in supporting enterprises in least developed countries, which in line with the arguments of the modern paradigm on the importance of enterprises in the economy: First, enterprises enhance competition and entrepreneurship and hence have external benefits on economy-wide efficiency, innovation, and aggregate productivity growth. Second, enterprises are generally more productive than other formal sector but financial market and other institutional failures and not-conducive macroeconomic environment impede enterprises development. Third, enterprises expansion boosts employment more than other formal sector growth because enterprises are more labor intensive. In other words, the World Bank believes that direct government support for enterprises in least developed countries help these countries exploit the social benefits from their greater competition and entrepreneurship, and their

enterprises can boost economic growth and development (World Bank, 2014). The divergent views by researchers indicate that there is no consensus among researchers on this important phenomenon. The varied opinions expressed by the different groups may be due to the different settings, the economic environment where studies were carried out, and the different methodological approaches employed.

2.2.2. Theory of Efficiency Estimation

Efficiency can be summarized as the attainment of a production goal without waste. The fundamental idea underlying all efficiency estimation, however, is that of the quantity of goods and services per unit of input. According to Coelli *et al.* (2005) efficiency estimation emerges naturally after the computation of the frontier production function, since it corresponds to the distance between an observation and the empirical estimate of the theoretical ideal. The estimated models provide a means of comparing each firms, either with the ideal production frontier or with each other, and also provide point estimates of variables' effect on efficiency which a measure of efficiency of a firm consisting two components. The technical efficiency which measures the ability of the firm to obtain the maximum output from given inputs; and allocative efficiency, which measures the ability of the firm to use inputs in optimal proportions given their prices. The computation of these efficiency measures involves estimating the unknown production frontier. Generally, if the actual production point lies on the production frontier, it is perfectly efficient. If it lies beneath the frontier then it is technically inefficient. Points below the frontier are not technically efficient, and technical efficiency shows the physical relationship of input and output of the firm.

Efficient frontier function to measure the firm's performance of productive units has been maintained using different techniques that can be classified in different ways. According to Milton *et al.* (2015) the classification of frontier models can be made according to the tools they are using, namely parametric and non-parametric frontier functions. The distinction between the two is mathematical programming and econometric approaches. The deterministic frontier functions can be solved either by using mathematical programming or by means of econometric techniques. The stochastic specifications are estimated by means of econometric techniques only. Based on the concept of frontier, efficiency is defined relative to production frontier consequently; enterprises is said to be efficient if it

is operating on the production frontier. Meanwhile, enterprises is said to be technically inefficient when it fails to achieve the maximum output from the given inputs. As the SFA impose functional and distributional forms on the error term, the DEA does not require any functional form to be specified. Further, while the former distinguishes the component of inefficiency in to random and inefficiency effect, the later deems any deviation from the efficiency frontier to the result of inefficiency (Tekle, 2016).

2.2.3. Theory of Performance Measurement

There are number of approaches exist to evaluate how performance and effectiveness of enterprises be measured. These are the goal approach, system resource approach, stakeholder approach and competitive value approach. The goal approach measures the extent an enterprise attains its goals while the system resource approach assesses the ability of an enterprise obtaining its resources Quinn and Rohrbaugh (1983). Both approaches measure the extent to which an enterprise achieves its goals and accesses to the resources. For the stakeholder approach and the competitive value approach, these evaluate performance of an enterprise based on its ability to meet the needs and expectations of the external stakeholders including the customers, suppliers, competitors (Zammuto, 1984).

All four approaches intend to measure the extent that an enterprise has met its planned targets; the first two approaches focus on meeting the internally-set targets while the latter two meeting the needs and expectations of the external stakeholders. Among these, goal approach is most commonly used method due to its simplicity, understandability and internally focused. Information is easily accessible by the managers for the evaluation process. For the remaining three approaches, they are deemed challenging to the managers of the enterprise (Quinn and Rohrbaugh, 1983). The system resource approach depends on quality of the internal communications and extent of securing for its resources, the stakeholders approach deals with issues relating to priority of the external stakeholders Zammuto (1984), while the competitive values approach depends on flexibility, effectiveness and efficiencies of an enterprise's structure of utilizing its resources to meet the external pressures. Quinn and Rohrbaugh (1983) conclude that among the approaches, the goal approach is a better fit for the enterprise where targets are being set internally based on the managers' interests and capability to achieve.

The enterprises performance measure is one of the most important concerns in the economy of the world considering the role of this sector for economic growth and development. Enterprises could measure their performance using the financial and non-financial measures. The financial measures include profit before tax and turnover while the non-financial measures focus on issues pertaining to customers' satisfaction and customers' referral rates, delivery time, waiting time and employees' turnover. The most commonly used measures of performance in the literature include profitability, growth in employees and survival. Financial performance measures are preferred over non-financial measures for having some characteristics such as quantitative, objective, scientific and intuitive. The performance measure through the profitability of enterprise (i.e. the excess of revenues over costs) is an essential indicator of enterprises performance. Because as enterprises are privately owned business, profits flow directly to the owners of the enterprises (Yirgalem and Viswanadham, 2016).

2.2.4. Theory of Impact Evaluation

The impact evaluation seeks to prove that the intervention had an outcome that would not otherwise have been achieved without the intervention. A successful evaluation is required to take into considerations the objective of the intervention, the target population, the treatment and feasible impact evaluation models. It states also that successful impact evaluation methods is judged by its capability of proving causality, measuring the counterfactual and therefore estimate impact. There are different impact evaluation approaches. These are quantitative, qualitative and theory-based impact evaluation approaches. In quantitative impact evaluation; the analysis is based on a representative survey of treatment group and a comparison group, preferably both before and after the intervention. The quantitative impact evaluation includes experimental, as when the evaluator purposely collects data and designs evaluations in advance, or quasi-experimental, as when data are collected to mimic an experimental situation. The experimental quantitative approach requires the eligible population be identified and then a random sample of those treated. A random sample of the untreated are a valid comparison group since there should be no systematic difference between their characteristics and those of the treatment group. Under quasi-experimental quantitative approach; selection may be based on a set of characteristics rather than just one. Hence, the comparison group needs to be matched on all these characteristics (Glennester, 2017).

The qualitative or participatory impact evaluation approach is the analysis based on participatory methods amongst beneficiaries that intended to empower beneficiaries by enabling them to shape decisions which affect their lives. According to Roche (1999) suggestion, it is more applicable in participatory research eschews the pre-set agenda implicit in the structured questionnaires used in the quantitative approach. Rather techniques developed for participatory rural analysis, such as village mappings, wealth rankings and oral life histories are used. In general, through various means, beneficiaries comment directly on how the intervention has affected their lives also called beneficiary assessment.

The theory-based impact evaluation approach is focus on analysis tracing the log frame from inputs to outcomes, using a mix of methods to establish causal linkages. According to organization for economic cooperation and development (2011) argument the theory-based impact evaluation approach is not an alternative to quantitative or qualitative approaches. Rather it is considered as method for evaluation design. A theory-based evaluation design is one in which the analysis is conducted along the length of the causal chain from inputs to impacts. Many impact evaluations concern themselves only with the final link in the chain final outcomes. This study was adopt the quantitative impact evaluation approach using the quasi-experimental method because of its cross-sectional survey on selected groups after intervention based on these set of common characteristics.

2.3. Analytical Framework

2.3.1. Efficiency Estimation of Enterprises

Efficiency is a situation in which an organization maximizes benefit and profit, while minimizing effort and expenditure. It is concerned with the process used in transforming inputs into output (Okoye, 2014). According to Melaku (2014) and Milton *et al.* (2015), the method for efficiency estimation can be broadly classified into frontier and non-frontier approaches. The non-frontier approach employs either deterministic techniques, which include growth accounting and index numbers, or econometric methods, which include growth regression and proxy numbers. The frontier approach includes two basic methods, data envelopment analysis (deterministic method) and stochastic frontier analysis

(econometric method). The basic difference between frontier and non-frontier models in the assumption is that observed production units do not fully utilize their existing technology.

The frontier models are superior by incorporating inefficiencies which in many cases arise in the production process. When production is not efficient, productivity change may result not only from technical change but also from improvements in efficiency of production. Thus, the frontier approach is preferred to the non-frontier approach so as to decompose change in total factor productivity into its components. Okoye (2014) suggested that stochastic frontier analysis and data envelopment analysis became the most commonly used methods of frontiers approach. Both methods estimate the efficiency Frontier, which shows the best efficient observed among enterprises. The stochastic frontier analysis is based on parametric econometric analysis while data envelopment analysis is a non-parametric mathematical programming method.

The data envelopment analysis is first introduced by Charnes *et al.* (1978). It is a mathematical programming approach that is commonly used to evaluate the efficiency of a number of business units. It allows efficiency to be estimated without any assumptions regarding the functional form of the production function or the weights for the different inputs and outputs chosen. It has some advantages in comparison with the stochastic frontier method. First, it is not necessary to assume some functional form for the production function. Second, it makes no a priori distinction between the relative importance of outputs and inputs considered as relevant in firm decision-making process. Third, it is relatively insensitive to model specification, the efficiency measurement is similar if it is estimate oriented to inputs or oriented to outputs. However, it has also some drawbacks. First, it is sensitive to small measurement errors, second, it is a non-parametric technique and statistical hypothesis tests are difficult, third, it doesn't incorporate the stochastic nature of production and it attributes any discrepancy between observed and potential output to inefficiency (Purwanto *et al.*, 2014; Melaku, 2014). In addition, the analysis may lead to unexpected results and is suspicious to outliers. It neglects inefficiencies resulted from omitted variables, unobserved measurement errors, and stochastic noise, which may result in a possible upward bias of inefficiency scores.

The stochastic frontier model was first introduced by Aigner *et al.* (1977), Meeusen and Van den Broeck (1977) and Battese and Coelli (1992). In this model there is a composed error term which captures the effects of exogenous shocks beyond the control of the analyzed units in addition to incorporating technical inefficiency. Errors in measurement of outputs and observations are also taken into consideration. Their original works were mainly applicable to cross-section data. The major reason why stochastic frontier model is commonly used is that the estimation is based on parametric econometric analysis, to define the frontier it uses economic theories, specification of the functional form for the frontier is needed a priori, it allows for the possibility of modeling and measurement error, it makes some assumptions about the error terms and the functional form and the assumptions and functional forms considered in stochastic frontier model are moderately subject to statistical tests and it also allows standard econometric tests which may be applied to guide the decision about which explanatory variables to include in the model (Melaku, 2014; Taciana *et al.*, 2017). The efficiency range is from zero to one, where the higher the score, the more efficient enterprise (Battese and Coelli, 1995; Fabio *et al.*, 2017). According to different scholars' suggestions, this study was employed the stochastic frontier model for the estimation of technical, allocative and economic efficiencies of the enterprises.

2.3.2. Measurement of Performance of Enterprises

A business enterprise could evaluate its performance using the financial and non-financial measures. The financial measures include profit before tax and turnover, while the non-financial measures focus on issues pertaining to customers' satisfaction and customers' referral rates, delivery time, waiting time and employees' turnover. Recognizing the limitations of relying solely on either the financial or non-financial measures, owners-managers of the modern small business has adopted a hybrid approach of using both the financial and non-financial measures. Non-financial performance measures can be better indicators of future financial performance (Gallani *et al.*, 2015). They do so by providing the missing link between business activities and financial results by providing forward looking information on a business performance. For instance, a performance measure on customer satisfaction may offer an indication of future cash flows that would not be captured otherwise.

It is necessary to be able to assess whether or not an enterprises has performed well over a certain period of time. From its profit and loss account, analysts can observe the profit it has generated. It is also necessary to know if enterprises are in a good short-term financial position, and if it is in a good financial position for long-term growth. One of the most common means of analyzing accounts is the use of financial ratios. Ratio is the simplest mathematical expression of two magnitudes which are meaningfully related. Ratio analysis and interpretation can be used by many different stakeholders; especially those outside of the organization who want to invest. Ratios can also be used to compare an enterprise's current position with its past positions (Caroline and Peter, 2016).

There is no consensus on how to measure performance of enterprises, which best suited for particular enterprises (David, 2016). Thus, performances are variously measured and the perspective are tied together and consistently monitored from the enterprise's context. Approaches which best suits to measure enterprises performance, conceivably lacks universality. However, the selection of performance measures that reflect the true situation of enterprises with some degree of certainty and reliability is indeed a crucial process. Emad *et al.* (2014), claims the performance measurement is an elusive and multifaceted construct as the change brought new realities in the market place. In views of various scholars, the use different ways of performance measurement is suggested likely due it help to take the advantage of various measures and minimizes shortcomings of single of measure performance of enterprises.

According to Yirgalem and Viswanadham (2016), financial and non-financial measures of performance includes profitability, total assets, return on investment, sales volume, employment size, capital employed, market share, customer satisfaction, productivity, turnover, delivery time, employees turnover and other. There is no empirical evidence that suggested financial measure is preferred over non-financial measures and vice versa. However, attempted to provide some theoretical justification that assumed to use profits, growth rate in sales and increase in capital assets as more precise and potentially offer more objective measurement as compared to other measures of performance of firm. Pinho and Elisabete (2014) argued that enterprises could measure their performance using hybrid approach combining both financial (profit) and nonfinancial measures (customer satisfaction, delivery time, waiting time and employees turnover). Ahmed (2015) also suggested use of financial and non-financial measures including the following; sales

growth market share, cost reduction, operating profit ratio, quality and productivity and return on investment in order to incorporate multidimensional aspects of enterprises performance.

Despite the various approaches of performance measurements used in single study, there are scholars who ignoring multidimensional aspects and hybrid measure of performance and confined to single measures of performance of the enterprises. For instance, Tefera *et al.* (2013) considered only single measure such as turnover or sales as proxy measure of enterprises performance, used only growth in employees since startup as objective measure of enterprises performance assuming other measures would result a measurement errors. Turnover as the better measure of small enterprises performance in comparison to employment size, but turnover data often lacks detail, due to the difficulties that would be experienced while collecting accurate financial data at all level of individual enterprises.

Gallani *et al.* (2015), has been used more diverse measure of performance such as; survival, sales volume, growth, profit margin, capital employed, numbers of employees. According to Blackburn *et al.* (2013), enterprises performance should be measures in terms of employment turnover and profitability growth. According to Lusimbo and Muturi (2016), convincingly argues, most academic researchers and policy planners appears to be focused on those two measures of performance of the enterprises; employment growth (increase in numbers employees), which addresses job concerns and sales growth (increase in sales), which addresses taxations concerns. Andile and Peter (2018) focused on accounting measures of enterprises performance such as return on asset, return on equity, return on investment, return on capital employed and sales growth and considered these key enterprises performance measures. Moreover, wide range of literature argues that financial and non-financial measures are used to measure the performance of enterprises. As recommended by various scholars, for the purpose of consistency and feasibility of various data, this study has adopted the financial measures of performance of the enterprises through profitability ratio analysis.

2.3.3. Impact Evaluation of Enterprises

According to Arkhangelsky and Guido (2018) there are two ways of analytical tools for impact analysis by using panel data. These are fixed-effects and random effects models.

Fixed effect model is applicable when we are interested in analyzing the impact of variables that vary over time. Fixed effect model explores the relationship between predictor and outcome variables within an entity (country, person, company, etc.). Each entity has its own individual characteristics that may or may not influence the predictor variables (for example, being a male or female could influence the opinion toward certain issue; or the political system of a particular country could have some effect on trade or GDP; or the business practices of a company may influence its stock price). When using fixed effect model we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error term and predictor variables. Fixed effect removes the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable. Another important assumption of the fixed effect model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different therefore the entity's error term and the constant which captures individual characteristics should not be correlated with the others (Andile and Peter, 2018).

During the analysis of impacts by using panel data with random effect model the rationale behind random effect model is that, unlike the fixed effect model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model (Blackwell and Adam, 2018). The crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the repressors in the model, not whether these effects are stochastic or not. If we have reason to believe that differences across entities have some influence on your dependent variable then you should use random effects (Bell and Kelvyn, 2015). An advantage of random effects is that you can include time invariant variables. In the fixed effects model these variables are absorbed by the intercept. Random effect assumes that the entity's error term is not correlated with the predictors which allows for time-invariant variables to play a role as explanatory variables. In random-effects you need to specify those individual characteristics that may or may not influence the predictor variables. The problem with this is that some variables may not be available therefore leading to omitted variable bias in the model. Random effect allows generalizing the inferences beyond the sample used in the model (Aronow and Cyrus, 2015; Taddy *et al.* 2016).

2.4. Review of Empirical Literature

2.4.1. Empirical Studies on Production Efficiency Estimation

Technical efficiency in production is ability of the enterprises to produce at the maximum output frontier production given quantities of inputs and production technology. The variation in technical efficiency of producers might arise from managerial decisions and specific farm characteristics that affect the ability of the producer to adequately use the technology. It is a micro concept observed differentials in technical efficiencies which may be due to differences in managerial ability, the presence of different environmental conditions such as soil fertility, rainfall, temperature, soil radiation, precipitation. The important role of efficiency in increasing agricultural output has been widely recognized by researchers and policy makers. Enterprises lying on the production frontier are 100 percent technically efficient and Technical inefficiency of the enterprises increases with distance from the production frontier (Okoye, 2014).

Victor and Boris (2016) in their study maintained that technical efficiency of enterprises is characterized by relationship between production and efficient production frontier. Kadurumba *et al.* (2014) stated that technical inefficiency arises when actual or observed output from a given input is less than that of the maximum possible. This agrees with Taciana *et al.* (2019) when they found out that technical inefficiency exists among enterprises in Imo state. Technical efficiency is thus calculated as actual output divided by expected output. However, several other methods of research philosophical view of importance of measurement error terms in the production process. The various methods calculate a technical efficiency index which measure the distance of the observed enterprises from a point on the production frontier. Accordingly, enterprises lying on the production frontier are 100 percent technically efficient with and technical inefficiency of the enterprise increases with distance from the production frontier.

Allocative efficiency measures the extent to which an analyzed diminishing marginal utility produces its outputs in a production that minimizes cost of production, assuming that the unit is already fully technical efficient i.e. when allocative is efficient (Okoye, 2014). Therefore the enterprises is considered allocatively efficient in the use of a

production resources if the enterprises is able to equate the value of the marginal value product of the factor to that of factor price is able to maximize profit with respect to that factor (Pilar *et al.*, 2018).

Economic efficiency is the ability of enterprises to maximize profit. It is also known as production efficiency and it is described as the product of technical and allocative efficiencies. An economically efficient input/output combination would be both on the frontier and the expansion path way. Economic efficiency exists when the marginal value product is not significantly different from marginal factor cost (Pilar *et al.*, 2018). To achieve economic efficiency, the ratio of marginal value product to marginal factor cost must be equal to one. Economic efficiency is concerned with maximum profit, i.e. when the enterprise chooses resources in such a way that its marginal value product is sufficient to offset marginal cost. The marginal value product is calculated from the respective regression coefficients using appropriate optimum levels of output price depending on the lead equation of the functional forms. The marginal factor cost is the market price of one unit of input. A ratio of less than one implies that input is being over utilized while a ratio greater than one implies that input is underutilized (Victor and Boris, 2016).

2.4.2. Empirical Studies on Financial Performance of the Enterprises

Enterprises performance is assessed by measuring the success or failure of enterprises in achieving its goals and can therefore be defined in a number of ways. According to Mendoza (2015) argued that performance of the enterprises can be described as the enterprise's ability to create acceptable outcomes and actions. They stated that performance of enterprises from the dimension how the enterprises is successful and use the performance and success interchangeably. Moreover, it is also evident that enterprises performance termed to be the enterprise's success in the market, which may have different outcomes (Emmanuel, 2013). On the other hand, Rufo (2015), on his study, critical analysis and modeling of enterprises performance, confirms that growth of enterprises synonymous with success. Similarly, Blackburn *et al.* (2013) noted that enterprises growth as proxy measure of enterprises performance. Moreover, performance of the enterprises can be described as the enterprise's ability to create acceptable outcomes and actions.

According to Gill and Shahbaz *et al.* (2015), on their study of barriers of enterprises growth evidenced that growth of enterprises is measured (increase in sales, improvement in overall performance and increase in market share), which supports the idea that performance, growth and success were alternatively used. This is due to the fact that as enterprises grow unemployment rate reduced and increases number of products and services offered to the society. To sum up, looking at various literature of enterprises performance, it can be perhaps justifiable to deduce that performance of enterprises is synonymous to success and growth (Pilar *et al.*, 2018). Thus, performance, success and growth of the firm are assumed to be synonyms due to the fact they would be measured using similar indicators, such as survival, profit; return on investment, sales growth, number of employed, happiness, reputation, and so on. Consequently, performance, success of enterprises can be used interchangeably.

2.4.3. Empirical Studies on Factors Affecting the Performance of Enterprises

Enterprises performance is influenced by both internal and contextual factors, operators need to understand what influences businesses to reach peak performance. The contextual factors include politico-legal, working premises, technological, infrastructural, marketing and financial factors. The influence of these factors to the enterprise performance is very important but it is noteworthy that the management has no control over them (Fatimah and Fatima, 2018). Nevertheless, the factors must be closely monitored to ensure that stringent measures are taken within the best time to either take advantage of the opportunities or combat the threats found in the external environment. The internal factors that influence the enterprise's performance can be classified as management and entrepreneurial factors.

Kinyua (2014) and Fatimah and Fatima (2018) conducted a longitudinal study to assess the impact of influential factors that affect the long-term survival and viability of enterprises. They examined various factors which influence business performance such as: as experience, education, occupation of parents, sex, race, age, entrepreneurial goals, motivations and goals, social learning theory, network affiliation (contacts and membership in organizations); human capital and environmental influences location, and socio political variables. Caroline and Peter (2016) studied the nature, characteristics, economic performance, opportunities and challenges of enterprises and suggest that factors influencing business performance could be attributed to personal factors such as

demographic variable and business factors such as amount of financing, use of technology, age of business, operating location, business structure and number of full-time employees as important factors in examining the performance as small scale business operators. The most comprehensive summary of factors influencing performance include: individual characteristics, parental influence, business motivation and goals, business strategies, goals and motives, networking and entrepreneurial orientation.

According to Marom and Lussier (2014), lack of capital was the major problem, which leads to failures of enterprises. Among the respondents investigated, 80% of them complained that lack of capital was contributing to the malfunctioning of their business. Other causes that failure of enterprises are land and premises 80%, taxation 70%, poor market and market information 68%, business support service 64%, poor record keeping wrong pricing 64%, negative cash flow 60%, management problems 58%, and conflict among partners of 50% respondents that claimed the cause as contributor to failure. Despite their importance, enterprises are confronted with a number of constraints. The constraints impede the performance of enterprises. Financing is a major obstacle for poor people to open up a new enterprise. This is mainly because the banking institutions are reluctant to provide loans to small businesses, most of which are unable to provide adequate collateral for loans.

According to Michael *et al.* (2009), disciplined financial management, availability of market/customers, location accessibility of the business, skilled workforce, good business networking, competitive pricing/low cost, selling variety of products/services availability of capital, availability of credit from the banks, no competition, clear vision of what is required, reading business magazines, attending workshops/seminars, attending workshops /seminars and focusing on niche market respective of their sequence are factors that contribute to business success.

Inadequate skills are a result of the fact that there are only a few vocational institutions that cater for developing skills; the most common form of acquiring skills in the small business sector is through apprenticeships, and the formal educational systems in the country prepare students for paid employment. Limited access to market and limited demand, lack of access to raw materials and their escalating prices, problems related to government rules and regulations, poor technology of production, lack of institutional support, lack of

favorable policy support, lack of working places (premise), short grace period granted by lending institutions, bureaucratic problems (in some offices) are also problems impeding the performance of enterprises. The technologies used by enterprises involve outdated and old equipment, unhygienic and very small quantities of production, very low flexibility to help produce diversified products, etc. Moreover, there is lack of technical training and refreshing opportunities for enterprise operators in the country (Deksiso, 2018).

In the past, the enterprises activity was largely left for the unskilled and non-educated partly because of its informality and ease of entry. This has changed. More and more of the youth graduating from schools, TVET colleges and universities are getting into the sector in search of self-employment. In terms of age distribution, for both the enterprises operators, the dominant age group is 20-39 (accounting for close to 55%) followed by those aged 40-49 (constituting about 31%). Those younger than 20 and over 60 constitute only 3% and 4%, respectively. Thus, the sector is providing employment opportunity to the most economically active section of the society. Looking into this for enterprises separately, again the same age group dominates but with noticeable differences: The 20-39 age group accounts for 66% in case of enterprises compared to 51% for enterprises. In terms of education, 71% of the small enterprise operators have at least secondary education while another 20% have vocational/TVET training. In contrast, among the operators, 67% have secondary education while 25% have non-formal education. In addition, more of those with TVET and similar education are joining the enterprise sector (ILO, 2015).

Hiebl (2015) found that skilled manpower, as measured by the share of skilled workers to total workers, has a significant and positive effect on the operational performance of the enterprises. Employee skills is the mechanism by which organizations develop value through new products, processes, and organizational systems that are needed to respond to changing markets, technologies and modes of competition. It plays a critical role in determining the long-term survival of organizations, enhancing an organization's success, and maintaining its sustainable competitive advantages through value creation. Most of the successful enterprises were characterized by qualities such as innovativeness, specialization and networking in their daily operations. Similarly, skilled employ is also one of the important determinants of an enterprises performance, since higher skilled employees is associated with higher employees productivity which will improve operational performance of enterprises. The limitation imposed on enterprise by the lack of

human resource is further amplified by the prevalence of staff turnover and subsequent loss of knowledge obtained from enterprises (Anne, 2014). The size of firms in manufacturing enterprise is mostly determined by the number of employees engaged in the enterprise but not skilled manpower. Heslina *et al.* (2016) found that most of the core processes of human resource management, namely, recruitment and selection, performance appraisal, training and development, as well as compensations have a momentous and positive impact on enterprises performance.

Women have limited access to vocational and technical training in South Asia. In fact, women on average have less access to education than men, and technical and vocational skills can only be developed on a strong foundation of basic primary and secondary education. South Asia is characterized by low enrolment among women in education, high dropout rates and poor quality of education. The existence of sufficient training access in building the capacity of enterprises provides them with high opportunity to have good performance (UNECE, 2014). Research shows that majority of the lot carrying out enterprises in Kenya are not quite well equipped in terms of education and skills. Majority of those who run enterprises are the ordinary lot whose educational background is wanting. Hence they may not be well equipped to carry out managerial routines for their enterprises. They also summarized that the entrepreneurs with higher education level and experiences have greater chances of succeeding than the people without education and experiences.

A research has been conducted by Cacciolatti *et al.* (2011) indicated that enterprises that make good use of structured marketing information presented a higher probability of growth. The good use of marketing information by the organization can lead to a higher probability of growth and enhance the competitiveness as well as a better decision making process. The ability to tap into new markets requires expertise and contacts. Women often lack access to training and experience in on how to participate in the market place and are therefore unable to market goods and services strategically. Thus, women-owned enterprises are often unable to take on both the production and marketing of their goods. In addition, they have often not been exposed to the international market and therefore lack knowledge about what is internationally acceptable (Brenda and Gregory, 2015).

Berihu *et al.* (2014) found that the enterprises competitiveness was increased through adopting information and communication technology. Application of information

technology will enhance the overall performance of enterprises. The adoption of information technology will assist an organization in storing information as well as communicating with customer, suppliers and business partner who will facilitate business transaction. Women have fewer business contacts, less knowledge of how to deal with the governmental bureaucracy and less bargaining power, all of which further limit their growth. Since most women entrepreneurs operate on a small scale, and are generally not members of professional organizations or part of other networks, they often find it difficult to access information. There are hardly any women only or women-majority networks where a woman could enter, gain confidence and move further. Lack of networks also deprives women of awareness and exposure to good role models. Few women are invited to join trade missions or delegations, due to the combined invisibility of women-dominated sectors or sub sectors and of women as individuals within any given sector (UNECE, 2014). Most existing networks are male dominated and sometimes not particularly welcoming to women but prefer to be exclusive. Even when a woman does venture into these networks, her task is often difficult because most network activities take place after regular working hours.

Most women have little access to policymakers or representation on policy making bodies. Large companies and men can more easily influence policy and have access to policy makers, who are seen more as their peers. Women tend not to belong to, and even less reach leadership positions in, mainstream business organizations, limiting their input into policymaking through lobbying. Women's lack of access to information also limits their knowledgeable input into policymaking (UNECE, 2014). The key factors that affect women entrepreneurs' performance especially in developing continents like Africa are: vulnerability of women to adverse effects of trade reform; restraints with regard to assets; lack of information to exploit opportunities; Poor mobilization of women entrepreneurs; lack of management skills; conflicting gender roles; gender inequality inappropriate technology; and constraints at the legal, institutional and policy levels (ILO, 2015).

Enterprises age, indicating a learning-by-doing experience, can also significantly affect enterprises operational performance, since old enterprises are able to participate in competitive markets due to their cumulative experience, business networks and reputation. Study findings support consideration of age of an organization as a factor that may affect enterprise survival and growth. Organizational decline and death is the liability of newness

that makes new micro enterprises face a greater risk of survival than older enterprises is that new enterprises do not have the experience, access, links, reputation or the legitimacy of the older enterprises, leading to limited access to external resources. The period of operation is one important factor for credit access to strengthen the performance of the business. According to Bonte *et al.* (2019), empirical studies based on individual data have found an inverse U-shaped relationship between age and the decision to start a business, using changes in the age distribution of the population of western German regions over time, they found in accordance with micro level analyses an inverse U-shaped relationship between the regional age structure and start-up activity in a region. Moreover, their findings suggest that the age specific likelihood of becoming an entrepreneur changes with the size of the age cohort, point in to the existence of a relationship between the age of the entrepreneur and the performance of the enterprise.

Individual characteristics of the entrepreneur may be expected to have direct relevance to the nature and performance of the enterprise. Based on the sex of the enterprise owners, we could see that more male are engaged in the enterprises than female: 56% compared to 44% for female. Male participation is even much higher in case of small scale business activities with male operators constituting 74%. The major factors are limited access to financial and material resources as well as education because of the obvious historical disadvantages that women encountered in the past. The level of investment, knowledge and infrastructural services required to start and run a business enterprise is lesser for micro than small scale businesses and women tend to engage in the former because of their limited access to such resources (Tariku, 2018). Resource endowment, capabilities and competitive advantages are major determinants of enterprises growth as per resource-based view since resources are basis for profitability and growth. Enterprises that are started operation with higher initial investment are more likely to grow than their counter parts that are started operation with relatively smaller initial investment (Mensah, 2016).

A number of studies have been undertaken to explore the major determinants of enterprise dynamism. Dynamism is a key to gauge the success and failure of a given enterprise during a given period of time. The dynamics of enterprises involve two components: net enterprises creation and net enterprises growth. He defines net enterprises creation as the difference between enterprises new start and enterprises closures while he defines net enterprises growth as the difference between expansion of the existing enterprises and

enterprises shrinkage (Berihu *et al.*, 2014). Geographic location has its implications for access to markets and other resources like finance, skilled labor, subcontractors, infrastructure, distribution and transport logistics and other facilities. Enterprises success also depends on neighborhood appearance and continued or maintained future business operations in that location. Location is also another important factor, since the operational performance of enterprises in different locations may be affected due to transport costs, infrastructure, spillover effects and natural resources (Heslina *et al.*, 2016).

2.4.4. Empirical Studies on Impacts of Enterprises

The role played by Enterprises, through the various economic benefits emanating from the sector was found to be eminent in the overall development effort and process of nations. In other words, by generating larger volumes of employment as well as higher levels of income, the enterprises will not only have contributed towards poverty reduction, but they will also have enhanced the welfare and standard of living of the many in the society (Yaregal, 2018). According to ILO (2015) existing strategy for poverty reduction through enterprises must emphasize the fact that enterprises make a positive contribution to poverty reduction when they provide employment, adequate levels of job quality, and low-cost goods and services used by the poor; entrepreneurship, combined with productivity increase, is a key ingredient for poverty reduction through enterprise development; and vibrant enterprises, competitive markets and a fair globalization can make a significant impact on poverty reduction.

As argued by Ahmad *et al.* (2011) the enterprises have a major sector of the growth and competitiveness of the economy. As indicated in their study enterprises sector of Pakistan represent approximately 90% of all the economic activities. Enterprises almost employed 80% of the non-agricultural work force; and shared about 40% in the annual GDP of the country. Enterprises sector of Pakistan is playing a very important part in the economic development and succession of technical improvement, sourcing to large scale industrial sector and promote economic renewal and social development. The significance of enterprises in economy cannot be underestimated because enterprises are the most important source of income, growth in the national economy, basic source of employment and social uplift (Pafunso and Adepoju, 2014).

Aminu *et al.* (2018) in their study pointed out that, the income generated from being engaged in enterprises primarily used to satisfy the poor's own physiological needs and those of their family, and then to provide a home and security for the household. They specifically claimed that enterprises help the urban poor by making them financially secure which in turn limits or reduces the misery, vulnerability and material and non-material hardships that come with poverty. The role played by enterprises in employment creation and income generation in most developing economies through by securing employment creation, income generation and multiplier effects on other sectors of the economy which were discussed one by one as follows.

Employment creation: From a worldwide perspective, it has been recognized that enterprises play a vital role in economic development, as they have been the primary sources of employment creation and output growth, not only in less developed countries but also in developed countries. In the face of increasing pressure from globalization, the informal sector activity and employment tend to expand in both developed and developing countries in the last two decades (ILO, 2015). Enterprises play key role in the economic wellbeing of Ethiopia and other developing countries. They have been identified to play key roles in a society including contributing to jobs through innovations and creativity as well as aiding human resources development. The immediate and the long run effect is that they affect levels of income and ultimately contributing to poverty alleviation (Yaregal, 2018). There can be little doubt that at the center of a country's economy, a truly enterprises development would be at the heart of the progress, where production, employment and output could be increased. Enterprises sector creates the majority of the country's net new employments (Chinweuba and Sunday, 2015).

The job opportunities available for poor people are usually not enough to overcome the impact of poverty sufficiently. Reducing poverty and hunger requires treating decent and productive employment as a central part of micro economic policy. It would contribute to achieve other sustainable development goals, efforts to fulfill our collective commitment. To fight poverty will fall short unless we focus on creating job opportunities and decent work for all. The link between unemployment and poverty reduction is predominantly a one way link in which growth in productive and remunerative employment brings about a rapid poverty reduction. It is possible that poverty reduction also has effect on employment getting out of poverty could enhance the ability to work. Without adequate employment,

new generations of young people find it difficult to create stable lives for themselves. The higher rate of growth in employment the faster is the reduction in poverty and hunger. Thus, as one of the major roles of enterprises, employment creation then plays an important role in poverty reduction (Motilewa, 2015).

The national survey conducted by FeMSEDA in 2014 indicates that more than 6.67 million people in the Ethiopia are engaged in enterprises sector. This indicates that enterprises are the second largest employment generating sector next to agriculture in the country. This implies that the sector is a quick remedy for unemployment and poverty problem. The realization of a modest standard of living through curbing unemployment and facilitating the environment for new job seekers and self-employment requires a direct intervention and support of the government and other concerned stakeholders. The impact of enterprises to economic growth, income generation and poverty reduction is highly recognized. Enterprise is particularly important to women because it provides opportunity for self-employment which represents a chance to exploit their potentials, at the same time give a flexible, less restrictive and requires less capital and (Yaregal, 2018).

Income generation: Enterprises members earned money by operating their business which serve to cover consumption needs and when favorable, is put towards reinvestment for expanding the business such investments cannot only sustain consumption needs in the short term but can earn resources for the long term. Sustaining a business allows it keep its place in a market, and when market conditions improve, it can then expand, creating more income (Chinweuba and Sunday, 2015). The enterprises are particularly important in the context of Ethiopia's poverty reduction strategy as the seedbeds for the development of medium and large enterprise (vertical integration) and because they absorb agriculturally underemployed labor, and diversify the sources of income for farming family (horizontal integration) (FeMSEDA, 2014). The study conducted by Tariku (2018), states that enterprises play key role in the economic wellbeing of developing countries like Ethiopia. They have been identified to play key roles in a society including contributing to jobs through innovations and creativity as well as aiding human resources development. The immediate and the long run effect is that they affect levels of income and ultimately contributing to poverty reduction.

2.5. Conceptual Framework of the Study

In every economy, enterprises are believed to contribute to the gross national product and to creating employment opportunities and often specialize in areas that big companies are not interested in. They are also thought to be flexible and can react quickly to the changes in the environment. In developing countries like Ethiopia, enterprises are one source of employment and income for the rural and urban population. More importantly, enterprises contribute to the reduction of poverty and vulnerability of the poor through enabling them to break the vicious cycle of poverty, and to enhance self-empowerment, respect and social dignity. They allow poor people to increase their income, accumulate assets, and enter into mainstream society. According to UND (2014), there is widespread consensus those enterprises: are labor-intensive, providing more opportunities for low skilled workers; are correlated with lower income distribution inequality; are necessary for agriculture-dependent nations transitioning to an industrial and service-oriented economy.

It is enough to recognize that enterprises are the emerging private sector in poor countries, and thus form the base for private sector-led growth. This rationale for enterprises intervention suggests that a enterprises development strategy is in reality just a private sector development strategy, recognizing that the majority of enterprises are small, that they may face different constraints and opportunities than large enterprises, and that the types of institutions and instruments best suited to their needs may be underprovided in distorted and segmented markets (ILO, 2015). Enterprises are the starting point of development in the economies towards industrialization. However, enterprises have their significant effect on the income distribution, tax revenue, and employment, efficient utilization of resources and stability of family income. According to Motilewa (2015) for developing countries, integration into the global economy through economic liberalization, deregulation and democratization is seen as the paramount way to triumph over poverty and inequality. The development of enterprises, which capacitate enterprises, can play a vital role in employing more labor.

Recently, a number of Sub-Saharan Africa countries governments and the donor community increased their involvement with enterprises assistance programs that include improving availability of credit, vocational training programs and short trainings to

entrepreneurs and their workers, and facilitating markets services among others (Tariku, 2018). Relative to developed countries, enterprises generate a great share of overall employment in developing economies, which frequently have a stronger emphasis on small-scale production. Enterprises contribution to employment levels can be observed in many contexts. In five African countries (Botswana, Kenya, Malawi, Swaziland, and Zimbabwe), enterprises generate nearly twice the level of employment as registered, large-scale companies and the public sector. Half of all Indonesian workers are employed in enterprises with fewer than five workers, and two-thirds of workers are employed in enterprises with fewer than 20 workers. In many Latin American countries, enterprises generate more than half of overall employment (UND, 2014).

Various authors identified key determinants of survival and failure of enterprises. Some empirical studies have been conducted to investigate the determinant factors affecting enterprises performance. Generally, these factors relate to entrepreneurial, enterprises, inter- enterprise characteristics and external factors. Entrepreneurial characteristics such as owner/operator sex, age, education level, previous work experience, management skill, economic background and marital status determine the performance of enterprises (Osinde, 2013; Berihu *et al.*, 2014; Brenda and Gregory, 2015). Similarly, Hailay *et al.* (2014) found that enterprises related factors including age, size, initial capital, location, formality, type of business to be the most determinant factors affecting the performance of enterprises. Another studies conducted by Semistatus and Rainer (2014) successful performance of growth of enterprises were affected by inter-enterprises related factors like linkage, network, and competition. The success determinants of enterprises was also related with external factors like access to credit, infrastructure, market, working place, technology, social services and other legal and regulatory frameworks (Gichana and Barasa, 2013; Fikirte and Endrias, 2015; Tomas *et al.*, 2018). To estimate the production efficiency, to measure the financial performance and to identify their determinant factors and to evaluate the impact of dairy enterprises development on employment creation and income generation in the study area, the researcher review materials across national and international investigations about enterprises. Based on the review of related literatures on multi-dimensional issues of enterprises; the research initiative conceptual framework of the study as shown in Figure 1 on the next page.

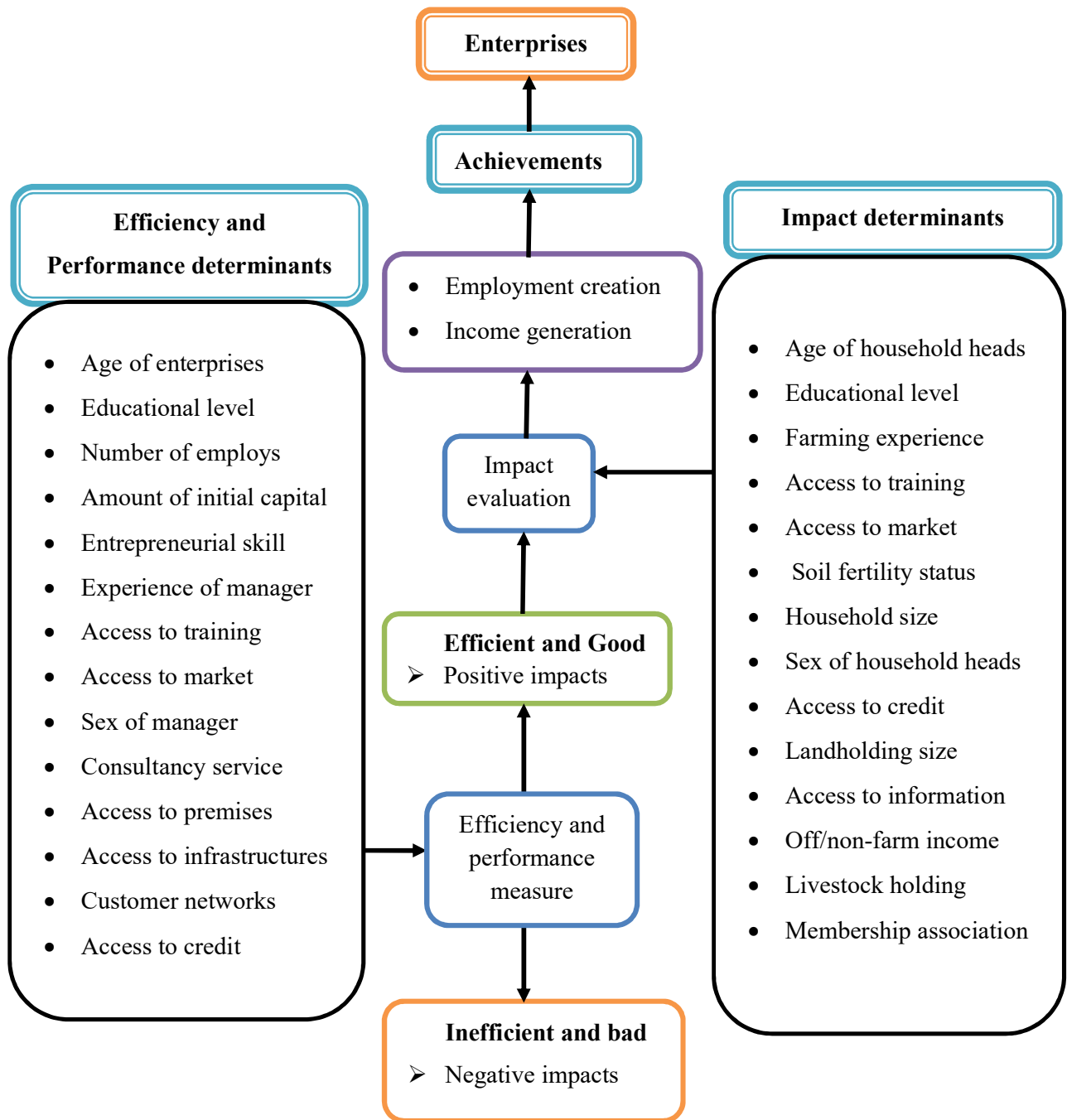


Figure 1: Conceptual framework of the study

Source: Own compilation based on review of related literatures

3. RESEARCH METHODOLOGY

This section presents the methodology to be followed in this study. It begins with the description of study area and continues with sampling methods and description of population, data collection methods and types of data and methods of data analysis. It presents definitions and working hypotheses of dependent and independent variables.

3.1. Descriptions of Study Area

The study area Hadiya zone is found in the Southern Nations' Nationalities and Peoples' Region (SNNPR) of Ethiopia. Hadiya is bordered on the south by Kembata Tembaro on the southwest by the Dawro Zone on the west by the Omo River which separates it from Oromia Region and the Yem Special Woreda on the north by Gurage on the northeast by Silte and on the east by the Halaba Zone; the woredas of Mirab Badawacho and Misraq Badawacho form an exclave separated from the rest of the zone by Kembata Tembaro.

Hadiya zone is located at a distance of 232 km away from the Addis Ababa, capital city of the country, to south and 180 km away from regional capital city, Hawassa to North West. It is characterized by temperate type of climate with daily temperature ranging from 18⁰c to 27⁰c, and it is located 1500 to 2500 meters above sea level. It has low to high rainy season for seven months from February to August and for the remaining five months from September to January have dry air condition throughout the year. The total population of the zone as per the population projection of Ethiopia for 2017 was estimated to be male 846,852 (49.5%) and female 863,960 (50.5%) the total of 1,710,812. It has a population density of 342.64. In the zone hard-working, peace-full, multi-ethnic and religious people are found.

The zone has 10 *woredas* and two town administrations. Hosanna town is the head quarter of the zone. The four largest ethnic groups living in Hadiya are the Hadiya (90.04%), the Kembata (1.96%), the Gurage (1.53%), and the Amhara (1.32%); all other ethnic groups make up 5.15% of the population. Hadiyisa is spoken as a first language by 90.94%, 2.24% spoke Amharic, and 1.94% spoke Kambatigna; the remaining 4.88% spoke all other

primary languages reported. 75.35% of the population said they were Protestants, 11.13% were Muslim, 8.45% practiced Ethiopian Orthodox Christianity, and 4.31% Catholic.

Mixed farming, business activities, public and private sectors employments are the dominant economic activities in the zone. Farmers in the study area practice mixed farming system, which is mainly characterized by the rearing of different types of livestock like cattle, sheep, and goat and production of multiple agricultural products such as cereals (wheat, *teff*, maize, barley and bean), fruits and vegetables. The area is specialized in wheat production and its productivity is about 65 quintals per hectare. In addition, some cash crops like *khat* and coffee are also produced. The geographical location of the study area is in Figure 2 below.

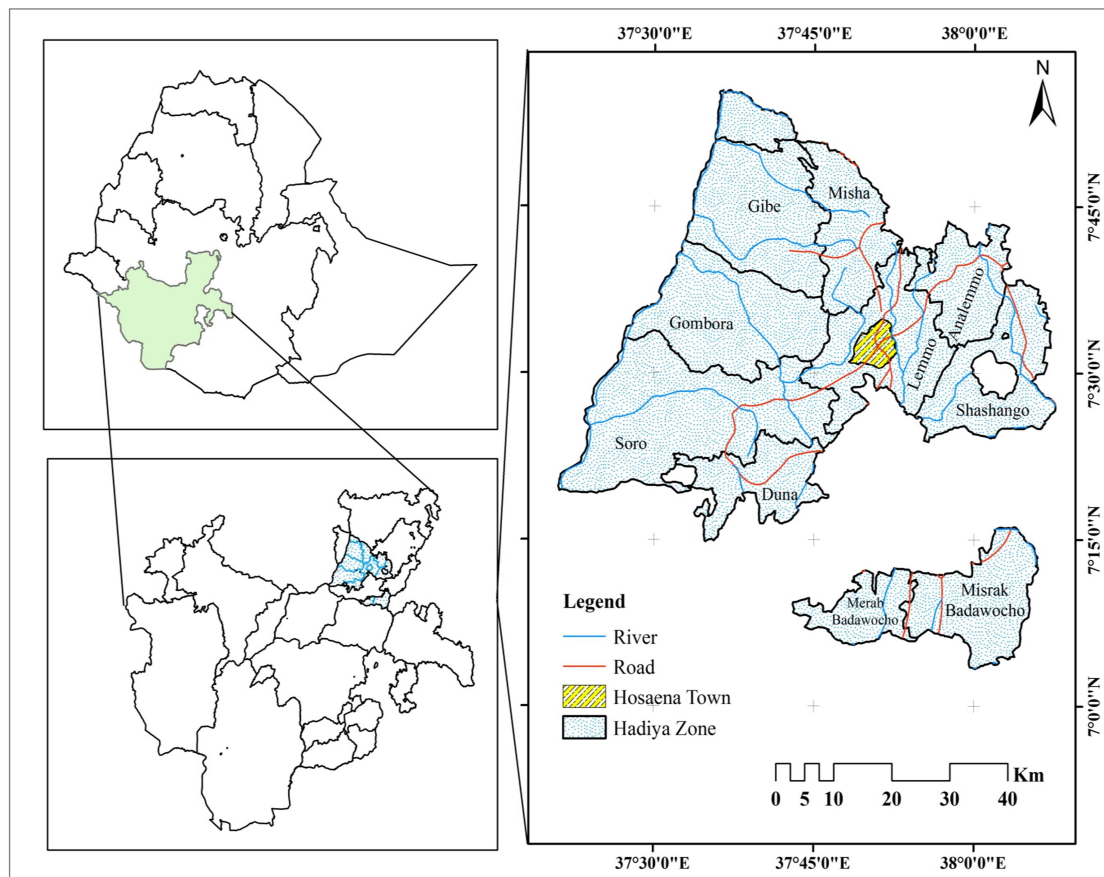


Figure 2: Location map of the study area

Source: Clipped from EthioGIS I. www.walris.wlrc-eth.org

3.2. Sampling Methods and Sample Size

To estimate production efficiency and to measure financial performance of the dairy enterprises, the study performed the production efficiency estimation and financial performance measure at enterprises level. For the production efficiency estimation and financial performance measure of dairy enterprises, the sampling frame was described as follows. In the first step three *woredas* namely, *Lemmo*, *Analemmo* and *Misha* were randomly selected from ten *woredas* in the zone. In the second step, a total of two *kebeles* from each selected three *woredas* were randomly selected. Following this, six *kebeles* were randomly selected and dairy enterprises within the six *kebeles* were stratified into micro and small level enterprise groups. From those six *kebeles* 114 micro level and 98 small level enterprises a total of 212 dairy enterprises were selected by taking enterprise lists of their names from the *kebeles*.

Table 3.1: Sampling distribution of dairy enterprises

<i>Woredas</i>	Total enterprises	<i>Kebeles</i>	Enterprises level	Total enterprises	Sample size
Lemmo	187	Shecha	Micro	46	18
			Small	36	15
		Masbira	Micro	55	22
			Small	50	20
Analemmo	176	Fonko	Micro	47	19
			Small	45	18
		Acemo	Micro	54	22
			Small	30	12
Misha	165	Morsuto	Micro	46	18
			Small	33	13
		Wasgabata	Micro	37	15
			Small	49	20
Total	528			528	212

Source: Own design based on enterprises list from three *woredas* and six *kebeles* (2016/17)

There are several ways to determine the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables and applying formulas to calculate a sample size. To determine the sample size of dairy enterprises for efficiency estimation and financial performance measure, this study was used simplified formula provided by Watson (2001) to determine the required sample size at 95% confidence level, estimated variance in the population 5% and margin of error 5%.

$$n = \frac{p(1-p)}{\frac{A^2}{Z^2} + p \frac{(1-p)}{N}} \frac{1}{R} \quad (1)$$

Where n is the sample size required (212), N is the population size (528), P is estimated variance (5%), A is margin of error (5%), Z is confidence level (95%) and R is estimated response rate (96%). So according to the above formula the sample size n was 212 dairy enterprises and this study was carried out on 212 dairy enterprises for production efficiency estimation and financial performance measure. A total of 212 dairy enterprises (114 from micro level and 98 from small level) were randomly selected based on probability proportional to size of the dairy enterprises. To capture the representative sample of dairy enterprises from each stratum, simple random sampling method was used.

To evaluate the impact of dairy enterprises on employment creation and income generation, the study used data collected at household level. For evaluation of the impacts of dairy enterprises development on employment creation and income generation, member and non-member household heads were included in the study based on the following sampling frame work. Following the previous sampling procedures, we stratified household heads within the previously selected six *kebeles* into member and non-member groups. From those six *kebeles* 126 member household heads which are members in previously selected 212 enterprises and 259 non-member household heads a total of 385 households were selected from each *kebele* using random sampling method by taking household head lists of their names from the *kebeles* office.

Table 3.2: Sampling distribution of households

<i>Woredas</i>	Total household heads	<i>Kebeles</i>	Population division criteria	Total household heads	Sample household heads
Lemmo	12907	Shecha	Members	2139	23
			Non-members	4443	47
		Masbira	Members	2056	22
			Non-members	4269	45
Analememo	12142	Fonko	Members	2091	22
			Non-members	4344	46
		Acemo	Members	1855	20
			Non-members	3852	40
Misha	11413	Morsuto	Members	2003	21
			Non-members	4160	44
		Wasgabata	Members	1706	18
			Non-members	3544	37
Total	36462			36462	385

Source: Own design based on enterprises list from three *woredas* and six *kebeles* (2016/17)

To determine the sample size for impact evaluation of dairy enterprises development on employment creation and income generation, this study used simplified formula provided by Kothari (2004) to determine the required sample size at 95% confidence level, estimated variance in the population 50% and margin of error 5%.

$$n = \frac{Z^2 pq}{e^2} = \frac{1.96^2 (0.5)(0.5)}{(0.05)^2} = 385 \quad (2)$$

Where, n is desired sample size; Z is values of standard variant at 95% confidence interval ($Z = 1.96$). e is desired level of precision; p is the estimated proportion of an attribute that is present in the population, and q is $1-p$. The value of Z is found in the statistical tables which contain the area under normal curve. P is the estimated proportion of an attribute present in the population with the value of 0.5 as suggested by Israel (1992) to get the desired minimum sample size of households at 95% confidence level. Accordingly, a

sample of 385 household heads were selected from six *kebeles* using random sampling with probability proportional to size as shown in Table 3.2 above.

Based on the proportion of the total sample size to the population ($385/36462 \approx 0.0106$), we can determine the proportion of sample household heads from members in dairy enterprises was ($11850 \times 0.0106 \approx 126$) and the proportion of sample household head from non-members in dairy enterprises was ($24612 \times 0.0106 \approx 259$), then this was allocated for each *kebele*. Then after, the sample proportion of the household heads from members in dairy enterprises was again distributed in the two levels (micro and small) with the estimated proportion of (54% and 46%) respectively (Hadiya zone enterprises development office). Accordingly, the sample proportion of member household head engaged in micro level was ($126 \times 0.54 \approx 68$) and the sample proportion of member household head engaged in small level was ($126 \times 0.46 \approx 58$) this was distributed throughout the study area.

3.3. Data Types, Sources and Collection Methods

The study used both primary and secondary data collected from various sources. The primary data were collected from the sample dairy enterprises, member and non-member household heads through semi-structured questionnaire using interview which was supplemented by key informants interview, focus groups discussions and personal observation using checklists which are pre-tested prior to its use. Secondary data were obtained from published books and journal articles, as well as unpublished annual reports and records from government offices and other relevant organizations. All data collection process was completed through semi-structured questioners interview administered by trained enumerators, supervisors and close support of the researcher.

The qualitative data were collected by using five key informant interviews and three focus groups discussion participants. Accordingly, three groups discussion with six members and totally eighteen focus group discussion participants (i.e. six managers from micro level enterprises, six managers from small level enterprises and six household heads) were purposively included in the study to triangulate and strengthen the collected data and to verify the collected data to be more reliable and consistent with the purpose of the study. Thoroughly, five key informant stakeholders was included to gather additional data from

Hadiya zone chief administer; Co-ordinator of Hadiya zone enterprises development core-process; Head, Hadiya zone agriculture and natural resource department; Co-ordinator of Hadiya zone animal and fish resource development core-process and Head, Hadiya zone omo micro-finance institute, which are mainly concerned with the issue being investigated was purposively included.

3.4. Methods of Data Analysis

The study employed both descriptive statistics and econometric model. The descriptive statistics as well as the empirical models were run in STATA 14 soft-ware. Specifically, descriptive statistics was used to describe sample household head demographic and socio-economic characteristic in the study area. For this purpose descriptive statistics such as mean, standard deviation, percentage and t-test for continuous variables and chi-square for dummy variables was used. Since descriptive statistics was important tools to present research results clearly and concisely. In case of that to compare and contrast different categories of sampled units with respect to the desired characteristics, so as to draw some important conclusions. The econometric models was employed to estimate the efficiency, to measure the performance and identify the determinant factors affecting their efficiency and financial performance and finally, to evaluate the impacts of dairy enterprises on employment creation and income generation was carried out using econometric methods called, stochastic frontier model, profitability ratio analysis, multiple linear regression model and propensity score matching analytical techniques was used respectively.

3.4.1. Efficiency Estimation of Enterprises

The production efficiency analysis of dairy enterprises was estimated by using three types of productive efficiency indicators; these are technical (output) efficiency, allocative (input) efficiency and economic (cost) efficiency scores. A number of techniques have been developed to estimate this productive efficiency indicators index. Several authors broadly classified them into two main groups: parametric and non-parametric. Generally, the parametric method uses a stochastic frontier technique by specifying a stochastic production function. It is composed of technical efficiency and statistical noise. The non-parametric approach is often associated with data envelopment analysis which is based on

a mathematical programming model to estimate the optimal level of output and does not distinguish between technical efficiency and statistical noise (Murillo, 2004; Coelli *et al.*, 2005; Viet and Charles, 2010).

As recommended by different scholars, the stochastic frontier approach is most relevant for this study. Stochastic frontier model (SFM) was first introduced by (Aigner *et al.*, 1977; Meeusen and Van den Broeck, 1977; Battese and Coelli, 1977). In this model, there is a composed error term which captures the effects of exogenous shocks beyond the control of the analyzed units in addition to incorporating technical inefficiency. Errors in measurement of outputs and observations are also taken into consideration. For cross-sectional data their model specification was expressed as follows:

$$Y_i = f(x_i\beta) + (V_i - U_i) \quad (3)$$

Where

Y_i is output of the j^{th} dairy enterprises, $i = (1, 2, 3 \dots n)$ are sample dairy enterprises,

X_{ij} is the i^{th} input used by the j^{th} dairy enterprises

β is a vector of unknown parameters

v_i is a random error which represents random variations or random shocks in the milk of the j^{th} dairy enterprises, outside the control of the dairy enterprises assumed independently and identically distributed as $N(0, \sigma^2)$.

u_i is non-negative random variable which estimate technical inefficiency in production and are assumed to be independently distributed as truncations at zero of the $N(\mu_i, \sigma^2)$ distribution with the assumption of a linear functional relationship, the mean distribution of u_i is a function of the explanatory variables and can be specified as:

$$\mu_i = Z_i\delta \quad (4)$$

Where

Z_i is a vector of variables that explain inefficiency of i^{th} dairy enterprises.

δ is a vector of unknown parameters to be estimated.

The individual dairy enterprises technical efficiencies from estimated stochastic frontiers were estimated as:

$$TE_i = \frac{y}{y^*} = \frac{\exp(X_i\beta + v_i - \nu_i)}{\exp(X_i\beta + v_i)} = \exp(-\nu_i) \quad (5)$$

Where

TE is technical efficiency, y is the observed output, the inefficiency term ν_i is always between 0 and 1, When ν_i is equal to 0, then production is on the frontier $y_i^* = \exp(X_i\beta + v_i)$ is the frontiers output and $TE=1$, therefore a dairy enterprises is technically efficient. When ν_i is greater than 0 ($\nu_i > 0$) the dairy enterprises is technically inefficient ($TE < 1$), since production was below the frontier.

For both the SFM and the inefficiency effects model, the maximum likelihood method can be used to estimate the coefficients of the two functions simultaneously. This was given consistent estimates of the parameters of the production frontier and the inefficiency effects model. For technical efficiency, Cobb Douglas stochastic frontier model was also used through maximum likelihood estimate approach to determine the technical efficiency of the enterprises. The likelihood function is expressed in terms of the variance parameters of the frontier function:

$$\delta^2 = \delta_v^2 + \delta_u^2 \text{ and } \gamma = \frac{\delta_u^2}{\delta_v^2} \quad (6)$$

Where

δ_v^2 is variance of noise

δ_u^2 is variance of inefficiency effects

If the value of δ^2 is equal to zero, then u_i is also zero which means the dairy enterprises are fully efficient. γ has a value between zero to one. If the value of γ is one, the deviations from the frontier are attributed to random error. If it has the value of one, the deviations are due to technical inefficiency.

Based on the suggestions of different scholars like, Kushnirovitch and Heilbrunn (2008); Sibylle (2011) and Melaku (2013), the inputs and output were arranged for the study by

taking into account the particularities of dairy enterprises which were defined in the following way: The dependent variable in the production function (y) is milk, the vector of inputs includes cow (number), labor (number), quantity of concentrated feed (kilogram), unconcentrated feed (kilogram), land (hector) and veterinary medicine (number).

The allocative efficiency of dairy enterprises measures their success in choosing optimal proportions of inputs given their price. For the dairy enterprises to realize allocative efficiency there should be an optimal combination of inputs so that output is produced at minimal cost and profit could be increased by simply reallocating resources (Coelli *et al.*, 2005). Therefore, the dairy enterprises have to choose a combination of inputs to be used in the right proportions at low prices so that output is produced at minimal costs that results into profit maximization. Thus, for the dairy enterprises to maximize profit, it requires the extra revenue (marginal value product) was generated from the employment of an extra unit of a resource, must be equal to its unit cost (marginal factor cost is equal to unit price of input).

Generally, if the dairy enterprises are to allocate resources efficiently and maximize its profits, the condition of marginal value product is equal to marginal factor cost should be achieved. The estimation of allocative efficiency was achieved using the Cobb-Douglas cost function analysis. The five conventional inputs commonly used to estimate efficiency of dairy enterprises in Stochastic Frontier Production Function Analysis were cow, labor, concentrated feed, unconcentrated feed, land and veterinary medicine. Accordingly, to estimate allocative efficiency, the following Stochastic Frontier Cobb-Douglas Cost Function was applied:

$$\ln C_i = \beta_0 + \sum_{i=1}^n \beta_i \ln X_i + \nu_i + \nu_i \quad (7)$$

Where

C_i is total cost of production in birr,

X_i is price of cow, labor, concentrated feed, unconcentrated feed, land and veterinary medicine.

β_0 and β_i are parameters to be estimated

v_i and u_i are as specified earlier but with positive sign of the inefficiency term since inefficiency factors raise the cost of production.

The allocative efficiency was then estimated from the Cobb-Douglas Stochastic Frontier Cost Function. Before fitting the Cobb-Douglas Cost Function, all the data on each variable was transformed into natural logarithms. Therefore, estimation of β_i can be expressed as:

$$\frac{\partial \ln Y}{\partial \ln X} = \left[\frac{\frac{1}{Y} * \partial Y}{\frac{1}{X} * \partial X} \right] = \left[\frac{X}{Y} * \frac{\partial Y}{\partial X} \right] = \beta_i \quad (8)$$

The marginal product (MP_i) of the i^{th} factor X was calculated as:

$$MP_i = \frac{\partial Y}{\partial X_i} = \beta_i \frac{Y}{X_i} \quad (9)$$

$$\text{But average product (AP)} = \frac{Y}{X_i}$$

Where

Y is the mean of natural logarithm of output

X_i is the mean of natural logarithm of input i

β_i is the estimated coefficient of input i

The value of marginal product of input i (VMP) can be obtained by multiplying marginal physical product (MP_i) by the price of output (P_y).

$$\text{Thus, } VMP_i = MP_i * P_y \quad (10)$$

$$\text{Allocative Efficiency (AE)} = \frac{VMP_i}{P_i} \text{ but } P_i = \text{Marginal cost of the } i^{th} \text{ input} \quad (11)$$

The allocative efficiency was determined by comparing the value of marginal product of input i (VMP_i) with the marginal factor cost (MIC_i). Since dairy enterprises are price takers in the input market, the marginal cost of input i approximates the price of the factor i , P_{xi} .

If $VMP_i > P_{x_i}$, the input is under used and then dairy enterprises output could be raised by increasing the use of this input. But, if $VMP_i < P_{x_i}$, the input is over used and then to raise dairy enterprises output then, the input use should be reduced. The point of allocative efficiency (maximum revenue) is reached when $VMP_i = P_{x_i}$. Finally, the economic efficiency of the dairy enterprises was determined by multiplying technical efficiency with allocative efficiency of the dairy enterprises.

$$EE = TE * AE \quad (12)$$

3.4.2. Sources of Inefficiency of Enterprises

To identify factors that contribute for the inefficiency of dairy enterprises in milk production, we need to analyze the effect of different internal and external factors on milk production efficiency by using OLS regression model.

$$Y_i = \beta_0 + \beta_{1j}X_{1j} + \dots\beta_{nj}X_{nj} + \varepsilon_i \quad (13)$$

Where

Y_i is the efficiency score of milk production

β_0 is the an intercept

β_{1-n} is the coefficient of j^{th} explanatory variable to be estimated and

ε_i is the error term assumed constant variance and zero mean.

3.4.3. Measurement of Financial Performance of Enterprises

Performance: It is defined as act of performing; of doing something successfully using resources. Rami and Ahmed (2007); Bidzakin, (2009) and Admasu (2012), stated that lack of universally accepted standard performance measures left the door open to business organizations to decide and choose its own performance measures that might not truly reflect their performance. They recommended that the change in profit has been widely adopted by most researchers and practiced in business performance models. Accordingly, this study was used profitability ratio as a dependent variable to 4measure the financial

performance of enterprises. Here the change in profit was used as the measure of the dependent variable performance of the enterprises involved in the survey. This is mainly because dairy enterprises focus more on profitability ratio than other modes of performance measures as recommended by most researchers in business performance models. Measure of financial performance of enterprises use to know the success status of the enterprises in terms of profitability ratio of the enterprises as equated in economic variables as follows.

$$\text{Profitability ratio} = \frac{\text{Net profit}}{\text{Sales}} \times 100 \quad (14)$$

Where

Profitability ratio: Is used to evaluate the enterprises ability to generate income as compared to its expenses and other cost associated with the generation of income during a particular period.

Net profit: This ratio measures the overall profitability of enterprises considering all direct as well as indirect cost. A high ratio represents a positive return in the enterprises and better the enterprise is.

Formula: Net profit = gross profit + indirect income - indirect expenses.

Sales: Are activities related to the quantity of milk sold in 2016/17 by enterprises.

Total revenue: Total revenue was the sum of the returns earned from performing different activities to sustain in the business. If the total revenue of the dairy enterprises increases more than the total cost, then value of gross profit also increases and greater than one in the short run, then the performance of dairy enterprises is acceptable (in the survived manner).

Total cost: Total cost was derived from the summation of fixed costs and variable costs. Total cost of production and selling are important parameter in estimating the gross profit associated with a given dairy enterprises. If the total cost of the dairy enterprises increases more than the total revenue, then value of gross profit also decreases and less than one in the short run, then the performance of dairy enterprises is in rejected (in the failed manner).

Generally the profitability ratio analysis is based on: the measurement value of net profit gained from the annual total sales of products to annul total costs of enterprises incurred in

operating different activities in the enterprises. Profitability ratio analysis is a systematic process of calculating the overall monetary benefits and costs of enterprises. Generally profitability ratio is dependent variable its analysis is based on the principle that if the profitability ratio of the enterprises in the short run is greater than or equal one, the enterprises financial performance is good/survived and the enterprises have positive impacts on employment creation and income generation and if the profitability ratio of the enterprises is less than one, the enterprises financial performance is bad/failed and the enterprises have negative impacts on employment creation and income generation.

3.4.4. Factors Affecting Financial Performance of Enterprises

In this study to identify the factors that affect the financial performance of enterprises, multiple linear regression was employed. Multiple linear regression analysis considers the inter-correlations among all variables involved. It is also used to determine the independent variables explained the variance in dependent variable (Farah and Nina, 2016; Desta *et al.*, 2018; Priscilla and Wei, 2018; Tariku, 2018). In this study profitability ratio was used as dependent variable, which is the base to identify the challenging factors of enterprises to be successful in their business. The profitability ratio was used because it is the base or primary measurement of performance of enterprises as it is the ratio of the total revenue and total cost of enterprises which is specified as follows:

$$Y_i = \beta_o + \beta_i x_i + \beta_i D_i + \Sigma_i \quad (15)$$

Y_i is response variable (profitability ratio)

β_o is intercept constant

β_i is slope coefficient

X_i represents continuous explanatory variables representing age of the enterprise, educational level, experience of manager, number of employees and amount of initial capital of the enterprises.

D_i represents dummy explanatory variables representing entrepreneurial skill of operator, access to training, access to market, sex of manager, consultancy service, access to premises, access to services, customer networks and access to credit for the enterprises.

Σ_i represents error term

Test of assumptions of OLS: Multiple linear regression model is based on several simplifying assumptions, which are used to test model validity (Gujarati, 2004). These assumptions were checked different measure that was appropriate for each assumption and the result showed that there were no problems. The diagnostic tests were also checked to measure multicollinearity, heteroscedasticity, and omitted variables test were discussed below.

Test of multicollinearity: Multicollinearity may cause lack of significance of individual independent variables, while the overall model may be strongly significant. It may also result in wrong signs and magnitudes of regression coefficient estimates and consequently incorrect conclusions about relationships between independent and dependent variables (Maddala, 1977). Variance inflation factor (VIF) was employed to detect the existence of multicollinearity among continuous explanatory variables.

$$VIF = \frac{1}{1 - R_i^2} \quad (16)$$

Where R_i^2 is the coefficient of multiple determinations between X_i and other explanatory variables, for each selected variables (X_i) were regressed on all other continuous explanatory variable. The coefficients of determination (R_i^2) were constructed for each case. The larger the value of R_i^2 can result the higher the value of VIF that cause higher multicollinearity problems among the variable X_i . If the VIF of a variable exceeds 10, which will happen if R_i^2 exceeds 0.90 that the explanatory variables have high multicollinearity problems and contingency coefficient that exceeds 0.75 for dummy variables will be excluded (Gujarati, 2004). If the value of is 1, it result in higher VIF and cause perfect collinearity. The explanatory variables that have a value of VIF 10 and above was excluded from model.

Test of heteroscedasticity: Heteroscedasticity occurs when the error term has non-constant variance but all other assumptions of the multiple linear regression model are satisfied, then the consequences of using the OLS estimator to obtain estimates of the population parameters are: still unbiased, OLS estimator is inefficient (it is not BLUE), the estimated variances and covariance of the OLS estimates are biased and

inconsistent and hypothesis tests are not valid. The result estimates are not even consistent in other word the regression coefficient is upward biased. This study tested the existence of heteroscedasticity by employing Breusch-Pagan test using STATA 14.

3.4.5. Impact Evaluation of the Enterprises

Propensity score matching (PSM) constructs a statistical comparison group that is based on a model of the probability of participating in the treatment, using observed characteristics. Participants are then matched on the basis of this probability, or propensity score, to nonparticipants. The average treatment effect of the program is then calculated as the mean difference in outcomes across these two groups. The validity of PSM depends on two conditions: First the conditional independence (unobserved factors do not affect participation) and second sizable common support or overlap in propensity scores across the participant and nonparticipant samples (Shahidur *et al.*, 2010).

The dairy enterprises development had been promoted by the government in the study area for the previous years following 1997 enterprise development strategy. Despite few households have been utilizing this service by being members of the dairy enterprises at different levels of dairy enterprises growth stages, understanding the variation of their capacity in creating employment and generating income as compared to non-members is an important issue. Therefore, in this study in order to evaluate the impacts of dairy enterprises development on member's household employment creation and income generation propensity score matching was employed.

Based on Rosenbaum and Rubin (1983), propensity score can be defined as the conditional probability of receiving a treatment given pre-treatment characteristics. Let Y_i^T and Y_i^C are the outcome variable for participant (members in dairy enterprises) and non-participant (non-members in dairy enterprises) respectively. The difference in outcome between treated and control groups can be seen from the following mathematical equation:

$$\Delta_i = Y_i^T - Y_i^C \quad (17)$$

Where

Y_i^T is outcome of treatment (for household member in dairy enterprises).

Y_i^C is outcome of the non-participant (for household non-member in dairy enterprises).

Δ_i is change in the outcome as a result of treatment for household participate in dairy enterprises.

Equation (17) be expressed in causal effect notational form, by assigning $D_i = 1$ as a treatment variable taking the value of 1 if the household received the treatment and 0 otherwise. Then the Average Treatment Effect of a household i can be written as:

$$ATE = E(Y_i^T | D_i = 1) - E(Y_i^C | D_i = 0) \quad (18)$$

Where

ATE is Average treatment effect, which is the effect of treatment on the outcome variables $E(Y_i^T | D_i = 1)$ is Average outcomes for household, with treatment, if he/she would participant ($D_i = 1$).

$E(Y_i^C | D_i = 0)$ is Average outcome of untreated, when he/she would non-participant, or absence of treatment ($D_i = 0$).

The Average Effect of Treatment on the Treated (ATT) for the sample households is given:

$$ATT = E(Y_i^T - Y_i^C | D_i = 1) = E(Y_i^T | D_i = 1) - E(Y_i^C | D_i = 1) \quad (19)$$

The fundamental evaluation problem in evaluation of impact is that it is impossible to observe a person's outcome for with and without treatment at the same time. While the post-intervention outcome $E(Y_i^T | D_i = 1)$ is possible to observe, however, the counterfactual outcome of the i^{th} household when she/he does not use the treatment is not observable in the data.

Thus, estimation of average treatment effect can give a seriously biased result, due to the fact that the population can differ among the comparison group, not only in terms of treatment status, but even in terms of other characteristics: this problem is often referred to as the fundamental problem of causal inference. Thus, simple mean comparison between

the treated and non-treated can be misleading, yet taking the mean outcome of non-participants as an approximation is not advisable, since participants and non-participants usually differ even in the absence of treatment (Caliendo and Kopeinig, 2008). A solution to this problem is to construct the unobserved outcome which is called the counterfactual outcome that households would have experienced, on average, had they not participated (Rosenbaum and Rubin, 1983), and this is the central idea of matching. They conclude that the effectiveness of matching estimators as a feasible estimator for impact evaluation depends on two fundamental assumptions:

Assumption 1: conditional independence assumption (CIA): It states that treatment assignment (D_i) conditional on attributes X is independent of the post program outcome (Y_i^T, Y_i^C). In formal notation, this assumption corresponds to:

$$(Y_i^T, Y_i^C) \perp (D_i | X_i) \quad (20)$$

This assumption imposes a restriction that choosing to participate in a program is purely random for similar individuals. As a consequence, this assumption excludes the familiar dependence between outcomes and participation that lead to a self-selection problem (Heckman *et al.*, 1998). The conditional average effect of treatment on the treated has a problem, if the number of the set of conditioning variables (X 's) is high, and thus the degree of complexity for finding identical households both from program users and non-users become difficult. To reduce the dimensionality problem in computing the conditional expectation, Rosenbaum and Rubin (1983) showed that instead of matching on the base of X 's one can equivalently match treated and control units on the basis of the propensity score defined as the conditional probability of receiving the treatment given the values of X 's, is expressed as:

$$P(\chi_i) = \Pr(D_i = 1 | X_i) \quad (21)$$

Where

P_r is the probability or the logistic cumulative distribution, $D_i = 1$ if the subject was treated X_i is a vector of pre-treatment characteristics. In estimating the propensity scores, all

variables that simultaneously affect participation in the program and outcome variable was included. Thus, the average treatment effect on the treated conditional on propensity score $P(X)$ can then be written as:

$$ATT = E(Y_i^T | P(x), D_i = 1) = E(Y_i^C | P(x), D_i = 1) \quad (22)$$

Assumption 2: Assumption of common support (ACS)

$$0 < P(X) < 1 \quad (23)$$

The assumption is that $P(X)$ lies between 0 and 1. This restriction implies that the test of the balancing property is performed only on the observations whose propensity score belongs to the common support region of the propensity score of treated and control groups (Becker and Ichino, 2002). Individuals that fall outside the common support region would be excluded in the treatment effect estimation. This is an important condition to guarantee improving the quality of the matching used to estimate the ATT. Once these two conditions are satisfied, the treatment assignment is said to be strongly ignorable and the PSM estimator of ATT is free of selection bias (Rosenbaum and Rubin 1983). Therefore, the researcher was employed this two method to make free PSM estimator of ATT from selection bias at the study. Different matching estimators were used in the estimation process of ATT in order to make sure that the results obtained are robust.

Different approaches are used to match participants and nonparticipants on the basis of the propensity score. They include nearest-neighbor matching, caliper and radius matching, stratification and interval matching, weighting on propensity score and kernel matching and local linear matching. Regression-based methods on the sample of participants and nonparticipants, using the propensity score as weights, can lead to more efficient estimates (Shahidur *et al*, 2010). However, the most commonly applied steps of implementation of propensity score match are discussed below.

Nearest neighbor matching: An individual from a comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score (Caliendo and Kopeinig, 2005). That is, each person in the treatment group chooses individual(s) with the closest propensity score to them. Nearest neighbor matching can be done with or without replacement. In the case of with replacement, an untreated individual

can serve more than once as a match, whereas it is considered only once in the case of without replacement. Nearest nearest-neighbor matching with replacement increases the average quality of matching and decreases precision of estimation while the reverse is true in the case of nearest neighbor without replacement (Caliendo and Kopeinig, 2005). Nearest neighbor with replacement is preferred to without when there are big differences between treated and untreated groups to reduce the risk of bad matching.

Kernel matching: In kernel matching, each person in the treatment group is matched to a weighted sum of individuals who have similar propensity score with greatest weight being given to people with closer scores. All treated units are matched with a weighted average of all controls with weights which are inversely proportional to the distance between the propensity scores of treated and controls. The most common approach is to use the normal distribution (with a mean of zero) as a kernel, where the weight attached to a particular comparator is proportional to the frequency of the distribution for the difference in scores observed (Caliendo and Kopeinig, 2005).

Caliper matching: If the closest neighbor is far away, the nearest neighbor matching produces bad matches, and in such situation caliper matching algorithm is used. In caliper matching an individual from the comparison group is chosen as a matching partner for a treated individual that lies within a given caliper (propensity score range) and is closest in terms of propensity score (Caliendo and Kopeinig, 2005). If the dimension of the neighbor is very small, it is possible that some treated units are not matched because the neighbor does not contain a control unit. But, the smaller the size of the neighbor the better is the quality of the matches.

Radius matching: Each treated unit is matched only with the control units whose propensity score falls into a predefined neighborhood of the propensity score of the treated unit. If the dimension of the neighborhood (i.e., the radius) is set to be very small, it is possible that some treated units are not matched because the neighborhood does not contain control units. On the other hand the smaller the size of the neighborhood the better the quality of the matches (Caliendo and Kopeinig, 2005).

Region of common support and overlap condition: Imposing of common support is important step in PSM because average treatment effect on treated and on population is

only defined in the common support region (Caliendo and Kopeinig, 2005). The common support region is the area within the minimum and maximum propensity scores of treated and comparison groups, respectively and it is done by cutting off those observations whose propensity scores are smaller than the minimum and greater than the maximum of treated and comparison groups, respectively.

The choice of a specific method depends on the data in question, and in particular on the degree of overlap between the treatment and comparison groups in terms of the propensity score. When there is substantial overlap in the distribution of the propensity score between the comparison and treatment groups, most of the matching algorithms will yield similar results (Dehejia and Wahba, 2002). A good matching estimator is the one that provides low pseudo R^2 value statistically insignificant likelihood ratio test of all regressors after matching (a matching estimator which balances all explanatory variables between both groups) Smith and Todd (2005) and also expected to retain relatively larger observations for evaluating the impact of an intervention (relatively large matched sample size is preferable).

Checking overlapping region and common support is required in using PSM. Imposing a common support condition ensures that any combination of characteristics observed in the treatment group can also be observed among the control group. No matches can be made to estimate the average treatment effects on the ATT parameter when there is no overlap between the treatment and non-treatment groups. The common support region is the area which contains the minimum and maximum propensity scores of treatment and control group households, respectively. Only the subset of the comparison group that is comparable to the treatment group should be used in the analysis i.e., observations which lie outside this region was discarded from analysis (Caliendo and Kopeinig, 2008).

Hence, an important step is to check the overlap and the region of common support between treatment and comparison group. One means to determine the region of common support more precisely is by comparing the minima and maxima of the propensity score in both groups. The primary purpose of the PSM is to serve as a balancing method for covariates between the member and non-member groups. Balancing test is to check whether the propensity score is adequately balanced. In other words, a balancing test seeks to examine if at each value of the propensity score, a given characteristic has the same

distribution for the treatment and comparison groups. The propensity scores themselves serve only as devices to balance the observed distribution of covariates between the treated and comparison groups. The success of propensity score estimation is therefore assessed by the resultant balance. The parameter of interest is the average treatment effect on the treated (Krasuaythong, 2008).

The ATT indicates the mean difference in the outcome variables between member and non-member of dairy enterprises separately, who are identical in observable characteristics and adequately was weighted by a balanced probability of participation. Sensitivity analysis helps to know whether the final evaluation results are sensitive with respect to the choice of the balancing score. To test the sensitivity of matching estimators, either t-test or F test can be used (Caliendo and Kopeinig, 2005). For estimating the scores, a logit model was used using pre-intervention characteristics of sample households and matching was performed using propensity scores for each observation.

In this study, logit model was used to predict the probability of each household being member in the dairy enterprises as a function of observed household characteristics used sample of the dairy enterprises members and non-members. In the logit model the dependent variable was membership, which assumed the value of 1, if a household head is member in dairy enterprises and 0 otherwise. The explanatory variables in this model are age of household head, educational level of household head, farming experience of household head, access to training, distance to market, soil fertility status, household size, sex of the household head, access to formal credit, landholding size, access to information, off-farm income, livestock holding and membership to association.

Testing the matching quality: It is checking whether the matching procedure can balance the distribution of different variables or not. Since we are conditioning on propensity score estimation is not to obtain a precise prediction of selection into treatment, but rather to balance the distributions of relevant variables in both groups. While there are different procedures available to check, the basic aim of all of them is to compare before and after matching if there still exists any difference after conditioning on propensity score. If the differences exist, there is an indication of incomplete matching and suggests remedial for actions (Caliendo and Kopeinig, 2008).

Sensitivity analysis: The final step in the implementation of PSM is checking the sensitivity of the estimated results (Caliendo and Kopeining, 2005). Matching method is based on the CIA, which states that the evaluator should observe all variables that are simultaneously influencing the participation decision and outcome variables. The estimation of treatment effects with matching estimators is based on the selection at observables assumption. However, a hidden bias might arise if there are unobserved variables which affect assignment into treatment and the outcome variable simultaneously which abolish the CIA. To check the sensitivity of the estimated ATT with respect to deviation from the CIA, it is suggested that the use of Rosenbaum bounding approach is appropriate (Rosenbaum, 2002).

Standardized bias: As noted by Rosenbaum and Rubin (1983) the standardized bias is an appropriate indicator which enables to assess the distance in marginal distributions of the X-variables. Though standardized bias is a common method used for most case.

t-test: It is an approach preferred when there is a concern with significance of results. two-sample t-test is employed to check if there is significant difference between the covariate means of treated and control group and suggested by Rosenbaum and Rubin (1985) as the covariates must be balanced after matching and there should be no significant difference between the two groups. However, this test has a limitation of showing clearly visible bias reduction before and after matching.

Joint significance and pseudo- R^2 : The Pseudo- R^2 shows how best the explanatory variable explain the probability of participation and it should be fairly low since there should not be significant difference in the distribution of both groups after matching (Caliendo and Kopeinig, 2005).

3.5. Definition of Variables and Working Hypothesis

3.5.1. Definition and Working Hypothesis for Efficiency Estimation

Output: Output refers to the quantity of milk that the sample dairy enterprise obtained in 2016/17 production year which is measured in liter.

Production inputs and costs: The number of milk cow holding, number of labor (employed in the enterprise), concentrated feed, unconcentrated feed and land allocated for dairy farm and veterinary medicine are inputs which have a positive impact on the output (Victor and Boris, 2016; Taciana *et al.*, 2019). The definition of input variables and input costs which are included in the SFM Cobb-Douglas frontier function for milk production are presented and defined in Tables 3.3 and 3.4 as follows:

Table 3.3: Definitions of production function variables

Variable	Description (in natural logarithms)
ln(output)	Milk output in liters
ln(cow)	Milk cows in number
ln(labor)	Labor (man-days)
ln(concentrate feed)	Quantity of concentrate feed in kilograms
ln(unconcentrated feed)	Quantity of unconcentrated feed in kilograms
ln(land)	Allocated land in hectare
ln(vet)	Monetary value

Table 3.4: Definitions of cost function variables

Variable	Description (in natural logarithms)
ln(cost)	Cost of production in Birr
Ln(cow)	Price of cow per number in Birr
ln(wage)	Wage of human labor per day in Birr
ln(concentrate feed)	Price of concentrate feed per kilogram in Birr
ln(unconcentrated feed)	Price of unconcentrated feed per kilogram in Birr
ln(land)	Rent of land per hectare in Birr
ln(vet)	Price of vet medication per number in Birr
ln(output)	Milk output in liter

3.5.2. Definition and Working Hypothesis for Determinants of Efficiency

In this study, the level of milk production efficiencies is hypothesized to be affected by a combined effect of internal and external factors. The variables used in the OLS model and the effect of those independent variables on milk production efficiency of dairy enterprises is discussed and hypothesis as follows:

Dependent variables: Efficiency scores of dairy enterprises that take the values between 0 and 1.

Independent variables: The independent variables included in the OLS model are: age of dairy enterprises, educational level of manager, number of employs, amount of initial capital, entrepreneurial skill, experience of the manager, access to training, access to market, sex of the manager, consultancy service, access to premises, access to services, customer networks and access to credit.

Age of enterprises (Age): Age of dairy enterprises refers to the duration of time that the dairy enterprises stay in the business. New dairy enterprises entering the market are unaware of their true efficiency immediately but as they mature, they are able to uncover their productive costs. James *et al.* (2013) asserts that enterprises learn about their performance overtime. Empirical implication derived by this model is that young dairy enterprises have accumulated less information than older ones about their managerial abilities. For this reason there was more exists among young dairy enterprises than older dairy enterprises. This study was considered the dairy enterprises age from the period of establishment up to the time when the data was collected. The liability of newness that makes new dairy enterprises face a greater risk than older dairy enterprises is that new dairy enterprises do not have the experience, access, links, reputation or the legitimacy of the older dairy enterprises, leading to limited access to external resources. Long period attendance of the dairy enterprises in the business builds the production efficiency of dairy enterprises to stay in the business (Pilar *et al.*, 2018). Likewise, it is also possible that older dairy enterprises exhibit lower efficiency, since they may suffer greater risk aversion and, therefore, show a lower capacity for innovation, which in turn reduces efficiency (Hiebl, 2015). It is assumed in this study that the longer duration stays of the dairy enterprises in the business result the good production efficiency of the dairy enterprises. The age of dairy

enterprises is continuous independent variable and assumed to have positive influence on the production efficiency of the dairy enterprises. Therefore, the sign of the coefficient for the age of dairy enterprises was expected to be positive or negative.

Educational level of manager (Edu): The level of education attained by the manager of the dairy enterprises is the attainment level of formal education. The level of education attained is likely to affect the levels of skills using which one may survive in the business (Okoye, 2014). The level of education is therefore assumed to be categorical independent variable and have positive influence on the production efficiency of the dairy enterprises. Therefore, the sign of the coefficient for the education level attained by the manager of enterprise variable was expected to be positive.

Number of employees (Emplo): The number of employees associated in the dairy enterprises is the total number of workers employed in the dairy enterprises. The number of employees in the dairy enterprises should be determined by the size of the dairy enterprises (Semistatus and Rainer, 2014). It is assumed in this study that the number of employees in the dairy enterprises indicates the goal of dairy enterprises which are labor intensive. If the dairy enterprises type is micro the number of employees engaged in the dairy enterprises is less than 10 workers and if it is small 10 to 50 workers are employed. The number of employees in the enterprise is continuous independent variable and assumed to have influence on the production efficiency of the dairy enterprises. The sign of the coefficient of the variable for the number of employees was therefore expected to be positive/negative.

Amount of initial capital (Capt): The amount of start-up capital is amount of initial capital owned from different sources of initial capital for dairy enterprises which is essential for dairy enterprises to start the business. According to Caroline and Peter, (2016) all business ventures regardless of size require finances from inception and throughout their life cycles. The amount invested will influence greatly the size of the venture, which in turn determines the early survival of dairy enterprises if other factors are held constant. The entrepreneur requires seed capital to start the business; to operate and manage the business (James *et al.*, 2013). It is known that the amount of initial capital is based on dairy enterprises level and paid up capital, in which the dairy enterprises level is micro the

amount of initial capital is less than Birr 100,000 and the dairy enterprises level is small Birr up to 500,000 as initial capital. The study assumed that the dairy enterprises start their business higher than the initial amount of capital settled has higher chance of having good production efficiency dairy enterprises. The amount of initial capital inter into the business is expected to be continuous independent variable and have positive influence on the production efficiency of the dairy enterprises. The sign of the coefficient of the variable for the amount of initial capital was therefore expected to be positive.

Entrepreneurial skill (Skill): The dairy enterprises operators are expected to have sufficient entrepreneurial skill in creation and modification of different products and services (Hailay *et al.*, 2014). Therefore, dairy enterprises which have skilled operators are expected to have good production efficiency. The sign of the coefficient of the variable entrepreneurial skill was expected to be positive. It was measured as an independent dummy variable taking a value of one, if enterprise have skilled operators and zero otherwise.

Experience of manager (Exp): The experience of managers refers to the managers' knowledge or skill acquired over time. Experience is the most important factor which increases the production efficiency of dairy enterprises and dairy enterprises managed by experienced managers better perform by creating link between sectors, such as micro finance, TVET and NGOs (Tariku, 2018). In other words the attitude of the individual in taking risks, motive of going into self-employment, his or her managerial abilities to raise capital and perceive new markets, determine the production efficiency of the dairy enterprises. When managers have the experience of being able to lead and inspire followers, the dairy enterprises have good production efficiency (Semistatus and Rainer, 2014). Because of this reason the experienced managers assumed to have positive influence on the production efficiency of the dairy enterprises. Therefore, the experience of manager was expected to be continuous independent variable and have positive influence on the production efficiency of the dairy enterprises. The sign of the coefficient for the variable experience of manager was therefore expected to be positive.

Access to training (Train): Access to training for operators of dairy enterprises refers to the facilitation of different trainings which assists the operators of the dairy enterprises to perform their activity in a suitable way. Participants in these trainings become equipped

with information and tools to make better production efficiency, work towards their goals and ultimately enhance their economic well-being (Taciana *et al.*, 2017). According to Masuku (2014), to make dairy enterprises competitive and efficient, increasing the capacity and skill of the operators through continuous trainings are crucial. Capacity building trainings would better prepare dairy enterprises to perform in the business they engaged (Pilar *et al.*, 2018). Therefore, dairy enterprises which have sufficient access of training for operators are expected to have good production efficiency. The sign of the coefficient of the variable access of training was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access to training and zero otherwise.

Access to market (Mkt): Access to market refers to the availability of market demand for the particular commodity or service. Dairy enterprises create different market access for their products insure the existence of market alternatives for their product. According to the findings of (Necmi, 2016), the higher level of market access results the greater level of dairy enterprises production efficiency. Thus, the sign of the coefficient of the variable access of market was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access to market and zero otherwise.

Consultancy service (Cons): A professional practice giving expert advice in a particular field. It shows advisory and other technical assistance for managers and operators of dairy enterprises since start up to the time of study. According to Kadurumba *et al.* (2014), to make dairy enterprises competitive and efficient, increasing the capacity and skill of the managers and operators through continuous flow up and provision of consultancies are significantly important. The sign of the coefficient of the variable consultancies services was expected to be positive. It was measured as an explanatory dummy variable taking a value of one if the dairy enterprises have sufficient and continues consultancies service and zero otherwise.

Sex of manager (Sex): Sex issue is important factor in production efficiency of dairy enterprises. In most countries, majority of dairy enterprises are operated and managed by men. The new start rates for male managed dairy enterprises are substantially higher as compared to female headed dairy enterprises and women managed dairy enterprises grow

less rapidly than those male managed dairy enterprises. Business that are managed by female manager face dual challenges, one is structural problems (problems common to all dairy enterprises) and the other is women specific problems such as sex biased practices, socio-cultural factors, unbalanced household responsibilities, unequal access to markets, illiteracy and lack of business skills (Taciana *et al.*, 2017). This indicates the male managed dairy enterprises efficient as compared to women managed dairy enterprises. The sign of the coefficient of the variable sex of manager was expected to be positive. It was measured as an explanatory dummy variable taking a value of one if the dairy enterprises manager is male and zero otherwise.

Access to infrastructure (Infra): The access of sufficient and suitable services to the function of dairy enterprises is crucial determinant of their production efficiency. Dairy enterprises located at main road side exhibit higher production efficiency compared to dairy enterprises located out of town (Victor and Boris, 2016). Services like electric power supply, water supply and transportation service have positive impact on the production efficiency of dairy enterprises and dairy enterprises which have well and enough services efficient better. The sign of the coefficient of the variable access to infrastructure was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access to infrastructures and zero otherwise.

Access to premises (Prem): The availability of sufficient premises which is well equipped with necessary facilities to produce, store and sell of their products in permanently secured the production efficiency of the dairy enterprises. It shows availability of own working place or industrial land (Gallani *et al.*, 2015). According to Victor and Boris (2016), access to premises have been major factors in improving the dairy enterprises production efficiency and has a positive impact to dairy enterprises production efficiency to be positive. It was measured as an explanatory dummy variable taking a value of one, if the dairy enterprises have access to premises and zero otherwise.

Customer networks (Netw): The enter-connection among input suppliers and output consumers' vertically and horizontally. Having an extensive social network is valuable assets that can help dairy enterprises to obtain access to information (leads about profitable business opportunities) as well as resources. While social networks can enhance dairy enterprises production efficiency in any context, they can be critical to dairy enterprises

production efficiency prospects in environments with pervasive market failures. It has numerous potential downsides for dairy enterprises production efficiency. In some cases, it may be too expensive for or inaccessible to the poor dairy enterprises may provide unequal access to resources, lack of stability, may be deeply rooted in societal traditions (Necmi, 2016). The sign of the coefficient of the variable customer network was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the dairy enterprises have sufficient customer network and zero otherwise.

Access to credit (Credit): Access to credit is a key issue for dairy enterprises production efficiency. Accessing credit, particularly for starting and expansion of the dairy enterprises, is one of the major constraints faced by dairy enterprises. The dairy enterprises often have fewer opportunities to gain access to credit for various reasons, including lack of collateral, unwillingness to accept collateral and negative perceptions about entrepreneurs by loan officers (Gallani *et al.*, 2015). According to the investigation of Jane *et al.* (2014) the key challenges hindering dairy enterprises from accessing credit facilities to be high cost of repayment, strict collateral requirements, unwillingness of people to act as guarantors, high credit facilities' processing fees and short repayment period. Therefore, the sign of the coefficient of the variable access to credit was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the dairy enterprises have access to credit and zero otherwise.

3.5.3. Definition and Working Hypothesis for Determinants of Financial Performance

Dependent variable: Profitability ratio is used to measure the financial performance of dairy enterprises. Here the profitability ratio value of the dairy enterprises is used as a dependent variable for financial performance of the dairy enterprises. This is mainly because dairy enterprises are more focused on profitability than other modes of financial performance measures. As Rufo (2015); Farah and Nina (2016); Ali and Bilal (2018); Desta *et al.* (2018); Priscilla and Wei (2018) and Tariku (2018) recommended that profitability ratio has been widely adopted by most researchers and practitioners in business financial performance models.

Independent variables: The independent variables in the model are: age of dairy enterprises, educational level of manager, number of employees, amount of initial capital,

entrepreneurial skill, experience of manager, access to training, access to market, sex of manager, consultancy service, access to premises, access to services, customer networks and access to credit. The nature and effect of those independent variables on the profitability ratio of dairy enterprises are discussed and hypothesis as follows:

Age of enterprises (Age): Age of dairy enterprises refers to the duration of time that the dairy enterprises stay in the business. New dairy enterprises entering the market are unaware of their true performance immediately but as they mature, they are able to uncover their productive costs. Dairy enterprises learn about their financial performance overtime (Bonte *et al.*, 2019). Empirical implication derived by this model is that young dairy enterprises have accumulated less information than older ones about their managerial abilities. For this reason there was more exists among young dairy enterprises than older dairy enterprises. This study was considered the dairy enterprises age from the period of establishment up to the time when the data was collected. The liability of newness that makes new dairy enterprises face a greater risk than older dairy enterprises is that new dairy enterprises do not have the experience, access, links, reputation or the legitimacy of the older dairy enterprises, leading to limited access to external resources. Long period attendance of the dairy enterprises in the business builds the financial performance of dairy enterprises to stay in the business (Caroline and Peter, 2016). It was assumed in this study that the longer duration stays of the dairy enterprises in the business result the good financial performance of the dairy enterprises. The age of dairy enterprises is continuous independent variable and assumed to have positive influence on the financial performance of the dairy enterprises. Therefore, the sign of the coefficient for the age of dairy enterprises was expected to be positive.

Educational level of manager (Edu): The level of education attained by the manager of the dairy enterprises is the attainment level of formal education. The level of education attained is likely to affect the levels of skills using which one may survive in the business (Kinyua, 2014). The level of education was therefore assumed to be categorical independent variable and have positive influence on the financial performance of the dairy enterprises. Therefore, the sign of the coefficient for the education level attained by the manager of dairy enterprises variable was expected to be positive.

Number of employees (Emplo): The number of employees associated in the dairy enterprises is the total number of workers employed in the dairy enterprises. The number of employees in the dairy enterprises should be determined by the size of the dairy enterprises (Caroline and Peter, 2016). It is assumed in this study that the number of employees in the dairy enterprises indicates the goal of dairy enterprises which are labor intensive. If the dairy enterprises type is micro the number of employees engaged in the enterprise is less than 10 workers and if it is small 10 to 50 workers are employed. The number of employees in the dairy enterprises was continuous independent variable and assumed to have positive influence on the financial performance of the dairy enterprises. The sign of the coefficient of the variable for the number of employees was therefore expected to be positive.

Amount of initial capital (Capt): The endowment of the important resource and competitive advantages are major determinants of dairy enterprises profit as per resource based view since resources are basis for profitability of dairy enterprises. Amount of start-up capital is amount of initial capital owned from different sources to start the business. According to Marom and Lussier (2014) all business ventures regardless of size require finances from inception and throughout their life cycles. The amount invested will influence greatly the size of the venture, which in turn determines the early survival of dairy enterprises if other factors are held constant. The entrepreneur requires seed capital to start the business; to operate and manage the business dairy enterprises (Mensah, 2016). It is known that the amount of initial capital is based on dairy enterprises level and paid up capital, in which the dairy enterprises level is micro the amount of initial capital is less than Birr 100,000 and the dairy enterprises level is small Birr up to 500,000 as initial capital. The study was assumed that the dairy enterprises start their business higher than the initial amount of capital settled has higher chance of having good financial performance dairy enterprises. The amount of initial capital inter into the business was expected to be continuous independent variable and have positive influence on the financial performance of the dairy enterprises. The sign of the coefficient of the variable for the amount of initial capital was therefore expected to be positive.

Entrepreneurial skill (Skill): The dairy enterprises operators are expected to have sufficient entrepreneurial skill in creation and modification of different products and

services (Hiebl, 2015). Therefore, dairy enterprises which have sufficient entrepreneurial skill are expected to have higher values of profit. The sign of the coefficient of the variable entrepreneurial skill was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the dairy enterprises have skilled operator and zero otherwise.

Experience of manager (Exp): The experience of managers refers to the managers' knowledge or skill acquired over time. Experience is the most important factor which increases the financial performance of dairy enterprises and dairy enterprises managed by experienced managers better perform by creating link between sectors, such as micro finance and NGOs (Fatimah and Fatima, 2018). In other words the attitude of the individual in taking risks, motive of going into self-employment, his or her managerial abilities to raise capital and perceive new markets, determine the financial performance of the dairy enterprises. When the managers have the experience of being able to lead and inspire followers, the dairy enterprises have good financial performance (Berihu *et al.*, 2014; Caroline and Peter, 2016). Because of this reason the experienced managers assumed to have positive influence on the financial performance of the dairy enterprises. The experience of managers was expected to be continuous independent variable and have positive influence on the financial performance of the dairy enterprises. The sign of the coefficient of the variable for the experience of managers was therefore expected to be positive.

Access to training (Train): Access to training for operators of dairy enterprises refers to the facilitation of different trainings which assists the operators of the dairy enterprises to perform their activity in a suitable way. The key factor in financial performance is financial literacy or financial trainings. Financial trainings programs teach the knowledge, skills and attitudes required to adopt good management practices for earning, spending, saving, borrowing and investing. Participants in these trainings become equipped with information and tools to make better financial profitability, work towards their financial goals and ultimately enhance their economic well-being (Deksiso, 2018). According to Kinyua (2014), to make dairy enterprises competitive and profitable, increasing the capacity and skill of the operators through continuous trainings, provision of advice and consultancy are crucial. Capacity building trainings would better prepare dairy enterprises to perform in the business they engaged (ILO, 2015). Therefore, dairy enterprises which

have sufficient access of training for operators are expected to have good financial performance. Therefore, the sign of the coefficient of the variable access of training was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access of training and zero otherwise.

Access to market (Mkt): Access to market refers to the availability of alternative market demand for the particular commodity or service. Dairy enterprises create different market access for their products insure the existence of market alternatives for their product. According to the findings of (Emmanuel, 2013), the higher level of market access results the greater level of dairy enterprises financial performance. Thus, the sign of the coefficient of the variable access to market was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access to market and zero otherwise.

Consultancy service (Cons): A professional practice giving expert advice in a particular field. It shows advisory and other technical assistance for managers and operators of dairy enterprises since start up to the time of study. According to Deksiso (2018), to make dairy enterprises competitive and profitable, increasing the capacity and skill of the managers and operators through continuous flow up and provision of consultancies are significantly important. The sign of the coefficient of the variable consultancies services was expected to be positive. It was measured as an explanatory dummy variable taking a value of one if the dairy enterprises have sufficient and continues consultancies service and zero otherwise.

Sex of manager (Sex): It is an important factor in financial performance of dairy enterprises. In most countries, majority of dairy enterprises are operated and managed by men (Brenda and Gregory, 2015). The new start rates for male managed dairy enterprises are substantially higher as compared to female managed dairy enterprises and women managed dairy enterprises grow less rapidly than those male managed dairy enterprises. Business that are managed by female entrepreneur face dual challenges, one is structural problems (problems common to all dairy enterprises) and the other is women specific problems such as sex biased practices, socio-cultural factors, unbalanced household responsibilities, unequal access to markets, illiteracy and lack of business skills (UNECE, 2014). The study made by Berihu *et al.* (2014) show that male managed dairy enterprises

perform better than as compared to women owned dairy enterprises. The sign of the coefficient of the variable sex of manager was expected to be positive. It was measured as an explanatory dummy variable taking a value of one if the dairy enterprises manager is male and zero otherwise.

Access to infrastructure (Infra): The access of sufficient and suitable infrastructure to the function of dairy enterprises is crucial determinant of their financial performance. Dairy enterprises located at main road side exhibit higher financial performance compared to dairy enterprises located out of town (Heslina *et al.*, 2016). Moreover, the dairy enterprises operating in commercial districts reveals strong tendency of profitability than those which operate at distant areas. Infrastructures like electric power supply, water supply and transportation service have positive impact on the financial performance of dairy enterprises and dairy enterprises which have well and enough infrastructures perform better. The sign of the coefficient of the variable access to infrastructure was expected to be positive. It was measured as an independent dummy variable taking a value of one if the dairy enterprises have access to infrastructures and zero otherwise.

Access to premises (Prem): The availability of sufficient premises which is well equipped with necessary facilities to produce, store and sell of their products in permanently secured the financial performance of the dairy enterprises. It shows availability of own working place or industrial land (Brenda and Gregory, 2015). According to Mendoza (2015), access to premise have been major factors in dairy enterprises financial performance and has a positive impact to dairy enterprises financial performance. The sign of the coefficient of the variable access to premises was expected to be positive. It was measured as an explanatory dummy variable taking a value of one, if the dairy enterprises have access to premises and zero otherwise.

Customer networks (Netw): The enter-connection among input suppliers and output consumers' vertically and horizontally. Having extensive social networks are valuable assets that can help dairy enterprises obtain access to information (leads about profitable business opportunities) as well as resources. While social networks can enhance dairy enterprises financial performance in any context, they can be critical to dairy enterprises financial performance prospects in environments with pervasive market failures. It has numerous potential downsides for dairy enterprises financial performance. In some cases,

it may be too expensive for or inaccessible to the poor dairy enterprises may provide unequal access to resources, lack of stability, may be deeply rooted in societal traditions (Berihu *et al.*, 2014). The sign of the coefficient of the variable customer network was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the dairy enterprises have sufficient customer network and zero otherwise.

Access to credit (Credit): Access to credit is a key issue for dairy enterprises financial performance. Accessing credit, particularly for starting and expansion of the dairy enterprises, is one of the major constraints faced by dairy enterprises. The dairy enterprises often have fewer opportunities to gain access to credit for various reasons, including lack of collateral, unwillingness to accept household assets as collateral and negative perceptions about entrepreneurs by loan officers (Kinyua, 2014). According to the investigation of Tariku (2018) the key challenges hindering dairy enterprises from accessing credit facilities to be high cost of repayment, strict collateral requirements, unwillingness of people to act as guarantors, high credit facilities' processing fees and short repayment period. The sign of the coefficient of the variable access to credit was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the dairy enterprises have access to credit and zero otherwise.

3.5.4. Definition and Working Hypotheses for Impact Evaluation

Dependent variable: The dependent variable in binary logit model to evaluate the impact of dairy enterprises development on employment creation and income generation was membership (treatment), which assumed the value of 1, if the household head is a member in dairy enterprises and 0 otherwise (control group/nonmember).

Outcome variables: The outcome variables in PSM model were total annual employment created by the household measured in terms of number of household members employed and total annual income of the household in Birr.

Independent variables: The explanatory variables used in the logit model for the impact evaluation are: age of household head in years, educational level of household head in highest grade completed, farming experience of household head in years, access to training, distance to market, soil fertility status, household size, sex of the household head,

access to formal credit, landholding size, access to information, off-farm income, livestock holding and membership to association. They were assumed to have influence on the propensity of the household heads to be member of dairy enterprises and also the outcome variables.

Age of household head (AGE): The age of household head refers to the length of time since birth, which the household head have been alive. Older household head are more risk averse and are assess the attributes of a membership than younger household head. When household head get older, they are expected to have greater experience of farming activities and they don't want to be member in dairy enterprises. But the younger household head have lower experience of farming activities and they are opted to be member in dairy enterprises. According to Wolday (2015) youth in Ethiopia have specific profiles and labeled as people with high mobility, lack of business experience and motivation to be self-employed, and they are initially organized with the support of government to create their own business. When they lack other alternatives, they are tending to engage in enterprises. Hence, the expected effect of age on household head membership status was positive or negative.

Educational level of household head (EDU): The level of education attained by the household head was the attainment level of education. Metasari (2019) study result revealed that, education level attained by household head is the key determinants of participation in enterprises. It is one of the most important variable preparing the household head to be member or not in dairy enterprises. The higher education level attained the more likely to be member and the vice versa. Therefore, it was assumed to be dummy independent variable and have positive influence on the membership status of the household head. Therefore, the sign of the coefficient for the education level attained by the household head was expected to be positive.

Farming experience of the household head (EXPRANCE): It refers to the number of year since household head starting farming activities to till data collection time. Farming experience is knowledge or skill acquired related to farming activities because of doing farming activities for a long period of time (WB, 2018). The farming experience of the household head was assumed to reflect the year of farming practice of the household head. However, as the household head gets more farming experience he prefer to not to be

member in dairy enterprises. Therefore, a negative relationship is expected between farming experience of household head and the dependent variable. Therefore, the experience of household head was expected to be continuous independent variable and have negative influence on the membership status of the household head. The sign of the coefficient for the variable farming experience of the household head was therefore expected to be negative.

Participation in training (TRAIN): It refers to access to different trainings. All the training programs that have content specific intended to help people to start a new business have found training helps enterprises start-up, although there is some evidence that training may merely speed up the entry of enterprises who were going to enter anyway, and potentially change the selection of who enters in to the business (Elahi, 2015). Household head that get dairy enterprises related training help to create awareness and promote understanding about the merits of the available information about dairy enterprises are hypothesized to be member than those who did not participate in different trainings. Because they have gotten different exposures, experiences, and other related issues to be member in dairy enterprises. Therefore, the sign of the coefficient of the variable participation in training was expected to be positive. It was measured as an independent dummy variable taking a value of one if the household head participate in training and zero otherwise.

Access to market (ACMKT): Access to market refers to the availability of market alternatives near by the locality. In rural locations, in contrast, market places are located far apart from the district, due to this low availability of inputs, unreliable supply and low output prices. This could be attributed to low demand and high transaction costs because of underdeveloped and unreliable infrastructure (Gollin and Rogerson, 2014). It was assumed that, if household head has market alternatives for his product he would not tend to be member in dairy enterprises. Therefore, household head with lack of market access have more probability to be member of dairy enterprises. Thus, the sign of the coefficient of the variable access to market was expected to be negative. It was measured as an independent dummy variable taking a value of one if the household head have access to market and zero otherwise.

Soil fertility status (FERTILITY): It refers to the productivity of the soil with no application of chemical and/or organic fertilizer. Soil fertility is the backbone of agricultural systems and plays a key role in determining food quantity and quality. In recent decades, soil fertility has decreased due to indiscriminate use of agrochemicals, and nations around the globe are now facing the challenge of increasing food production while sustainably maintaining soil fertility (WB, 2018). It was assumed that, the more the soil fertile, the less intention of household head to be member in dairy enterprises than that of soil infertile household head. Hence, the better the fertility status of the soil, the lesser the household head goes to membership. Therefore, this variable expected to have a negative relation with the membership status of household head. It was measured as an independent dummy variable taking a value of one if the household head have fertile land and zero otherwise.

Household size (FAMSIZE): It refers to the total number of family members living together. Family size of the households was determining participation of households in dairy enterprises positively and having more male members in the household was also determining participation positively. This might be due to the cultural fact that female members need to shoulder responsibility of households and they need not to let females to participate outdoor activities (Araya, 2014). It was assumed that, if the household head have large household size have high probability of being member in dairy enterprises and vice versa. Therefore, it is continuous independent variable and assumed to have influence on the membership status of the household head. The sign of the coefficient of the variable for the household size was therefore expected to be positive/negative.

Sex of the household head (SEX): It refers to sex of the household head. According to Araya (2014), participation on dairy enterprises enables households to improve their income, consumption and capital holding, the government offices which are responsible to support the dairy enterprises have to work hard to mobilize women to participate in dairy enterprises, in order to reduce the incidence of poverty and income inequality. To achieve this, different experience sharing days have to be organized to share the dairy enterprises members to the non-members on the benefits they enjoy and their current welfares. It was assumed that, female household head has less probability to be member of dairy enterprises due to different economic and social barriers and they shoulder additional responsibilities within their household. Therefore, the sign of the coefficient of the variable sex of

household head was expected to be negative. It was measured as an explanatory dummy variable taking a value of one if the household head is male and zero otherwise.

Access to formal credit (CREDIT): The availability of finance which is crucial to acquire capital ingredient in starting up or running business activity. According to Vuong *et al.* (2019) study results indicate that household's capital endowments, marital status, family size, distance to the market center, and locations affect the probability to ask for and amount of credit. It was assumed that, household head often have fewer opportunities to gain access to formal credit for various reasons, including lack of collateral, unwillingness to accept household assets as collateral by loan officers. Thus, the sign of the coefficient of the variable access to formal credit was expected to be positive. It was measured as an independent dummy variable taking a value of one, if the household head have access to formal credit and zero otherwise.

Land holding size (LANDHOLD): The size of land owned by household head is one of the important resources to prepare platform for economic growth. The land holding size of the household heads negatively affect the membership status of household head. A significant proportion of interviewed rural households tiny plots of land and do not anticipate sufficient income opportunities in rural areas. Farm sizes in Ethiopia are also decreasing as a result of population pressure, which results in increased subdivision to allow successive generations' access to at least a small plot for farming (Zemen, 2014). It is assumed that, if the household head has sufficient land to cultivate for crop production, they doesn't want to be member in dairy enterprises and the vice versa. Therefore, the land holding size of household head was expected to be continuous independent variable and have negative influence on the membership status of the household head. The sign of the coefficient for the variable land holding size of the household head was therefore expected to be negative.

Access to information (INFO): Information access plays a significant role in getting awareness about membership in dairy enterprises. Even if dairy enterprises play a vital role in the livelihood of rural household by generating income, peoples become little aware to them because of lack of necessary information about them in order to participate (Yaregal, 2018). This is a dummy independent variable represented by 1 if the household head has owned one or more of information access equipment's like, mobile phone, radio, TV and 0

otherwise. Therefore, the information access is hypothesized to have positive influence on membership status of the household head.

Off-farm income (OFAM): It is broader and includes all incomes generated out of own farm. It refers to the participation of household head in off-farm income generating activities to get additional income that increase the level of their income. Income diversification of households based on share of income from each sources show that, the share of crop income takes the highest share of the total household income followed by livestock income. So those, majority of farm households are mainly engaged in farming with few off-farm and/or non-farm activities (Gebre-Egziabher *et al.* 2018). In this case such income may have negative impact on membership status of the household head in dairy enterprises. Thus, the sign of the coefficient of the variable off-farm income was expected to be negative. It was measured as an independent dummy variable taking a value of one if the household head have off-farm income and zero otherwise.

Livestock holding (TLU): This refers to the total number of livestock holding measured in TLU owned by the household head. It is taken as a proxy indicator of wealth of household head. The livelihood of rural households is the result of the interaction between complex strategies and multiple income generating activities. As a result, farm households in rural areas participate in multiple economic activities and thus diversify income sources to minimize agriculture related risks and problems (Bassie, 2014). It was assumed that, if the household head have larger number of livestock is relatively rich and they deny being the member of dairy enterprises as compared to those who own less number of livestock. Therefore, the livestock holding of household head was expected to be continuous independent variable and have negative influence on the membership status of the household head. The sign of the coefficient for the variable livestock holding of the household head was therefore expected to be negative.

Membership to association (ASSO): It refers to the participation of the household head in any other economic associations like cooperatives. An involvement in such association doesn't creating better business environments for dairy enterprises (White, 2018). It is assumed that, if the household head were member in other association, they doesn't want to be member in dairy enterprises and the vice versa. Therefore, the membership association of household head was expected to be dummy independent variable and have

negative influence on the membership status of the household head in the dairy enterprises. The sign of the coefficient for the variable membership to association of the household head was therefore expected to be negative.

4. RESULTS AND DISCUSSION

This chapter presents the findings of the study and discusses the main results of the study in comparison with the results of other similar studies. Thus, it is organized in two sections. The first section provides descriptive analysis on the demographic, socio-economic and institutional characteristics of sampled dairy enterprises and household heads included in the study. The second section deals with econometric analysis of production efficiency, financial performance measurements and their determinants and impact of dairy enterprises on employment creation and income generation by using SFM, profitability ratio analysis and PSM models, and it further presents the results of the study in comparison with other related research findings in Ethiopia and elsewhere.

4.1. Descriptive Analysis

4.1.1. Output and Input Factors for Production Efficiency of Enterprises

There are factors that determine production efficiency of dairy enterprises. Hence, to understand these factors it is important to know the descriptive statistics of the milk obtained from individual dairy enterprises and inputs used. Generally, the intensity of production efficiency depends greatly on the allocation of production inputs such as land, labor, cow, concentrated feed, unconcentrated feed and veterinary medicine. As shown in Appendix Table 4, the mean milk amount obtained by sample dairy enterprises was 15010.9 liters for total sampled dairy enterprise (it was 14763.5 liters for micro level dairy enterprise and 16064.48 liters for small level dairy enterprise).

4.1.2. Characteristics of Sample Enterprises

The age of dairy enterprises refers to the duration of time the enterprise stay in the business. In the study area, dairy enterprises were established and started operating following national enterprise development strategy of 1997 and the revised national enterprise development strategy 2011. The mean age of total sampled enterprises was 7.45 years (it was 4.25 for micro level and 8.45 for small level dairy enterprise) with a minimum of 1 year and maximum of 13 years of age. The mean number of employee in the

total sampled enterprises was 8.7 (it was 8.58 for micro level and 8.66 for small level enterprise). The mean amount initial capital of the total sampled enterprises was Birr 150341(it was Birr 75271 for micro level and Birr 175000 for small level enterprise) with a minimum of Birr 50000 and maximum of Birr 250000. This indicates that the some of the dairy enterprises in the study area started their business with insufficient amount of initial capital. Regarding the experience of the managers of dairy enterprises included in the sample, the mean years of experience was 7.64 for total sampled enterprises (4.98 for small level and 7.64 for small level dairy enterprises) with the minimum years of experience 1 and the maximum of 13 years of experience (Appendix Table 5)

4.1.5. Characteristics of Sample Managers of Enterprises

About 71% and 29% of total sampled dairy enterprises (66.6% and 33.3% for micro level dairy enterprises and 76.5% and 23.5% for small level dairy enterprises) managers were male and female respectively as indicated in Table 4.1 below. This indicates that there was not proportional participation of men and women in management position of dairy enterprises in the study area.

Table 4.1: Sex of enterprises managers

Sex of managers	Total sample		Micro level		Small level	
	Frequency	%	Frequency	%	Frequency	%
Male	151	71	76	66.7	75	116.5
Female	61	29	38	33.3	23	23.5
Total	212	100	114	100	98	100

Source: Author's survey data (2016/17)

About 43% of the total sample dairy enterprises managers (it was 48.2% of micro level and 36.7% of small level enterprises managers) attained from grade 1-8 (elementary level of education), 32% of the sample dairy enterprises managers (it was 32.5% of micro level and 31.6% of small level enterprises managers) attained from grade 9-12 (high school level), 18% of total sample dairy enterprises managers (16.7% for micro level and 19% for small level enterprises managers) had preparatory level of educational background and 7% of the total sample dairy enterprises managers (2.6% for micro level and 12.3% for small level enterprises managers) have upgraded their academic status up to TVT and above level of

education (Table 4.2). This indicates that the majority of dairy enterprises managers have attained elementary and high school levels of education.

Table 4.2: Educational level of managers

Educational level	Total sample		Micro level		Small level	
	Frequency	%	Frequency	%	Frequency	%
Elementary	91	43	55	48.2	36	36.7
High school	68	32	37	32.5	31	31.6
Preparatory	38	18	19	16.7	19	19.4
TVT and above	15	7	3	2.6	12	12.3
Total	212	100	114	100	98	100

Source: Author's survey data (2016/17)

4.1.6. Entrepreneurial Skill of the Operators in the Enterprises

In the study area, about 69% of the total sample dairy enterprises (61.4% for micro and 77.6% for small enterprises) included in the study had organized by operators who had entrepreneurial skill or had ability to do something well which leads the dairy enterprises to achieve their intended goals of establishment. On the other hand, the study ensures that 31% of the total sample dairy enterprises (it was 38.6% of micro level and 22.4% small level enterprises) did not have operators who have adequate entrepreneurial skills in doing their tasks in the dairy enterprises (Table 4.3).

Table 4.3: Entrepreneurial skill of the operators'

Entrepreneurial skill	Total sample		Micro level		Small level	
	Frequency	%	Frequency	%	Frequency	%
Yes	146	69	70	61.4	76	77.6
No	66	31	44	38.6	22	22.4
Total	212	100	114	100	98	100

Source: Author's survey data (2016/17)

4.1.7. Descriptive Results of Sample Households

The survey results showed that out of 385 sampled household heads, 126 (32.5%) were members and the remaining 259 (67.5%) were non-members. From total sample household heads, the majority of them (74%) were male-headed (the corresponding figures are 85% and 69% for members and non-members respectively). This result shows that enterprises membership is dominated by male headed households. This could be attributed to various reasons, which could be due to the weak economic position of female headed households including limited access and use of information due to cultural barriers. This might prevent female headed households from being member in dairy enterprises.

The mean age of the sample household heads was 32 years with a minimum of 25 years and a maximum of 71 years. The mean age of the member household heads was 31 years, whereas, that of the non-member household heads was 34 years. The result depicts that the household heads both in member and non-member categories were found to be in active working age. Education level of household heads varies among the member and non-member household heads. About 21.3% member household heads were illiterate and 78.7% were literate whereas, 26.5% of non-member household heads were illiterate whereas 73.5% were literate.

The land holding sizes among both members and non-members indicate that dairy enterprises members have small land size than non-members. From the member group, 48.29% households have land size below one hectare and 51.71% of household heads have land size above one hectare. In other hand the land holding size for non-member group, 27.2% households have land size below one hectare and 72.8% of households have land size above one hectare. Based on the land size possessed by non-member households' respondent they are better than member of dairy enterprises in the study area.

The average household size of the sample households in the study was six persons with high mean total dependency ratio of 1.34. The average household size for member households was 7.34 persons while it was 5.06 persons for non-member households. When we compare the average household size between members and non-members, households had higher households size than household who are not members in dairy enterprises. The mean comparison test of household size between the two groups showed that there was a

statistically significant difference in the mean household size. From this we can conclude that, household size might be the determinant factor of membership in dairy enterprises in the study area.

The mean livestock holding in Tropical Livestock Unit (TLU) of the sample households was 6.45, where the minimum was 2 and the maximum was 32. The mean livestock holding for member households was 4.62 TLU and 8.29 TLU for non-member households. Member households have less livestock number when compared to non-member households. The mean comparison test for the two groups showed that the difference between the groups with regard to livestock holding is significant. This means household heads with low livestock holding were encouraged to be member in dairy enterprises than household heads owning large number of livestock.

4.2. Econometric Analyses

4.2.1 Efficiency Analysis Using SFA Method

4.2.1.1. Test of hypothesis

In this section we tried to estimate dairy enterprises' TE, AE and EE of milk production in the study area. Keeping in mind the widely accepted way of carrying out SFA in efficiency analysis, it was opted for executing multiple inputs and single output and it is possible to test various hypotheses using maximum likelihood ratio test, which were not possible in non-parametric models. In order to choose an appropriate model for further analysis and interpretation, hypotheses tests before parameter estimates of production frontier function and the inefficiency effects. Because of this, three hypotheses were tested, to select the correct functional form for the given data set, for the existence of inefficiency effects and for variables that explain the differences in efficiency.

Table 4.4: Generalized likelihood ratio tests of hypothesis for the parameters of the SFA

Null hypothesis	For total sampled Enterprises				
	LH ₀	LH ₁	Calculated χ^2 (LR) value	Critical χ^2 value	Decision
Production function is CD, (i.e. $H_0: \beta_{ij} = 0$)	-170.74	-161.03	19.42	32.67	Not reject
Absence of inefficiency, (i.e. $H_0: \gamma = 0$)	-187.4	-170.74	33.32	2.71	Reject H_0
Joint efficiency effects are insignificant, (i.e. $H_0: \delta_1 = \dots \delta_{14} = 0$)	-188.3	-170.74	36.6	32.67	Reject H_0
For Micro Level Enterprises					
Production function is CD, (i.e. $H_0: \beta_{ij} = 0$)	-95.4	-88.6	13.6	32.67	Not reject
Absence of inefficiency, (i.e. $H_0: \gamma = 0$)	-101.6	-95.4	12.4	2.71	Reject H_0
Joint efficiency effects are insignificant, (i.e. $H_0: \delta_1 = \dots \delta_{14} = 0$)	-115.12	-95.4	39.4	32.67	Reject H_0
For Small Level Enterprises					
Production function is CD, (i.e. $H_0: \beta_{ij} = 0$)	-85.9	-78.4	15	32.67	Not reject
(Absence of inefficiency), $H_0: \gamma = 0$	-90.5	-85.9	9.2	2.71	Reject H_0
Joint efficiency effects are insignificant, (i.e. $H_0: \delta_1 = \dots \delta_{14} = 0$)	-107.7	-85.9	43.6	32.67	Reject H_0

Source: Author's survey data (2016/17)

The first test identifies an appropriate functional form between the restrictive Cobb Douglas and the more flexible Translog production functions. The Translog frontier function turns into Cobb-Douglas when all the square and interaction terms in the translog are zero. The test is made based on the value of likelihood ratio (LR) statistic, which can

be computed from the log likelihood value obtained from estimation of Cobb-Douglas and Translog functional specifications. Then, this computed value is compared with the upper 5% critical value of the chi-square at the degree of freedom equals to the difference between the numbers of explanatory variables used in the two functional forms (in this case $df = 14$). For the sample dairy enterprises, the estimated log likelihood values of the Cobb-Douglas and Translog production functions for total sample dairy enterprises were -170.74 and -161.03 (It is -95.4 and -88.6 for micro level enterprises and -85.9 and -78.4 for small level enterprises) respectively. Thus, the null hypothesis that all coefficients of the square and interaction terms in Translog specification are equal to zero was accepted. This implies that the Cobb-Douglas functional form adequately represents the data.

The second null hypothesis was $H_0: \gamma = 0$, which specifies that the inefficiency effects in the SPF were not stochastic, i.e., milk producing dairy enterprises are efficient and have no room for efficiency improvement. After the appropriate production function is selected, the next step is a test for adequacy of representing the data using SPF over the traditional mean response function, OLS. The null hypothesis, $H_0: \gamma = 0$, which specifies that the inefficiency effects are absent from the model (that is all dairy enterprises are fully efficient). Whereas, the alternative hypothesis, $H_1: \gamma > 0$, states that there is inefficiency in production of milk in the study area. Since this study is using the STATA version computer programs, after fitting the function with the required defined variables the computer output displays results which include the test of null hypothesis about inefficiency component. From this computer program output it is found that, log likelihood value = -187.4, $(\chi^2 (01)\text{-value} = 33.32$ and $p = 0.001$) for total sample dairy enterprises (but it is log likelihood value = -101.6, $(\chi^2 (01)\text{-value} = 12.4$ and $p = 0.025$ for micro level dairy enterprises and log likelihood value = -90.5, $(\chi^2 (01)\text{-value} = 9.2$ and $p = 0.04$ for small level dairy enterprises). Therefore, the decision of null hypotheses $H_0: \gamma = 0$, which specifies that the inefficiency effects are absent from the model is rejected at 1% level of significance for the total sampled dairy enterprises (but it is 5% level for both micro and small level dairy enterprises).

The coefficient for the discrepancy ratio (γ) could be interpreted in such a way that for the total sampled dairy enterprises was about 85.41% (83.63% for micro level dairy enterprises and 84.00% for small level dairy enterprises), the variability in milk output in the study area was attribute to inefficiency scores effect, while the remaining 14.59% variation in

output for total sampled dairy enterprises was due to the effect of random noise (16.37% for micro level dairy enterprises and 16.00% small level dairy enterprises) in the study area. This implies presence of scope for improving output of milk by first identifying those institutional, socioeconomic and farm attribute factors causing this variation. Therefore, this data can be better represented by the stochastic production frontier than the average response function. The null hypothesis was rejected (Table 4.4). This implies the traditional average production function does not adequately represent the data. Therefore, the inclusion of the technical inefficiency term is an important issue to the model.

The third null hypothesis that the explanatory variables associated with inefficiency effects are all zero ($H_0: \delta_1 = \delta_2 \dots = \delta_{14} = 0$) was also tested. To test this hypothesis likewise, LR (the inefficiency effect) was calculated using the value of the Log-Likelihood function under the stochastic production function model (a model without explanatory variables of inefficiency effects: H_0) and the full frontier model (a model with explanatory variables that are supposed to determine inefficiency of each: H_1).

For the total sample dairy enterprises, the calculated value $\lambda_{LR} = -2(170.74 - 188.3) = 36.6$ (for micro level dairy enterprises $\lambda_{LR} = -2(95.4 - 115.12) = 39.4$ and for small level dairy enterprises $\lambda_{LR} = -2(85.9 - 107.7) = 43.6$) is greater than the critical value of 32.67 at 14 degree of freedom (Table 4.9) the value of LR implying that, the null hypothesis (H_0) that explanatory variables are simultaneously equal to zero was rejected at 5% significance level. Hence, these variables simultaneously explain the sources of efficiency differences among sample dairy enterprises in the study area. Thus the observed inefficiency among the milk producing dairy enterprises in Hadiya zone could be attributed to the variables specified in the model and the variables exercised a significant role in explaining the observed inefficiency. Therefore, the result confirms as the null hypothesis was rejected, implying that there is at least one variable that explain the difference in efficiency.

4.2.1.2. Estimation of parameters of production function model

The output variable was milk production defined as quantity of milk produced in liters whereas the inputs were cow, unconcentrated feed, concentrated feed, labor, veterinary medicine and land. The result of the Cobb-Douglas stochastic production frontier for the total sample dairy enterprises showed that inputs like cow (at 10% significance level),

concentrated feed (at 1% significance level), labor (at 1% significance level) and land (at 5% significance level) allocated for milk were found to positively and significantly explained the level of efficiency of milk production (Table 4.5), which are important variables in shifting the frontier output to the right. This indicated that at each and every unit of these variables there is a possibility to increase the level of output.

As shown on Table 4.5 below, the parameter estimate for unconcentrated feed and veterinary medicine turned out to be insignificant. Given unconcentrated feed and veterinary medicine are the important production input in the study area, the insignificance of the estimated coefficients for unconcentrated feed and veterinary medicine which implies that use of this input has no significant effect on productivity was contrary to the expectation. Out of total inputs allocated for milk production, the elasticity of cow is very high implying that these have more effect in determining the output level at the best practice (the maximum technical efficiency score). The positive coefficients of inputs indicate a 1% increase in cow, concentrated feed, labor and land yields 34.54%, 13.25%, 47.49%, 15.28%, increase in milk output improvement, respectively for the sampled dairy enterprises. This result is in agreement to that of Mugambi (2014) and Maina *et al.* (2018) who found the herd size to have a great impact on milk production.

The estimated stochastic production frontier model indicates that labor and cow for dairy enterprises were key inputs in improving milk productivity since its response is one of the moderate perhaps, due to the low application level of the inputs. This implies that there is a need to increase the current level of these inputs usage along with good farm management. In other words, as indicated on Tables 4.5 if all the inputs are improved by 1%, milk output would increase by 1.63% for sample dairy enterprises. The results showed that dairy enterprises were operating in the stage one of production process i.e. the 1% increase in the level of input used; increases the output by 1.63%, (increasing return to scale) and dairy enterprises have ample opportunities to increase output by improving their efficiencies. Therefore the dairy enterprises should increase the level of inputs used up to the point where the constant return to scale (optimization) was achieved. Another essential outcome in the analysis is the variance ratio parameter γ which found to be significant at 1% level expressing that about 85.41% of milk output for dairy enterprises deviations are caused by inefficiency of dairy enterprises that are under the control of them. The dairy enterprises

should reduce the level of inefficiency by correcting inefficiency factors under their control.

Table 4.5: Maximum likelihood estimates of output

Variables	Parameters	Coefficient	Std. Err.
Constant	β_0	1.2099	2.1908
Ln(cow)	β_1	0.3454*	0.1798
Ln(unconce)	β_2	0.1814	0.2530
Ln(conce)	β_3	0.1325***	0.0189
Ln(labor)	β_4	0.4749***	0.0271
Ln(vet)	β_5	0.3399	0.7269
Ln(land)	β_6	0.1528**	0.0707
Sigma-square	δ^2	0.6795***	
Gamma	γ	0.8541	
Lambda	λ	2.4208***	
Log likelihood function		-170.74	
Returns to scale		1.6269	

Source: Author's survey data (2016/17)

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

The maximum likelihood estimates of AE revealed that the coefficients of Cobb-Douglas stochastic frontier cost function. As shown on Table 4.6, the parameter estimate for unconcentrated feed and veterinary medicine turned out to be insignificant. The result of the Cobb-Douglas stochastic production frontier for the total sample dairy enterprises showed that inputs like cow (at 1% significance level), concentrated feed (at 10% significance level), and land (at 1% significance level) allocated for milk production were found to positively and significantly explained the level of cost of production of milk. To increase in output by using right proportion of inputs given their prices dairy enterprises have to choose the best combination of inputs given the prices of inputs and output.

The optimal combination of inputs, output could be produced at a minimal cost. Therefore, in this study AE was estimated from milk output and input variables include land, labor, cow, concentrated feed, unconcentrated feed and veterinary medicine. These all variables

were transformed into natural logarithms, and stochastic frontier Cobb-Douglas cost function was estimated by maximum likelihood method. The cost of production of milk was measured in Ethiopian Birr. Based on the cost estimation of production function, the cost of inputs used for milk production was estimated by; rent of land per hectare in Birr, wage of labor per day in Birr, price of cow per number in Birr, price of concentrated feed per kilogram in Birr, price of unconcentrated feed per kilogram in Birr and price of vet medication per number in Birr as specified in equation 23 below.

$$\begin{aligned} \ln C_i = & 0.6667 + 0.0865 \ln C_{cow} + 0.0857 \ln C_{labor} + 0.0274 \ln C_{cons feed} + \\ & 0.0496 \ln C_{uncons feed} + 0.452 \ln C_{land} + 0.0302 \ln C_{med} + 0.9959 \ln Y_{output} \end{aligned} \quad (23)$$

Where

C_i is cost of milk production for i^{th} enterprise in Birr

C_{cow} is price of cow per number in Birr

C_{labor} is wage of labor per day in Birr

$C_{cons feed}$ is price of concentrated feed per kilogram in Birr

$C_{uncons feed}$ is price of unconcentrated feed per kilogram in Birr

C_{land} is rental value of land per hectare in Birr

C_{med} price of vet medication per number in Birr

Y_{output} is total milk output in liter of the i^{th} enterprise

Table 4.6: Maximum likelihood estimates of cost

Variables	Parameters	Coefficient	Std. Err.
Ln(output)	Y_i	0.9959***	0.0588
Ln(price of cow)	β_1	0.0865***	0.0192
Ln(wage)	β_2	0.0857	0.5059
ln(price of concentrate feed)	β_3	0.0274*	0.0141
ln(price of unconcentrate feed)	β_4	0.0496	0.0575
Ln(rent of land)	β_5	0.452***	0.0493
Ln(price of medication)	β_6	0.0302	0.0585
Constant	β_0	0.6667	1.5740
Sigma-square	δ^2	0.2486	0.0243
Lambda	λ	0.0127	0.3511
Log likelihood function		-153.28	
Wald χ^2		596.71***	

Source: Author's survey data (2016/17)

Note: *, ***, shows significance at 10% and 1% probability level respectively.

4.2.1.3. Efficiency scores of dairy enterprises

According to the SFA model results, there exist efficiency differentials among the milk producing dairy enterprises in the study area. TE scores range from 13.78% to 91.06% with the mean of 60.18% (ranging from 14.80% to 90.15% with the mean 60.08% for micro level dairy enterprises and from 14.48% to 89.48% with the mean 58.79% for small level dairy enterprises). Such low efficiencies in production indicated potential for improvements in milk production given the current levels of productivity among the dairy enterprises (Table 4.7).

Table 4.7: Summary statistics of estimated TE of total sampled dairy enterprises

Types of sample	TE estimates of dairy enterprises			
	Maximum	Minimum	Mean	Standard deviation
Total sample enterprises	0.9106	0.1378	0.6018	0.1816
Micro level enterprises	0.9015	0.1480	0.6009	0.1778
Small level enterprises	0.8945	0.1448	0.5879	0.1822

Source: Author's survey data (2016/17)

The SFA model results indicated that the mean TE for total sampled dairy enterprises was 60.1% (60% for micro level dairy enterprises and 58.7% for small level dairy enterprises), indicating farm enterprises were producing 39.9% less (40% for micro level dairy enterprises and 41.3% for small level dairy enterprises) of the potential output given their prevailing level of technology and input use. Alternatively, the dairy enterprises could still produce their current output of milk with fewer inputs if they were more efficient. Under the assumption of constant returns to scale, the efficiency scores remain the same in both input orientation (input minimization) and output orientation (output maximization). Thus, if we had chosen to keep inputs constant and measure efficiency in output increasing direction the efficiency score is also indicating that outputs should be increased by 39.9% to become efficient (40% for micro level enterprises and 41.3% small level enterprises). The average TE was an indication that most of the dairy enterprises in the study area were still using their resources inefficiently in the production process and there still exists opportunities for rising their milk production by improving their current level of technical efficiency. Therefore, the result of this study on mean level of technical efficiency was comparable to other similar studies (Sajjad *et al.*, 2010; Alemdar *et al.*, 2010; Dlamini, 2012; Michalickova, 2013).

Table 4.8: Summary statistics of estimated AE of sampled dairy enterprises

Types of sample	AE estimates of dairy enterprises			
	Maximum	Minimum	Mean	Standard deviation
Total sampled enterprises	0.9381	0.1684	0.5992	0.1856
Micro level enterprises	0.9232	0.1830	0.6089	0.1743
Small level enterprises	0.9406	0.1843	0.6369	0.1900

Source: Author's survey data (2016/17)

The SFA model results showed that the mean AE for the total sampled dairy enterprises was 59.9% (60.8% for micro level dairy enterprises and 63.6% for small level dairy enterprises), indicating 40.1% increase (39.2% for micro level dairy enterprises and 36.4% for small level dairy enterprises) in output by using the right proportion of inputs given their prices. The combined effect of TE and AE shows that the mean EE of total sample dairy enterprises was 36.1% (it was 36.8% for micro level dairy enterprises and 37.3% for small level dairy enterprises). This result indicated that EE for the total sample dairy enterprises was 63.9% (63.2% for micro level dairy enterprises and 62.7% for small level dairy enterprises) increase in output by improving both TE and AE, with the existing level of inputs. Therefore, this result shows the existence of significant technical, allocative and economic inefficiencies in milk production among dairy enterprises in the study area. The result of this study were comparable with other similar studies (Alemdar *et al.*, 2010; Karoi *et al.*, 2010; Sajjad *et al.*, 2010; Dlamini, 2012; Michalickova, 2013; Masuku *et al.*, 2014; Mawa *et al.*, 2014).

Table 4.9: Summary statistics of estimated EE of sampled dairy enterprises

Types of sample	EE estimates of dairy enterprises			
	Maximum	Minimum	Mean	Standard deviation
Total sampled enterprises	0.7382	0.0647	0.3616	0.1628
Micro level enterprises	0.6654	0.0723	0.3688	0.1557
Small level enterprises	0.7179	0.0720	0.3734	0.1611

Source: Author's survey data (2016/17)

As summarized in Table 4.10, from the result of SFA model 39.62%, 41.98%, and 58.96%, of the total sampled dairy enterprises were operating below the overall mean level of TE, AE and EE scores (39.47%, 41.22% and 51.75% for micro level dairy enterprises and 43.87%, 37.75% and 53.06% for small level dairy enterprises scores respectively). This might imply that in the long run improving the existing levels of TE, AE and EE scores of dairy enterprises lead to significant increment in the level of milk output. However, as presented in Table 4.10, majority of the sampled dairy enterprises 60.38%, 58.02% and 41.04% were able to attain above the overall mean levels of TE, AE and EE scores respectively (60.53%, 58.78% and 48.25% for micro level enterprises and 56.13%, 62.25% and 46.94% for small level enterprises TE, AE and EE scores respectively).

Table 4.10: Frequency distribution of the range of TE, AE and EE

Range of efficiency scores and percentages									
Range of efficiency scores	Frequency of total sampled enterprises under			Frequency of micro level enterprises under			Frequency of small level enterprises under		
	TE	AE	EE	TE	AE	EE	TE	AE	EE
< 30	19	19	75	10	10	38	10	8	33
30-40	12	18	50	6	8	21	7	3	19
41-50	21	20	39	9	10	33	9	13	23
51-60	32	32	30	20	19	13	18	13	16
61-70	52	54	16	34	24	9	30	17	6
71-80	44	36	2	25	29	0	14	23	1
81-90	30	32	0	9	13	0	10	17	0
91-100	2	1	0	1	1	0	0	4	0

Source: Author's survey data (2016/17)

4.2.1.4. Estimation results of sources of inefficiency

Estimating the sources of inefficiency and its extent is very important for policy making to address the problems of dairy enterprises. In this regard, external, internal and enterprise specific and institutional variables were hypothesized to affect efficiency of dairy enterprises in the study area. Accordingly, the inefficiency model parameters were

estimated by OLS method estimation procedure. Before explaining the model, multicollinearity test was made and the mean VIFs were 2.01 and the maximum and minimum VIF was 5.89 and 1.07 for total sample dairy enterprises, whereas the mean VIFs were 2.21 and the maximum and minimum VIF was 6.93 and 1.17 for micro level dairy enterprises and the mean VIF was 2.41 and the maximum and minimum VIF was 8.04 and 1.16 for small level dairy enterprises respectively for all variables. This shows that there is no problem of multicollinearity in the data set for variables included in the model. The CC for dummy variables was also performed as indicated in appendix Table 1. As confirmed in Appendix Table 2, there is no omitted variable in the model. Furthermore, all the variables were tested for the problem of heteroskedasticity using the Breuch-Pagan test, and heteroskedasticity was not found (Appendix Table 3). In addition, a test for normality distribution was indicated by plots of residuals was made using Kernel density plot of residuals. The estimated graph resembles normally distributed curve which shows that the normality assumption is not violated (Figure 4.1).

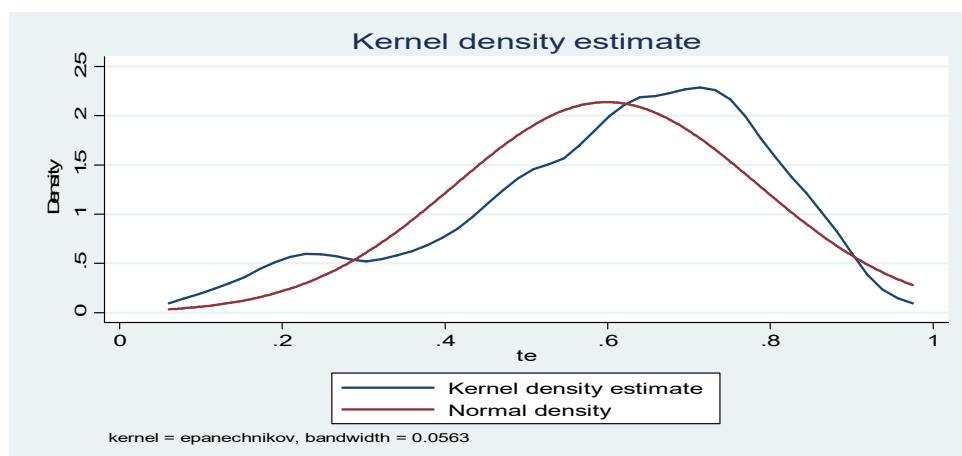


Figure 4.1: Kernel density plot residuals estimate

Source: Author's survey data (2016/17)

Table 4.11: Determinants of efficiencies score differentials among dairy enterprises

Variables	Total sample dairy enterprises			Micro level dairy enterprises			Small level dairy enterprises		
	TE	AE	EE	TE	AE	EE	TE	AE	EE
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Age	-0.022	-0.119	0.063	-0.086	-0.099	0.077	-0.015	0.019**	0.018
Education	0.019***	-0.108	0.289	0.029***	-0.218	0.016	0.023***	-0.020	0.038**
No. of employees	-0.086	0.025**	0.036**	-0.293	0.022*	0.125	-0.204	0.012**	0.017*
Initial capital	0.290	-0.190	-0.064	0.041	-0.006	0.005	0.051	-0.306	-0.042
Entrepreneur skill	0.090	0.144	-0.162	0.281	0.260	-0.131	0.240	0.030	-0.082
Experience	0.033**	0.027*	-0.095	0.393	-0.185	0.163	0.018**	0.016*	0.014**
Access to training	0.019**	-0.048	0.032*	0.013*	-0.123	0.026**	0.018*	-0.032	0.021*
Access to market	0.015***	0.016*	0.013***	0.058**	-0.061	0.070*	0.014**	-0.069	-0.014
Sex of manager	0.028*	-0.083	-0.189	0.201	0.021**	-0.265	0.193	0.298	0.018
Consultancy service	-0.177	-0.197	-0.254	-0.062	-0.067	-0.103	-0.113	0.085	-0.066
Access to premises	-0.345	0.284	-0.005	-0.018	0.194	-0.016	0.336	-0.106	-0.040
Access to infrastructure	0.065	-0.079	0.042	0.017	-0.085	0.149	-0.033	0.021	-0.131
Customer networks	-0.232	-0.170	-0.014	-0.037	0.066	-0.008	-0.375	-0.007	0.083
Access to credit	0.018***	-0.215	0.220	0.019***	-0.050	0.014*	0.015**	0.027**	0.023*

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

The result of the model showed that TE of total sampled enterprises was found to be significantly and positively influenced by education level of manager, experience of manager, access to training, access to market, sex of manager and access to credit at 1%, 5% and 10% significant levels. In the same manner micro level enterprises were influenced by education level of manager, access to training, access to market and access to credit were significantly and positively affect efficiency at 1%, 5% and 10% significance levels. The small level enterprises TE were also significantly and positively influenced by education level of manager, experience of manager, access to training, access to market and access to credit as indicated in Table 4.11 at 1%, 5% and 10% significance levels.

As indicated in Table 4.11 the AE of total sampled dairy enterprises as significantly and positively determined by number of employees, experience of manager and access to market at 5% and 10% significant levels. Further the AE of micro level enterprises were significantly and positively influenced by number of employees and sex of manager at 5% and 10% significant levels. Finally, the AE of small level enterprises were significantly and positively affected by age of enterprise, number of employees, experience of manager and access to credit as shown in Table 4.11 at 5% and 10% significance levels.

The result of the study confirms that the EE of total sampled dairy enterprises as significantly and positively determined by number of employee, access to training and access to market at 1%, 5% and 10% significance levels. Moreover, EE of micro level enterprises were also found to be significantly and positively influenced by access to training, access to market and access to credit at 1%, 5% and 10% significance levels. Furthermore, the EE of small level enterprises were significantly and positively affected by education level of manager, number of employee, experience of manager, access to training and access to credit at 5% and 10% significance levels (Table 4.11). The discussion about each of the significant variable is provided below.

Age of dairy enterprises (age): The coefficient estimated for age of dairy enterprises variable shows a positive and significant effect on AE of small level enterprises engaged in milk production implying that the older dairy enterprises are more allocatively efficient than new ones. A year increase in age of enterprises could bring an overall increase in the level of AE of small level enterprises by 1.93 percent. The result also supports the hypothesis that long stay in the dairy business has been found to be positive and

statistically significant on efficiency of enterprises which indicates that older dairy enterprises tend to have more efficiencies than younger ones. This could be due to the use of right proportion of inputs given their prices. As the age young, the dairy enterprises tend to be more risk averse and hesitate to adopt new technologies making the production process efficient. Pilar *et al.* (2018) obtained similar findings and concluded that younger dairy enterprises tend to be more conservative and less receptive to modern technologies. Another reason might be that dairy production is very strenuous giving older dairy enterprises advantageous than the younger dairy production dairy enterprises in the study area.

Education level of manager (Edu): The coefficient of the variable education level of manager was found to be positive and statistically significant at 1% probability level for total sampled dairy enterprises TE. This means the improvement in the level of education of the manager by one level then the TE of total sampled dairy enterprises increase in the level of TE by 1.9 percent. Similarly, it is found to be positive and statistically significant at 1% probability level for micro level dairy enterprises TE. This implies that an improvement in the level of education of the manager by one then the TE of micro level dairy enterprises increase in the level of TE by 2.9 percent. It is also found to be positive and statistically significant at 1% and 5% probability level for small level dairy enterprises TE and EE of the dairy enterprises respectively. From this an increase in the level of education of manager could bring an overall increase in the level of TE and EE of small level dairy enterprises increase in the level of TE and EE by 2.3 and 3.8 percents respectively. This finding might be due to the fact that higher education opens up higher opportunities for dairy enterprises manager and hence that creates higher incentives to pay much attention to improve the efficiency scores of the dairy enterprises. The finding of this study was confirmed with the finding of Masuku *et al.* (2014) obtained similar results and concluded that enterprises manager with higher education level are more likely to be rich in such opportunities and hence depend more on better methods for their enterprises to be efficient in their business that have acquired relatively more technical and managerial expertise on the job than lower level educated ones.

Number of employee (Emplo): The coefficient of number of employee was observed positive and statistically significant at 5% probability level for total sampled dairy enterprises AE and EE. This implies that an increment by one employee, then the AE and

EE of total sampled dairy enterprises increase in the level of AE and EE by 2.5 and 3.6 percents respectively. Similarly, it is found to be positive and statistically significant at 10% probability level for micro level dairy enterprises AE. This indicates that an increment by one employee, then the AE of micro level dairy enterprises increases in the level of AE by 2.2 percent. It is also found to be positive and statistically significant at 5% and 10% probability level for small level dairy enterprises AE and EE of the enterprises respectively. This implies that an increment by one employee, then the AE and EE of small level dairy enterprises increase in the level of AE and EE by 1.2 and 1.7 percents respectively. The positive sign of this inefficiency parameter establish the fact that efficiency of dairy enterprises increase with increase in number of employee with in the appropriate work load of the dairy enterprises. This may be due to the fact that increased number of employee means increasing available labor force for dairy production activities.

Experience of manager (Exp): The variable experience of manager may be defined as knowledge and skill gained by contact with facts and events with staying in the business for long period of time. By its nature, it is a product of the past and therefore limited to and controlled by previous exposures. Number of years a manager has spent in the dairy enterprises business may give an indication of practical knowledge he/she has acquired on how to cope with the inherent dairy farm production, processing and marketing problems leading to higher levels of efficiency scores. The coefficient of the variable experience of manager was found to be positive and statistically significant at 5% and 10% probability level for total sampled dairy enterprises TE and AE respectively. That implies the experienced manager performs better in in managing enterprise than non-experienced manager. Therefore, experience of manager increases the levels of TE and AE of total sampled dairy enterprises by 3.3 and 2.7 percents respectively. Similarly, it is found to be positive and statistically significant at 5%, 10% and 5% probability level for small level enterprises TE, AE and EE of the enterprises respectively. This indicates that experienced manager performs better in in managing enterprise than non- experienced manager. Thus, experience of manager increases the levels of TE, AE and EE of small level dairy enterprises by 1.8, 1.6 and 1.4 percents respectively. This indicates that there is increase in the level of efficiencies as the manager has experienced in the field of dairy enterprises business in the study area.

Access to training (Train): The dairy enterprises' which had sufficient access to training is expected to provide dairy enterprises with new information, technologies and demonstration of best practices on managerial, operational and financial issues to dairy enterprises build their capacity and encourage them very well to succeed in the business. It also improves both dairy enterprises' ability of choosing appropriate combination of inputs and ability of getting the maximum output from the inputs. The coefficient of access to training was observed positive and statistically significant at 5% and 10% probability level for total sampled dairy enterprises TE and EE. That implies enterprise operator who participated in training performs better in operational technical skills than non-participant. Thus, participation in training increases the levels of TE and EE of total sampled enterprises by 1.9 and 3.2 percents respectively. Similarly, it is found to be positive and statistically significant at 10% and 5% probability level for micro level enterprises TE and EE. This indicates that operator who participated in training performs better in operational technical skills than non-participant. Thus, participation in training increases the levels of TE and EE of micro level enterprises by 1.3 and 2.6 percents respectively. It is also found to be positive and statistically significant at 10% probability level for small level enterprises TE and EE of the enterprises in the study area. That means operator who participated in training performs better in operational technical skills than non-participant. Thus, participation in training increases the levels of TE and EE of small level enterprises by 1.8 and 2.1 percents respectively. That is the availability of access to training on different issues of the dairy enterprises increases the chance of dairy enterprises to have good TE and EE in their business. Similarly, Taciana *et al.* (2017) and Mawa *et al.*, 2014 found that the existence of sufficient training access in building the capacity of dairy enterprises provides them with high opportunity to have good TE and EE of enterprises.

Access to market (Mkt): Another factor worth considering, as a variable affecting efficiency was access to markets. The hypothesis in this study is that dairy enterprises needs different market accesses for their products insure the higher level of market access results the greater level of production efficiency. This might be due to the fact that as dairy enterprises which did not have sufficient market access, there would be limited access to input and output markets linkages and market information. The coefficient of access to market was observed positive and statistically significant at 1%, 10% and 1% probability level for total sampled dairy enterprises TE, AE and EE. Hence, access to alternative market access increases the levels of TE, AE and EE of total sampled enterprises by 1.5,

1.6 and 1.3 percents respectively. Similarly, it is found to be positive and statistically significant at 5% and 10% probability level for micro level dairy enterprises TE and EE. From this, access to alternative market access increases the levels of TE and EE of micro level dairy enterprises by 1.3 and 2.6 percents respectively. It is also found to be positive and statistically significant at 5% probability level for small level dairy enterprises TE of the enterprises. Thus, access to alternative market access increases the levels TE of small level dairy enterprises by 1.4 percent. The dairy enterprises which have sufficient market access for their product have better chance to increase the profitability opportunities of dairy enterprises with higher returns than dairy enterprises with limited access to market. Similar result was found in the work of (Mawa *et al.*, 2014), that dairy enterprises which have different market access were expected to have higher TE, AE and EE than those without alternative market accesses.

Sex of manager (Sex): The sex of manager coefficient measured as dummy variable with value of one for male and zero for female was found to be positive and statistically significant at 10% probability level for total sampled dairy enterprises TE. Based on this, male managed enterprises increase the level of total sampled dairy enterprises TE by 2.8 percent. Similarly, it is found to be positive and statistically significant at 5% probability level for micro level enterprises AE of the enterprises in the study area. From this, male managed enterprises increase the level of micro level enterprises AE by 2.1 percent. There were significant differences in efficiency scores among male-managed and female managed dairy enterprises. Male managed dairy enterprises were more likely to be efficient than female managed dairy enterprises. This is due to the fact that female managed dairy enterprises have additional responsibilities within their household. This suggests that dairy enterprises which are managed by females were less efficient than dairy enterprises managed by men which are found in the study area. The result of this study have similar conclusion with the finding of Enete and Amusa, 2010. They concluded that in many cases, as decision makers females were disproportionately imply their responsibility due to different attitudinal and home based activities made them busy even if they are loyal in their responsibility. They may therefore have acquired relatively more inefficient managerial expertise on the position than men.

Access to credit (Credit): The coefficient of the dummy variable for access to credit was found to be positive and statistically significant at 1% and probability level for total

sampled dairy enterprises TE. This indicates that access to credit is the solution for the shortage of capital which contributes to build better efficiency for enterprise in their business than non-accessed. Therefore, access to credit increases the level of total sampled dairy enterprises TE by 1.8 percent. It is also found to be positive and statistically significant at 1% and 10% probability level for micro level dairy enterprises TE and EE. This implies that access to credit is engine to motivate enterprise to produce more efficiently than non-accessed. Therefore, access to credit increases the level of micro level dairy enterprises TE and EE 1.9 and 1.4 percents respectively. Similarly, it is found to be positive and statistically significant at 5%, 5% and 10% probability level for small level dairy enterprises TE, AE and EE of the enterprises respectively. This means that access to credit is the monetary power to push enterprise to produce more effectively than non-accessed. Therefore, access to credit increases the level of small level enterprises TE, AE and EE 1.5, 2.7 and 2.3 percents respectively. The results indicate that dairy enterprises which have more access to credit had more efficient than those which had not sufficient access to credit in the study area.

4.2.2. Profitability Ratios of Dairy Enterprises

The profitability ratio analysis of 212 dairy enterprises showed that 142 (67%) of total sample dairy enterprises (73 (64%) for micro level and 69 (70%) for small level dairy enterprises) had profitability ratio greater than or equal to one, this implies that (67%) of total sample dairy enterprises, 64% of micro level and 70% of small level enterprises were performing well. Whereas, 70 (33%) of total sample dairy enterprises (41 (36%) for micro level and 29 (30%) for small level dairy enterprises) had profitability ratio less than one, which indicates that 33% of total sample dairy enterprises, 36% of micro level and 29% of small level dairy enterprises were performing in a bad/loss manner as indicated in Table 4.12. In a similar way key informants interview and focus group discussion agreed with the financial performance status of the dairy enterprises. As the key informants and focus group participants states that the poor financial performance of dairy enterprises was result of dairy enterprises related problems and stockholders problems includes; insufficient amount of initial capital, managerial incompetence, inadequate consultancy service, lack of premises and shortage of market access and customer networks for their products. As they discussed the profitability of dairy enterprises was not by chance, but by improving their financial performance through participating in different training to upgrade their skill,

resolved disputes by discussion, kept records of every transaction, did not withdraw investment capital rather convert part of profit to investment capital and sharing and implementation of best practices which fastens their vision of success.

Table 4.12: Profitability ratio analysis of dairy enterprises

	Total sample		Micro level		Small level	
Profitability ratio	Frequency	%	Frequency	%	Frequency	%
Greater than /equal to one	142	67	73	64	69	70
Less than one	70	33	41	36	29	30
Total	212	100	114	100	98	100

Source: Author's survey data (2016/17)

4.2.3. Factors Affecting the Financial Performance of Dairy enterprises

A multiple linear regression analysis was employed by using the profitability ratio as the dependent variable and age of dairy enterprises, educational level, number of employee, amount of initial capital, entrepreneurial skill, experience of manager, access to training, access to market, sex of manager, consultancy service, access to premises, access to infrastructure, customer network and access to credit as the independent variables. The result showed that about 73% of total sample dairy enterprises (75% for micro level and 71% for small level dairy enterprises) variation in profitability ratio was due to independent variables included in the model. The remaining 27% of total sample dairy enterprises (25% for micro level and 29% for small level dairy enterprises) variation in profitability ratio was explained by other variables not included in the model. Therefore, the model was the best fit model for the data (Table 4.13). From the independent variables included in the model age of dairy enterprise, amount of initial capital and access to training were statistically significant at less than 1% significance level; number of employees, experience of manager, access to market, consultancy service and access to credit were statistically significant at less than 5% significance level as hypothesized and educational level and entrepreneurial skill were also statistically significant at less than 10% significance level. All statistically significant explanatory variables found in the model had positive relationship with the financial performance of the dairy enterprises.

Table 4.13: Result of multiple liner regression analysis

Variables	Total sample dairy enterprises			Micro level dairy enterprises			Small level dairy enterprises		
	Coefficient	St. Error	P-value	Coefficient	St. Error	P-value	Coefficient	St. Error	P-value
Age	1.268***	0.146	0.000	2.076***	0.183	0.000	1.683***	0.109	0.000
Education	0.369*	0.273	0.060	0.399*	0.260	0.067	0.397*	0.286	0.053
No. of employee	0.033**	0.014	0.043	0.072**	0.027	0.036	0.087**	0.031	0.050
Initial capital	3.531***	0.415	0.000	3.838***	0.420	0.000	2.971***	0.410	0.000
Entrepreneur skill	0.785*	0.501	0.090	0.590*	0.487	0.082	0.790*	0.515	0.098
Experience	0.642**	0.280	0.027	0.624**	0.292	0.033	0.641**	0.268	0.021
Access to training	2.251***	0.204	0.000	1.944***	0.205	0.000	2.581***	0.203	0.000
Access to market	0.408**	0.173	0.031	0.385**	0.162	0.042	0.409**	0.164	0.020
Sex of manager	0.002	0.025	0.197	0.006	0.027	0.220	0.004	0.023	0.174
Consultancy service	0.098**	0.037	0.041	0.760**	0.340	0.048	0.935**	0.416	0.034
Access to premises	0.188	0.386	0.521	0.197	0.392	0.595	0.028	0.380	0.447
Access to infrastructure	0.030	0.103	0.400	0.078	0.113	0.410	0.019	0.093	0.390
Customer networks	0.015	0.056	0.643	0.028	0.067	0.776	0.021	0.045	0.510
Access to credit	0.029 **	0.013	0.032	0.037**	0.014	0.039	0.026**	0.012	0.025
Adjusted R ² = 0.732			Adjusted R ² = 0.754			Adjusted R ² = 0.710			

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

The variables which were statistically significant in the model to predict the financial performance of dairy enterprises were discussed as follows.

Age of the dairy enterprises (Age): The age of the dairy enterprise is statistically significant at less than 1% significance level and had a positive relationship with the financial performance of the dairy enterprise. An increase in the age of the dairy enterprise by one year increases the profitability ratio (financial performance) by 14.6% for total sample dairy enterprise (18.3% for micro level and 10.9% for small level dairy enterprises). Thus, long period existence of the dairy enterprises in the business improves the financial performances of dairy enterprises. This is in line with the result of Bonte *et al.* (2019) who found that new dairy enterprises' face great risk of survival in the business than older once.

Educational level of manger (Edu): The educational level attained by the dairy enterprises managers was statistically significant at less than 10% significance level had positive relationship with the financial performance of the dairy enterprises. The possible reason could be that higher educational level enhances the managers' capacity to easily understand the value and benefits of dairy enterprises while lower educational level of the managers understanding about dairy enterprises. A unit increase in the education level of managers increases the profitability ratio (financial performance) by 27.3% for total sample dairy enterprises (26% for micro level and 28.6% for small level enterprises). Kinyua (2014) in their study argued that managers with more education were more likely to be successful in the dairy enterprises sector. They also summarized that the managers with higher education level have greater chance of succeeding than those without education.

Number of employees (Emplo): The number of employees was statistically significant at less than 5% significance level as hypothesized and positively related with the financial performance of dairy enterprises. A unit increase in the number of employees in the dairy enterprises increases the profitability ratio (financial performance) by 2.9% for total sample dairy enterprises (2.7% for micro level and 3.1% for small level enterprises). This indicates that proper number of employees in the dairy enterprises with the work load and efficient use of working capacity of the operators in the dairy enterprises improves the financial performance of dairy enterprises. Similar results were found by Caroline and

Peter (2016) reported that proper number and match of employees in the dairy enterprises had a momentous and positive impact on the financial performance of dairy enterprises.

Amount of initial capital (Capt) The amount of initial capital of dairy enterprises during start-up of the business was statistically significant at less than 1% significance level and positively related with the financial performance of dairy enterprises. The coefficient of variable indicates that a unit increase in the amount of initial capital of the dairy enterprises increases the profitability ratio (financial performance) by 41.5% for total sample dairy enterprises (42% for micro level and 41% for small level dairy enterprises). Thus, sufficient amount of initial capital capacitates dairy enterprises to operate with full potential to run their business and hence facilitates good performing environment for the dairy enterprises to survive and continue in the business. Similarly, Marom and Lussier (2014) found that amount of initial capital of the dairy enterprises to start the business was highly related with the financial performance of the dairy enterprises and they were challenged to have sufficient amount of initial capital to run their business could not succeed and exist in the business. In the same manner, Mensah (2016) found that inadequacy and costly of credit facilities and sources, shortage of working capital and high investment in fixed assets during start-up period have higher influence on dairy enterprises financial performance.

Entrepreneurial skill (Skill): The entrepreneurial skill of the operators in the dairy enterprises was statistically significant at less than 10% significance level and had positive relationship with the financial performance of the dairy enterprises. Thus, dairy enterprises associated with effective and efficient entrepreneurs in performing successful skill have higher probability of having a good financial performance. Skilled operator is also one of the important determinants of a dairy enterprises financial performance, since of availability highly skilled employees is associated with higher employees' productivity which was improve financial performance of dairy enterprises (Hiebl, 2015). The appreciation and initiation of entrepreneurial skills of the operators by different trainings and best practice sharing is advantageous to promote the financial performance of the dairy enterprises. On the same way, Kinyua (2014) found that there were positive correlations among reactiveness and dairy enterprises operation with business financial performance. Effective entrepreneurship with skills and experiences was lead to a higher skill as well as competitiveness in the business financial performance of dairy enterprises.

Experience of the manager (Exp): The experience of the manager of the dairy enterprises was statistically significant at less than 5% significance level as hypothesized and had positive relationship with the financial performance of the dairy enterprises. This shows that dairy enterprises managed by experienced managers have higher probability of having good financial performance. This is in agreement with the finding of Berihu *et al.* (2014) who stated that when the managers have experience of being able to lead and champion the followers, the dairy enterprises have good financial performance and become successful in the business.

Access to training (Train): Access to training for the dairy enterprises in different aspects was statistically significant at less than 1% significance level and had positive relationship with the financial performance of the dairy enterprises. That is the availability of access to training on different issues of the dairy enterprises increases the chance of dairy enterprises to have good financial performance in their business. Similarly, ILO (2015) found that the existence of sufficient training access in building the capacity of dairy enterprises provides them with high opportunity to have good financial performance.

Access to market (Mkt): Access to market for the products of the dairy enterprises was statistically significant at less than 5% significance level as hypothesized and had positive relationship with the financial performance of the dairy enterprises. This indicates that dairy enterprises which have higher market access for their products have higher probability of having good financial performance in the business. In the same manner the finding of UNECE (2014) states that the decisive decision making of dairy enterprises good or bad financial performance is in the hand of market. So the existence of market access for the dairy enterprises products can improve the financial performance of dairy enterprises to exist in the business.

Consultancy service (Cons): The consultancy service was statistically significant at less than 5% significance level and had positive relationship with the financial performance of the total sample dairy enterprises. As indicated, dairy enterprises that have chance to get stakeholders' consultancy service have stand in better position in their financial performance. This could be due the fact that the consultancy service increment of the stockholders associated with experience, skill and knowledge development the dairy enterprises managers to manage the dairy enterprises activities successfully that leads them

to achieve the extended goals of establishment. According to the finding of Deksiso (2018) there is feasible existence of relationship between the consultancy service and the financial performance of dairy enterprises.

Access to credit (Credit): This variable was associated positively and significantly with the financial performance of dairy enterprises at less than 5% significance level as hypothesized. This shows that dairy enterprises which have the access to credit have higher probability of having good financial performance rather than those who did not have credit access. As dairy enterprises managers proves that, even if the credit access have significant impact on financial performance getting the access to credit was very difficult. The possible reason is that different financial institution that facilitates credit access needs collateral and asks past trend of using credit access from different financial institutions. Because of these cases number of dairy enterprises does not get the way to obtain financial credit access from different financial institutions that may improve their performance.

4.2.4. Impact Analysis of Dairy Enterprises

The impact of dairy enterprises on employment creation and income generation were evaluated by employing propensity score matching model. Prior to the matching exercise, members significantly differed from non-members in most characteristics. The process of matching thus creates a high degree of covariate balance between the members and non-members samples that were used in the estimation procedure. According to the results, the imbalance between the members and non-members samples in propensity score, reduced much below 10% after matching; and the no case was significantly different from zero ($P < 0.01$). This indicated that all differences in means between members and non-members had been removed through matching in the initial period (before member in dairy enterprises).

There are some important tasks to be carried out before conducting the matching exercise. First, we estimate predicted values of treatment participation (propensity score) for the entire sample household heads (both members and non-members). Second, a common support condition should be imposed on the propensity score distributions of member household heads and non-member household heads which helps to identify common support area for both members and non-members that their propensity score fall inside the

interval. Thirdly, discard observations whose predicted propensity scores fall outside the range of the common support region. Fourth, conducting a sensitivity analysis to check the robustness of the estimation (whether the hidden bias affects the estimated ATT or not).

As shown in Table 4.14, among members, the predicted propensity scores range from 0.0136 to 0.9644, with a mean of 0.6454. Among non-members, they range from 0.0007 to 0.8844, with a mean score of 0.1718. Thus, the common support assumption is satisfied in the region [0.0136 to 0.8844]. In other words, households whose estimated propensity scores are less than 0.0136 and larger than 0.8844 were not considered for the matching exercise. As a result of this restriction 16 member households were excluded from the analysis.

Table 4.14: Distribution of estimated propensity scores

Group	Observation	Mean	Std. Dev.	Min	Max
Total observation	385	0.3263	0.3231	0.0007	0.9644
Members	126	0.6454	0.2244	0.0136	0.9644
Non-members	259	0.1718	0.2396	0.0007	0.8844

Source: Author's survey data (2016/17)

Choice of matching algorithms: The choice of best matching estimator was conducted based on four different criteria as proposed by Dehejia and Wahba (2002). After obtaining the predicted values conditional on the observable covariates from logit estimation, matching was done using matching algorithm which is selected among the commonly used matching methods (kernel matching, nearest neighbour matching, calliper and radius matching) based on the best fit matching algorithm selection criteria: estimator which have low pseudo- R^2 , large matched sample size, large number of insignificant variables after matching and mean standard bias between three and five is preferable over others. Based on this suggestion nearest neighbour (4) matching algorithm is the best matching algorithm for the study. Thereafter, the estimation results and discussion are the direct outcomes of the nearest neighbor (4) matching algorithm (Table 4.15).

Table 4.15: Matching performance of different estimators

Matching estimator	Performance criteria			
	Pseudo-R ²	Matched sample size	Mean standard bias	Number of significant variables after matching
Kernel matching				
Band width of 0.1	0.031	369	6.0	0
Band width of 0.25	0.020	369	7.5	0
Band width of 0.5	0.054	369	14.0	0
Nearest neighbour matching				
Neighbour 1	0.037	369	8.1	1
Neighbour 2	0.031	369	9.4	1
Neighbour 3	0.018	369	6.0	0
Neighbour 4	0.013	369	5.0	0
Neighbour 5	0.017	369	6.2	0
Calliper matching				
Band width of 0.1	0.037	369	9.3	1
Band width of 0.25	0.037	369	9.3	1
Band width of 0.5	0.037	369	9.3	1
Radius matching				
Band width of 0.1	0.434	369	48.1	5
Band width of 0.25	0.434	369	48.1	5
Band width of 0.5	0.434	369	48.1	5

Source: Author's survey data (2016/17), nearest neighbour (4) matching was the best matching.

Balancing test for covariates: After selecting the best performing matching algorithm, the next task is to check the balancing test for covariates using different procedures by applying nearest neighbour (4) matching algorithm. The values of pseudo-R² and LR chi-square, before and after matching, can be used as indices for the fulfillment of the balancing requirement. A low pseudo-R² value shows that member households do not have much distinct characteristics overall and as such finding a good match between member and non-member households becomes simple. The low value of pseudo-R² and the

insignificant LR chi-square after matching supported the hypothesis that both groups have the same distribution in covariates after matching. This implies that we have found a comparable group of members with non-members on employment creation and income generation based on similar covariates. The main intention of estimating propensity score is to balance the distributions of relevant variables in both groups. The balancing powers of the estimations are ensured by following testing methods (Table 4.14).

Table 4.16: Balancing test for covariates

Variable	Sample	Mean		%bias	%reductionBias	t-test		V(T)/V(C)
		Member	Non-member			t	p>/t/	
Pscore	Unmatched	0.6454	0.6408	2.0		0.16	0.871	1.05
	Matched	0.6101	0.6079	0.9	74.6	0.07	0.941	0.99
AGE	Unmatched	5.7880	6.3480	-12.0		-0.95	0.344	0.88
	Matched	5.6405	6.5034	-18.4	-59.9	-1.33	0.185	0.74
EDU	Unmatched	2.4640	2.5360	-7.7		-0.59	0.553	1.30
	Matched	2.4775	2.4572	2.2	66.5	0.15	0.880	1.18
TLU	Unmatched	5.9760	6.0080	-1.0		-0.08	0.938	1.18
	Matched	6.0991	5.6734	13.2	44.2	1.00	0.317	1.35
OFAM	Unmatched	13730	13528	17.0		1.22	0.222	1.50
	Matched	13282	13169	5.5	86.7	0.44	0.661	0.79
FERTILITY	Unmatched	0.6960	0.6560	8.6		0.67	0.501	.
	Matched	0.7297	0.7432	-2.9	-40.2	-0.23	0.820	.
EXPRIENCE	Unmatched	2.1120	2.080	2.9		0.24	0.808	1.70
	Matched	2.1351	2.1712	-3.3	0.5	-0.25	0.802	.
TRAIN	Unmatched	0.7040	0.7760	-15.2		-1.30	0.196	.
	Matched	0.7027	0.7612	-12.4	90.3	-0.98	0.327	.
MKT	Unmatched	0.3120	0.368	-11.7		-0.93	0.352	.
	Matched	0.3243	0.2950	6.1	61.1	0.47	0.639	.
FAMSIZE	Unmatched	0.9440	0.9520	-2.1		-0.28	0.777	.
	Matched	0.9369	0.93243	1.2	81.8	0.14	0.893	.
SEX	Unmatched	0.2720	0.2080	15.6		1.18	0.238	.
	Matched	0.2432	0.2409	0.5	65.7	0.04	0.969	.
INFO	Unmatched	0.440	0.4960	-11.4		-0.89	0.377	.
	Matched	0.4234	0.4301	-1.4	27.3	-0.10	0.919	.
LANDHLD	Unmatched	0.8720	0.8160	13.2		1.22	0.224	.
	Matched	0.8558	0.8491	1.6	73.6	0.14	0.888	.
ASSO	Unmatched	0.9360	0.960	-7.2		-0.85	0.395	.
	Matched	0.9279	0.9301	-0.7	70.2	-0.07	0.948	.
CREDIT	Unmatched	0.560	0.4640	19.3		1.52	0.130	.
	Matched	0.5675	0.5450	4.5	80.0	0.34	0.737	.

Source: Author's survey data (2016/17)

The standardized bias before match and after match, the total bias reduction obtained by the matching procedure as shown at Table 4.16, Standardized difference in covariates before matching is in between of 1% and 19.3% in absolute value whereas the remaining standardized difference of covariates for almost all covariates lies between 0.5% and 18.4% after matching. This is fairly below the critical level of 20% suggested by Rosenbaum and Rubin (1985). Therefore, the process of matching creates a high degree of covariate balance between the member and non-member samples that are ready to use in the estimation procedure. The same to that, t-values also reveal that all of the covariates are balanced and become statistically insignificant, suggesting that matching helps to reduce the bias associated with observable characteristics.

These results indicate that the matching procedure is able to balance the characteristics in the treated (members) and the matched untreated (non-members) groups. Hence, these results can be used to assess the impact of dairy enterprises on employment creation and income generation. This enables researcher to compare observed outcomes for treatments (members) with those of an untreated (non-members) groups sharing a common support region.

4.2.4.1. Impact of dairy enterprises on employment creation

The results of the nearest neighbour (4) matching algorithm confirm that there were difference between member and the non-member household's in terms of total annual employment created by households in number. A comparative analysis shows that member households were better than non-member households by creating employment opportunities for about 4 persons annually (i.e. 33.98% higher than non-member households) and this gain was statistically significant at 1% probability level. In this case, the mean employment created by the member households was about 6 persons annually and that of the non-member households was about 2 persons annually. These results confirm that membership in dairy enterprises increased the employment creation of the households, which is the good remedy for number of jobless individuals in the study area (Table 4.17).

4.2.4.2. Impact of dairy enterprises on income generation

According to the best matching algorithm estimates [i.e. nearest neighbor (4) matching algorithm] showed that being member in dairy enterprises had a positive and significant impact on of household's total annual income in Birr (Table 4.17). As the result indicated that the impact of being member in dairy enterprises was significant at 1%. As expressed below in Table 4.17, the mean household's total income was about Birr 18,302.00 for member household's, while the corresponding figure for the non-member household's was Birr 5,962.00 and the average income difference between member and non-member households were Birr 12,339.00. It implies that the total annual income of the member household's was almost 32.57% higher than that of total annual income of the non-member household's. The results indicate that membership in dairy enterprises increased the total annual income of the household's, which is the god source of income for the household's to carve the problem of income scarcity.

Table 4.17: Average treatment effect on treated

Variable	Sample	Member	Non-member	Difference	SE	t-value
Employment creation	ATT	6.1441	2.0878	4.0563	0.3060	13.26***
Income generation	ATT	18,302	5,962	12,339	1,444	8.54 **

Source: Author's survey data (2016/17)

4.2.5. Sensitivity Analysis

In non-experimental data, it should be clear that matching estimators are not robust against hidden biases. It was important to test the robustness of results to departures from the unobserved factors. Since it was not possible to estimate the magnitude of selection bias with non-experimental data, the problem can be addressed by sensitivity analysis. Therefore, sensitivity analysis were carried out to check quality of comparison matching among member and non-member group with observed covariates and mainly to check robustness for unobserved covariates. The result showed that membership in dairy enterprises had a significant and positive impact on employment creation and income

generation and the ATT estimate result were found to be insensitive to unobserved selection bias. In case the CIA fails in PSM it can be easily solved the pitfall using the comparison between the simulated and baseline ATTs estimates. Thus, for any given configuration of the parameters P_{ij} , the sensitivity analysis retrieves a point estimate of the ATT which is robust to the failure of the CIA implied by that particular configuration. Using a given set of values of the sensitivity parameters, the matching estimation is repeated many times and a simulated estimate of the ATT is retrieved as an average of the ATTs over the distribution of U . It is associated with a large outcome effects ($\Gamma > 1$) and selection effects ($\Lambda > 1$) for the nearest neighbour (4) matching algorithms, the overall simulated ATTs of each member of dairy enterprises are still too much closer to the baseline ATTs. Hence, both the values of outcome effect and selection effects are larger than unity each, and also the difference in percentage between the baseline ATTs and simulated ATTs are below 10% make it stronger in the credibility of our estimated ATTs as well. The simulated ATT of each of the employment creation and income generation are too close to the baseline estimate. Obviously, this implies that it is only when U is simulated to provide incredibly large outcome effect; the ATT can be driven far from the baseline estimates or even closer to zero. Thus, we can conclude that our impact estimates ATT are insensitive to unobserved selection bias and are a pure effect of membership in dairy enterprises. On the whole, all the results estimated support and strengthen the robustness of the matching analysis is the reliable conclusion.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

This study was undertaken to evaluate the production efficiency, financial performance and impact of dairy enterprises on employment creation and income generation in Hadiya Zone, Ethiopia. For this end, the study examined relevant literature, the national enterprise development strategy and programs and carried out the study to attain the intended objectives. The study was mainly based on the primary data which were collected from sampled 212 dairy enterprises for production efficiency estimation and financial performance measure at enterprises level and 385 household heads from members and non-members groups for impact evaluation of dairy enterprises on employment creation and income generation that were randomly drawn from Hadiya zone three *Weredas* and six *Kebeles* through multi-stage sampling technique. The secondary data were also obtained from published and unpublished annual reports and other relevant organization documents to support the primary data and describe the study area.

Descriptive statistics and econometric models were used to analyze the data. The econometric models including stochastic frontier model, profitability ratio analysis, multiple linear regression model and propensity score matching analytical techniques were employed. The descriptive analyses of the study provided outline of issues related to the socioeconomic and institutional characteristics of sample farm households. Moreover, indicators of farm technology adoption and its technical efficiency were also discussed using descriptive statistics.

Considering the demographic characteristics, the results of this study showed that out of 385 total sampled household heads 126 (32.5%) were members and 259 (67.5%) non-members in dairy enterprises in the study area. From total sampled household heads, the majority of them were male-headed (with nearly 76%); for two groups, the corresponding figures are 87% and 71% for members and non-members respectively. And the mean age of sampled household heads were 32 years with a minimum of 25 years and a maximum of 61 years. The mean age of the member household heads was about 31 years, whereas, that of the non-members was 34 years.

From the total inputs allocated for milk production, unconcentrated feed and veterinary medicine turned out to be insignificant. But cow, concentrated feed, labor and land were significant. The elasticity of labor and cow are very high implying that these have more effect in determining the output level at the best practice (the maximum technical efficiency scores). The positive coefficients of inputs indicate a 1% increase in cow, concentrated feed, labor and land yields 34.54%, 13.25%, 47.49%, 15.28% increments on milk output respectively. Therefore, they are very important variables in shifting the frontier output to the right. This indicates that at each and every unit of these variables there is the possibility to increase in the level of output.

According to the SFA model results, there exists a difference in efficiency scores among the milk producing dairy enterprises in the study area. TE scores range from 13.78% to 91.06% with the mean 60.18%. Such low efficiencies in production indicated potential for improvements in milk production given the current levels of productivity among the dairy enterprises. This suggests that dairy enterprises were not operating at the possibility production frontier and there is a considerable potential to increase the productivity of milk with the present inputs available to milk producing dairy enterprises. The SFA model results showed that the mean AE of dairy enterprises was 59.9%. It indicates that the AE of dairy enterprises was revealed 40.1% increase in output by using right proportion of inputs given their prices. The combined effect of TE and AE shows that the mean EE of dairy enterprises was 36.1% in the study area.

Currently, there is an increased recognition of the important role played by dairy enterprises in the economic development of a country. The impact of dairy enterprises in employment creation and income generation is increasingly recognized and has become a major playing field for policy makers and donors with dual objective of enhancing growth and alleviating poverty. However, their financial performances to realize the intended goals are not as expected due to variety of factors which hinder their activities in the business. The good performance of micro enterprises in their filled of business was the result of generation of higher profit from their business than costs incurred. According to the result obtained from profitability ratio analysis 142 (67%) of dairy enterprises found in the study area profitable whereas 70 (33%) were incurred loss. As the findings of this study showed, 33% of the dairy enterprises included in this study had bad financial performance

when their financial performance were measured based on profitability ratio values of the them.

This is because there are a number of constraints identified by this study which hinder the financial performance of dairy enterprises in the study area. The result of multiple liner regression analysis showed that from the independent variables included in the model age of dairy enterprises, amount of initial capital and access to training were statistically significant at less than 1% significance level; number of employee, experience of manager, access to market, access to premises and access to credit were statistically significant at less than 5% significance level as hypothesized and educational level and entrepreneurial skill were also statistically significant at less than 10% significance level. All statistically significant explanatory variables found in the model had positive relationship with the financial performance of the dairy enterprises.

The results of the nearest neighbor (4) matching algorithm confirm that there were difference between member and the non-member household's in terms of total annual employment created by households in number. As the result indicated that the impact of membership in dairy enterprises was significant at 1% probability level. The result revealed that the membership resulted in average increment of household's annual employment creation by about 4 persons and income generation by Birr 12,339.00. The result showed that membership in dairy enterprises had a significant and positive impact on employment creation and income generation. The impact estimates were found to be insensitive to unobserved selection bias. It is, therefore, essential to expand and strengthen development of dairy enterprises and the membership of households in dairy enterprises to increase employment creation and income generation of members.

5.2. Conclusion and Recommendations

Based on the finding of this study, high inefficiency and weak optimal use of dairy farm inputs were the most important problems to the study area which needs appropriate policy intervention to address these problems. Therefore, the results of this study give information to policy makers on how to improve the technical efficiency of dairy enterprises, their optimal use of resources to become efficient in their business which helps them to achieve

good financial performance beyond their cost incur conditions which ensures the positive impact of dairy enterprises in employment creation and income generation in the study area.

The SPF result revealed that from the inputs allocated for the production of milk, number of cow, quantity of concentrated feed, labor and land were appeared to be positively and significantly influencing milk production. But, unconcentrated feed and veterinary medicine was statistically insignificant in the production process of milk. Given unconcentrated feed and veterinary medicine were important production input in the study area, the insignificance of the estimated coefficients for unconcentrated feed and veterinary medicine which imply that use of these inputs has no significant effect on productivity was contrary to the expectation. The results showed that dairy enterprises were operating in the stage one of production function that is one percent increase in the level of input use; increases the output by more than one percent (increasing returns to scale) and dairy enterprises have opportunities to increase output by improving their efficiencies. Therefore dairy enterprises should increase the level of inputs used up to the point where the constant return to scale (optimization) was achieved. So dairy enterprises should have to maximize their efficiency scores level because, they should have to be successful to transform their enterprises from the micro and small level to medium and large enterprises in the long run.

The major determinants of efficiency differentials among dairy enterprises which are estimated in the model showed that, TE of dairy enterprises was found to be statistically and significantly influenced by education level, experience of manager, access to training, access to market, sex of manger and access to credit at different significant levels. Moreover, the AE of dairy enterprises were statistically and significantly determined by number of employees, experience of manager and access to market in the study area at different levels of significance. Furthermore, the result of the study confirms that the EE of dairy enterprises were statistically and significantly determined by number of employees, access to training and access to market at different levels of significance. This indicates that there was the existence of technical, allocative and economic inefficiencies between dairy enterprises that indicates there is a room for improvement inefficiency even at the existing level of inputs by using right proportion of inputs given their prices if policy measures are taken.

As the findings of this study showed, almost 33% of the sampled dairy enterprises had bad financial performance when their financial performance were measured. There are a number of constraints identified by this study which hinder the financial performance of dairy enterprises. These included: low age of dairy enterprises stay in the business, small amount of initial capital, limited access to training, inadequate number of employees, low experience of managers in the overall managerial activity, insufficient access of market, premises, credit, low education and skill levels of managers which leads them to best succeed in the business. To tackle the above mentioned challenges and to improve the financial performance of dairy enterprises, government and all other concerned bodies should give crucial attention and financial institutions should provide sufficient loan prepared on the business plan of dairy enterprises with effective and efficient repayment rate.

The financial institutions should establish suitable alternative systems of saving with attractive interest rate to invite dairy enterprises to follow the principle of save to invest in near future. Administrative bodies should give high emphasis to facilitate basic requirement to promote start-up and expansion of dairy enterprises which brings high job creation and sustainability of dairy enterprises in the business. Dairy enterprises should take different trainings to initiate and upgrade their capacity and managerial skills. They should arrange the number of employees in the dairy enterprises according to the size and proper work load in the enterprises. Even if the majority of dairy enterprises found in the study area currently survived and run their business, the survival status of the dairy enterprises is the primary and necessary condition to exist in the business, but it is not sufficient and satisfactory condition to transform them into highly industrialized dairy enterprises. High level of financial performance builds the capacity of dairy enterprises to attain the intended goals of tangible reduction of unemployment and poverty reduction. Therefore, concerned government authorities should strengthen their efforts in continuous follow ups and backstopping of dairy enterprises.

Based on the result of PSM, one can assure that membership in dairy enterprises has a positive significant impact on employment creation and income generation. To reduce the alarming rate of unemployment and shortage of income, dairy enterprises play uncountable and visible roles on the likelihood of the societies. It is, therefore, essential to expand and strengthen households' membership in dairy enterprises by giving special attention to the

major problems that member households are currently facing. To create efficient enterprises in their production and good in their financial performance, government and stakeholders should capacitate them through adequate follow-up and proper support so that they become best source of employment creation and income generation for the society in the study area.

The overall results imply that the major improvements related to dairy enterprises' production efficiency and financial performance as well as their impacts on employment creation and income generation would require attention on the identified significant factors. Generally, there is no single policy and strategy that can be recommended to improve the production efficiency and financial performance of dairy enterprises as well as their impact on employment creation and income generation. Hence, the findings of this study recommend the need for implementing different policies and strategies that separately target and address the dairy enterprises' production efficiency and financial performance as well as their impact on employment creation and income generation.

The results of this study confirmed that, if dairy enterprises are efficient in their production and have good financial performance they have also positive impact on employment creation and income generation of member households. Thus, further researches are required on the impact of membership in dairy enterprises on some common economic variables like, saving promotion, asset building, income inequality reduction, import substitution and innovation etc. to provide strong policy recommendations.

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7. APPENDICES

Appendix 1: Appendix Tables

Appendix Table 1: Multicollinearity test of determinants of efficiency and performance

Total sampled dairy enterprises		
Variable	VIF	1/VIF
Emplo	6.93	0.144199
Age	6.68	0.149756
Edu	1.90	0.526876
Capt	1.39	0.717786
Mean VIF	2.21	
Micro level dairy enterprises		
Emplo	8.04	0.124350
Age	7.67	0.130440
Edu	1.83	0.545559
Capt	1.53	0.655524
Mean VIF	2.41	
Small level dairy enterprises		
Emplo	5.86	0.170790
Age	5.78	0.173023
Edu	2.10	0.477031
Capt	1.19	0.841984
Mean VIF	2.01	

Total sampled dairy enterprises										
Variable	Skill	Exp	Train	Mkt	Cons	Sex	Infra	Prem	Netw	Credit
Skill	1.00									
Exp	0.03	1.00								
Train	0.06	0.32	1.00							
Mkt	0.02	0.32	0.26	1.00						
Cons	0.07	0.04	0.47	0.03	1.00					
Sex	0.23	0.11	0.06	0.17	0.04	1.00				
Infra	0.09	0.11	0.15	0.22	0.03	0.17	1.00			
Prem	0.01	0.04	0.19	0.14	0.30	0.04	0.02	1.00		
Netw	0.01	0.08	0.02	0.10	0.28	0.08	0.00	0.12	1.00	
Credit	0.04	0.24	0.17	0.17	0.00	0.06	0.06	0.02	0.08	1.00
Micro level dairy enterprises										
Skill	1.00									
Exp	0.01	1.00								
Train	0.07	0.25	1.00							
Mkt	0.038	0.29	0.30	1.00						
Cons	0.01	0.01	0.43	0.05	1.00					
Sex	0.15	0.05	0.10	0.10	0.09	1.00				
Infra	0.00	0.25	0.21	0.20	0.03	0.05	1.00			
Prem	0.01	0.04	0.10	0.20	0.29	0.01	0.03	1.00		
Netw	0.06	0.11	0.03	0.14	0.23	0.11	0.02	0.20	1.00	
Credit	0.05	0.20	0.23	0.10	0.09	0.12	0.14	0.09	0.04	1.00
Small level dairy enterprises										
Skill	1.00									
Exp	0.03	1.00								
Train	0.06	0.32	1.00							
Mkt	0.02	0.32	0.26	1.00						
Cons	0.07	0.04	0.47	0.03	1.00					
Sex	0.23	0.11	0.06	0.17	0.04	1.00				
Infra	0.09	0.11	0.15	0.22	0.03	0.17	1.00			
Prem	0.01	0.04	0.19	0.14	0.30	0.04	0.02	1.00		
Netw	0.01	0.08	0.02	0.10	0.28	0.08	0.00	0.12	1.00	
Credit	0.04	0.24	0.17	0.17	0.00	0.06	0.06	0.02	0.08	1.00

Appendix Table 2: Heteroskedasticity test

Breusch-Pagan /Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values	
Total sampled dairy enterprises	
chi2(1)	2.31
Prob > chi2	0.1282
Micro level dairy enterprises	
chi2(1)	0.91
Prob > chi2	0.3391
Small level dairy enterprises	
chi2(1)	12.70
Prob > chi2	0.0004

Appendix Table 3:Omitted variable test

Ramsey RESET test using powers of the fitted values of ee	
Ho: model has no omitted variables	
Total sampled dairy enterprises	
F(3, 95)	9.57
Prob > F	0.0000
Micro level dairy enterprises	
F(3, 79)	7.93
Prob > F	0.0001
Small level dairy enterprises	
F(3, 193)	6.42
Prob > F	0.0004

Table 4: Descriptive statistics of output and production inputs

Output/input	Descriptive statistics											
	Total sample dairy enterprises				Micro level dairy enterprises				Small level dairy enterprises			
	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Milk (liter)	15010.9	11589.2	2737	54750	14763.5	12018.8	2737.5	54057	16064.48	12523.5	3431	54750
No. of milking cows	6.24	1.81	3	18	6.26	1.80	3	9	6.49	1.86	3	18
Labor (man day)	8.7	4.5	5	30	8.58	4.29	5	30	8.66	4.65	5	30
Concentrated feed (kg)	199.4	280	50	1800	220.5	295	50	1800	228.9	309	50	1800
Unconcentrated feed (kg)	497.6	724	328	10500	571.2	966	328	7500	588.9	1038	108	10500
Land size (ha)	0.39	0.06	0.27	0.60	0.41	0.06	0.30	0.60	0.41	0.06	0.30	0.60
Vet medicine (Money)	1.8	0.87	0.50	6.30	1.96	0.94	0.50	6.3	2.02	0.96	0.50	6.30

Source: Author's survey data (2016/17)

Table 5: Descriptive statistics of sample enterprises

Variables	Descriptive statistics											
	Total sample dairy enterprises				Micro level dairy enterprises				Small level dairy enterprises			
	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Age of enterprises	7.45	4.52	1	13	4.27	4.14	1	9	8.45	5.53	1	13
Number of employees	8.7	4.5	5	30	8.58	4.29	5	30	8.66	4.65	5	30
Amount of initial capital	150341	124700	50000	250000	75271	4550	50000	100000	175000	50235	100000	250000
Experience of managers	7.64	4.26	1	13	4.98	4.54	1	9	7.64	5.13	1	13

Source: Author's survey data (2016/17)

Appendix Table 6: Maximum likelihood estimate of SPF model for sample enterprises

Variables	Parameters	Total sample dairy enterprises		Micro level dairy enterprises		Small level dairy enterprises	
		Coeff	Std. Err.	Coeff	Std. Err.	Coeff	Std. Err.
Constant	β_0	1.2099	2.1908	2.2890	3.1123	2.8546	3.7466
Ln(cow)	β_1	0.3454*	0.1798	0.4598*	0.4299	0.3621*	0.2722
Ln(unconce)	B2	0.1814	0.2530	0.3102	0.3980	0.2323	0.4383
Ln(conce)	B3	0.1325***	0.0189	0.0845***	0.0248	0.0889***	0.0219
Ln(labor)	B4	0.4749***	0.0271	0.0993***	0.0278	0.0743***	0.0127
Ln(vet)	B5	0.3399	0.7269	0.2559	1.0994	0.3232	1.2869
Ln(land)	B6	0.1528**	0.0707	0.2566**	0.1017	0.2766**	0.1198
Sigma-square	δ^2	0.6795***		0.7011***		0.7639***	
Gamma	γ	0.8541		83.63		0.84	
Lambda	λ	2.4208***		2.26***		2.2933***	
Log likelihood		-170.74		-95.41		-85.92	
Returns to scale		1.6269		1.4163		1.4574	

Source: Author's survey data (2016/17)

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Appendix Table 7: Efficiency scores summary of sample dairy enterprises

Ent ID	TE	AE	EE	Ent ID	TE	AE	EE
1	0.214329	0.216472	0.215415	31	0.582594	0.446107	0.443922
2	0.648466	0.65495	0.651745	32	0.44169	0.737213	0.733606
3	0.451074	0.455584	0.453342	33	0.729914	0.692959	0.68957
4	0.791033	0.798943	0.79501	34	0.686098	0.558744	0.55601
5	0.559898	0.565497	0.562712	35	0.553212	0.859321	0.855155
6	0.792683	0.80061	0.796675	36	0.850813	0.452344	0.450121
7	0.901357	0.91037	0.905888	37	0.447865	0.687222	0.683864
8	0.258745	0.261332	0.260064	38	0.680418	0.731611	0.728037
9	0.644549	0.650995	0.647795	39	0.724367	0.379491	0.377637
10	0.836256	0.844619	0.840474	40	0.375734	0.710736	0.707249
11	0.28667	0.289537	0.288118	41	0.703699	0.274805	0.27346
12	0.24083	0.243239	0.242047	42	0.272084	0.703612	0.700158
13	0.2464	0.248864	0.247641	43	0.696645	0.142282	0.141589
14	0.674714	0.681461	0.678117	44	0.140873	0.67665	0.673337
15	0.338186	0.341568	0.339889	45	0.669951	0.517743	0.515215
16	0.644425	0.650869	0.647659	46	0.512617	0.702964	0.699538
17	0.795367	0.80332	0.799359	47	0.696004	0.796412	0.792521
18	0.494687	0.499634	0.497187	48	0.788527	0.731005	0.727457
19	0.807488	0.815563	0.811543	49	0.723767	0.723042	0.719515
20	0.787567	0.795443	0.791524	50	0.715883	0.368003	0.366233
21	0.41447	0.418615	0.416546	51	0.364359	0.810332	0.806356
22	0.811983	0.820102	0.816055	52	0.802309	0.139217	0.138537
23	0.506936	0.512006	0.509481	53	0.137838	0.319566	0.318004
24	0.695972	0.702932	0.699454	54	0.316402	0.706231	0.702836
25	0.812696	0.820823	0.816767	55	0.699239	0.655742	0.652542
26	0.55886	0.564449	0.561675	56	0.64925	0.611074	0.608086
27	0.582594	0.58842	0.585509	57	0.605024	0.807297	0.803354
28	0.799304	0.68544	0.682104	58	0.331411	0.334725	0.73677
29	0.678654	0.583198	0.580351	59	0.733015	0.740345	0.733634
30	0.577423	0.583198	0.757691	60	0.729907	0.737206	0.534207

Ent ID	TE	AE	EE	Ent ID	TE	AE	EE
61	0.753858	0.761396	0.439126	93	0.531499	0.536814	0.899961
62	0.436905	0.441274	0.741668	94	0.895373	0.904327	0.547766
63	0.737921	0.7453	0.594841	95	0.544991	0.550441	0.788271
64	0.591843	0.597761	0.41556	96	0.784284	0.792127	0.625512
65	0.41346	0.417595	0.40393	97	0.622346	0.628569	0.651091
66	0.401893	0.405912	0.450636	98	0.647806	0.654284	0.798303
67	0.448363	0.452846	0.832838	99	0.794255	0.802197	0.307011
68	0.828612	0.836898	0.670209	100	0.305458	0.308512	0.648654
69	0.666778	0.673446	0.875203	101	0.645372	0.651825	0.615225
70	0.870779	0.879487	0.179204	102	0.612118	0.618239	0.649767
71	0.178298	0.180081	0.915264	103	0.646482	0.652947	0.513334
72	0.910622	0.919728	0.793563	104	0.510735	0.515842	0.675312
73	0.789558	0.797454	0.526039	105	0.671878	0.678597	0.305915
74	0.523372	0.528605	0.606614	106	0.304364	0.307407	0.835339
75	0.603567	0.609602	0.412813	107	0.831115	0.839426	0.181155
76	0.41072	0.414827	0.466334	108	0.180238	0.18204	0.584226
77	0.463978	0.468618	0.627899	109	0.581262	0.587075	0.176435
78	0.624709	0.630956	0.68764	110	0.175542	0.177297	0.707113
79	0.68415	0.690992	0.781861	111	0.703532	0.710567	0.478993
80	0.777867	0.785645	0.675605	112	0.476568	0.481334	0.430515
81	0.672187	0.678909	0.266665	113	0.42833	0.432613	0.876252
82	0.265316	0.26797	0.720956	114	0.871815	0.880533	0.583688
83	0.717291	0.724464	0.250781	115	0.580742	0.586549	0.655425
84	0.249517	0.252012	0.765523	116	0.652102	0.658623	0.70044
85	0.761658	0.769275	0.850195	117	0.696902	0.703871	0.838457
86	0.845898	0.854357	0.333098	118	0.834227	0.842569	0.319409
87	0.31779	0.320967	0.82465	119	0.463906	0.468545	0.550659
88	0.820478	0.828682	0.274206	120	0.547866	0.553345	0.497002
89	0.272809	0.275537	0.4874	121	0.494487	0.499431	0.544635
90	0.484926	0.489775	0.584125	122	0.541874	0.547293	0.520262
91	0.581171	0.586982	0.664891	123	0.517627	0.522803	0.424328
92	0.661532	0.668148	0.301954	124	0.422175	0.426397	0.769304

Ent ID	TE	AE	EE	Ent ID	TE	AE	EE
125	0.300428	0.303432	0.274907	157	0.765403	0.773057	0.725111
126	0.273522	0.276258	0.641359	158	0.721427	0.728641	0.680187
127	0.638106	0.644487	0.886844	159	0.676737	0.683505	0.710701
128	0.882353	0.891176	0.533279	160	0.707103	0.714174	0.715317
129	0.530572	0.535878	0.624622	161	0.7117	0.718816	0.51408
130	0.621459	0.627674	0.638758	162	0.511485	0.5166	0.787374
131	0.635521	0.641876	0.642953	163	0.783382	0.791216	0.682739
132	0.639697	0.646093	0.304001	164	0.679277	0.686069	0.463547
133	0.30246	0.305484	0.729938	165	0.461196	0.465808	0.654846
134	0.72624	0.733503	0.782103	166	0.651537	0.658052	0.587848
135	0.778134	0.785915	0.614614	167	0.58487	0.590718	0.503483
136	0.6115	0.617615	0.524133	168	0.500933	0.505942	0.688631
137	0.521474	0.526689	0.631753	169	0.68514	0.691992	0.434302
138	0.628545	0.634831	0.465708	170	0.432096	0.436417	0.840809
139	0.463348	0.467981	0.655262	171	0.836529	0.844894	0.177691
140	0.651937	0.658457	0.64849	172	0.176792	0.17856	0.7095
141	0.645205	0.651657	0.780377	173	0.705902	0.712961	0.441424
142	0.776418	0.784182	0.815757	174	0.439192	0.443584	0.487115
143	0.81162	0.819736	0.250264	175	0.484651	0.489498	0.680051
144	0.248997	0.251487	0.622876	176	0.676598	0.683364	0.150987
145	0.619713	0.62591	0.693128	177	0.15022	0.151722	0.806286
146	0.689627	0.696523	0.595102	178	0.802209	0.810231	0.601472
147	0.592094	0.598014	0.466268	179	0.598424	0.604408	0.540882
148	0.538136	0.543517	0.456607	180	0.633935	0.640274	0.767974
149	0.454292	0.458835	0.600028	181	0.764056	0.771696	0.674299
150	0.596981	0.602951	0.712546	182	0.670873	0.677581	0.815684
151	0.708929	0.716018	0.664616	183	0.81162	0.819736	0.599135
152	0.661222	0.667835	0.698658	184	0.596089	0.60205	0.805486
153	0.695107	0.702058	0.71688	185	0.801384	0.809398	0.674985
154	0.71324	0.720373	0.799638	186	0.67156	0.678275	0.578799
155	0.795569	0.803524	0.75692	187	0.575851	0.671559	0.668312
156	0.753072	0.760603	0.81493	188	0.66491	0.600792	0.597877

Ent ID	TE	AE	EE	Ent ID	TE	AE	EE
189	0.810773	0.818881	0.758396	209	0.594843	0.344883	0.343215
190	0.754536	0.762082	0.715191	210	0.341468	0.503218	0.500787
191	0.711558	0.718673	0.558794	211	0.498236	0.691147	0.687807
192	0.55595	0.561509	0.799146	212	0.684304	0.77587	0.77213
193	0.79507	0.80302	0.752138	Mean	0.6018	0.5992	0.3616
194	0.748315	0.755798	0.780227				
195	0.776265	0.784028	0.713947				
196	0.710329	0.717432	0.595603				
197	0.592573	0.598499	0.742248				
198	0.738471	0.745856	0.550861				
199	0.548064	0.553545	0.516293				
200	0.513671	0.518808	0.799075				
201	0.795012	0.802962	0.739245				
202	0.735479	0.742833	0.282664				
203	0.281207	0.284019	0.619848				
204	0.616693	0.62286	0.821868				
205	0.817688	0.825864	0.56276				
206	0.559898	0.565497	0.798287				
207	0.794213	0.802155	0.498111				
208	0.49558	0.500536	0.637183				

Appendix Table 8: Determinants of efficiencies differentials of total sample enterprises

Total sample dairy enterprises			
	TE	AE	EE
Variable	Coefficients	Coefficients	Coefficients
Age	-0.022	-0.119	0.063
Education	0.019***	-0.108	0.289
No. of employees	-0.086	0.025**	0.036**
Initial capital	0.290	-0.190	-0.064
Entrepreneur skill	0.090	0.144	-0.162
Experience	0.033**	0.027*	-0.095
Access to training	0.019**	-0.048	0.032*
Access to market	0.015***	0.016*	0.013***
sex of manager	0.028*	-0.083	-0.189
Consultancy service	-0.177	-0.197	-0.254
Access to premises	-0.345	0.284	-0.005
Access to infrastructure	0.065	-0.079	0.042
Customer networks	-0.232	-0.170	-0.014
Access to credit	0.018***	-0.215	0.220

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

Appendix Table 9: Determinants of efficiencies differentials of micro level dairy enterprise

Micro level enterprises			
	TE	AE	EE
Variable	Coefficients	Coefficients	Coefficients
Age	-0.086	-0.099	0.077
Education	0.029***	-0.218	0.016
No. of employees	-0.293	0.022*	0.125
Initial capital	0.041	-0.006	0.005
Entrepreneur skill	0.281	0.260	-0.131
Experience	0.393	-0.185	0.163
Access to training	0.013*	-0.123	0.026**
Access to market	0.058**	-0.061	0.070*
sex of manager	0.201	0.021**	-0.265
Consultancy service	-0.062	-0.067	-0.103
Access to premises	-0.018	0.194	-0.016
Access to infrastructure	0.017	-0.085	0.149
Customer networks	-0.037	0.066	-0.008
Access to credit	0.019***	-0.050	0.014*

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

Appendix Table 10: Determinants of efficiencies differentials of small level dairy enterprise

Small level enterprises			
Variable	TE	AE	EE
	Coefficients	Coefficients	Coefficients
Age	-0.015	0.019**	0.018
Education	0.023***	-0.020	0.038**
No. of employees	-0.204	0.012**	0.017*
Initial capital	0.051	-0.306	-0.042
Entrepreneur skill	0.240	0.030	-0.082
Experience	0.018**	0.016*	0.014**
Access to training	0.018*	-0.032	0.021*
Access to market	0.014**	-0.069	-0.014
sex of manager	0.193	0.298	0.018
Consultancy service	-0.113	0.085	-0.066
Access to premises	0.336	-0.106	-0.040
Access to infrastructure	-0.033	0.021	-0.131
Customer networks	-0.375	-0.007	0.083
Access to credit	0.015**	0.027**	0.023*

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

Appendix Table 11: Result of multiple linear regression analysis of total sample enterprises

Variable	Coefficients	St. Error	P-value
Age	1.268***	0.146	0.000
Education	0.369*	0.273	0.060
No. of employees	0.033**	0.014	0.043
Initial capital	3.531***	0.415	0.000
Entrepreneur skill	0.785*	0.501	0.090
Experience	0.642**	0.280	0.027
Access to training	2.251***	0.204	0.000
Access to market	0.408**	0.173	0.031
sex of manager	0.002	0.025	0.197
Consultancy service	0.098**	0.037	0.041
Access to premises	0.188	0.386	0.521
Access to infrastructure	0.030	0.103	0.400
Customer networks	0.015	0.056	0.643
Access to credit	0.029 **	0.013	0.032

Adjusted $R^2 = 0.732$

P-value = 000

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

Appendix Table 12: Result of multiple linear regression analysis of micro level enterprises

Variable	Coefficients	St. Error	P-value
Age	2.076***	0.183	0.000
Education	0.399*	0.260	0.067
No. of employees	0.072**	0.027	0.036
Initial capital	3.838***	0.420	0.000
Entrepreneur skill	0.590*	0.487	0.082
Experience	0.624**	0.292	0.033
Access to training	1.944***	0.205	0.000
Access to market	0.385**	0.162	0.042
sex of manager	0.006	0.027	0.220
Consultancy service	0.760**	0.340	0.048
Access to premises	0.197	0.392	0.595
Access to infrastructure	0.078	0.113	0.410
Customer networks	0.028	0.067	0.776
Access to credit	0.037**	0.014	0.039

Adjusted $R^2 = 0.754$

P-value = 000

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

Appendix Table 13: Result of multiple linear regression analysis of small level enterprises

Variable	Coefficients	St. Error	P-value
Age	1.683***	0.109	0.000
Education	0.397*	0.286	0.053
No. of employees	0.087**	0.031	0.050
Initial capital	2.971***	0.410	0.000
Entrepreneur skill	0.790*	0.515	0.098
Experience	0.641**	0.268	0.021
Access to training	2.581***	0.203	0.000
Access to market	0.409**	0.164	0.020
sex of manager	0.004	0.023	0.174
Consultancy service	0.935**	0.416	0.034
Access to premises	0.028	0.380	0.447
Access to infrastructure	0.019	0.093	0.390
Customer networks	0.021	0.045	0.510
Access to credit	0.026**	0.012	0.025

Adjusted $R^2 = 0.710$

P-value = 000

Note: *, **, ***, shows significance at 10%, 5% and 1% probability level respectively.

Source: Author's survey data (2016/17)

PRODUCTION EFFICIENCY, FINANCIAL PERFORMANCE AND IMPACT OF DAIRY ENTERPRISES IN HADIYA ZONE, ETHIOPIA

Appendix 2: Questionnaire

General instruction for Enumerators

- Please introduce yourself before starting the interview.
- Inform the purpose of the study, which is to collect the first hand data that will be used only for PhD dissertation writing on the above indicated topic.
- Please careful on the estimates that exact measurements are not available.
- Carefully read and follow the instructions while you are starting the interview.

Part one: Identification

Woreda

Kebele.....

Village

Name of dairy enterprises.....

Name of the manager.....

Name of enumerator.....

Signature.....

Name of supervisor.....

Signature.....

Date

Part two: Data related to production efficiency and financial performance of dairy enterprises

1. Sex of manager

01) Male 02) Female

2. Age of manager _____ year

3. Marital status of manager

01) Single 02) Married 03) Divorced 04) Widowed

4. Age of dairy enterprise stay in the business _____ year

5. Education level of manager attained so far

01) Illiterate 02) Elementary 03) High school

04) Preparatory 05) TVET and above

6. Did the manager have previous work experience related to dairy enterprise business?

0) No 1) Yes

7. Did your enterprise have skilled operators?

0) No 1) Yes

8. Cost of farm major inputs used in milk production in 2016/17

Farm inputs	Unit of quantity measurement	Total quantity	Unit of price measurement	Per-unit price
Cow	Number		Birr	
Labor	Man-day		Wage	
Concentered feed	Kilogram		Birr	
Unconcentered feed	Kilogram		Birr	
Land	Hectare		Rent	
Vet medicine	Dose		Birr	

9. What amount of milk produced in your enterprise in 2016/17? _____ liters

10. The amount of sales in 2016/17 in liters _____

11. What was the price per liter at your selling point(s) in 2016/17? Birr _____

12. The amount of total revenue in 2016/17 in Birr _____

13. The amount of total cost in 2016/17 in Birr _____

14. The amount of total direct income in 2016/17 in Birr _____

15. The amount of total indirect income in 2016/17 in Birr _____

16. Where do you sell your milk?

- 1) Neighbors 2) Milk collectors 3) Milk processors
 4) Restaurants 5) Consumers
 6) Others (specify).....

17. Who determined the price of milk you have been sold in 2016/17?

- 1) Government 2) Your enterprise 3) Processors
 4) Collectors 5) Consumers
 6) Others (specify).....

18. What system do you used for selling your milk in 2016/17?

- 1) Cash on delivery 2) Two weeks billing 3) Monthly billing
 4) Others (specify).....

19. Are you satisfied with the price offered at your delivery point for your milk in 2016/17?

- 0) No 1) Yes

If No, what price level do you think will satisfy you? Birr _____

20. Did your enterprise have access to training which is use to improve the financial performance of your enterprises in 2016/17? 0) No 1) Yes

21. Did your enterprise products have market access/customers in 2016/17?

- 0) No 1) Yes

22. Did your enterprises have access of consultancy service which is use to improve the financial performance of your enterprise in 2016/17?

- 0) No 1) Yes

23. Did your enterprise have access to premises /own production and selling place?

- 0) No 1) Yes

24. Did your enterprise have access to infrastructure /electric power, water and road?

- 0) No 1) Yes

25. Did your enterprise have access of customer network which connects input suppliers and output consumers of your dairy enterprise in 2016/17?

- 0) No 1) Yes

26. Did your enterprise have access to credit in 2016/17?

- 0) No 1) Yes

27. Amount of credit received in 2016/17 in Birr _____

28. Initial number of employees/operators in the enterprise male ____ and female ____

29. Current number of employees/operators in the enterprise male ____ and female ____

30. Age composition of members of your enterprise

Dairy enterprise	Age composition range of members of dairy enterprise			
Male	18-30	31-43	44-56	57 and above
Number				
Female	18-30	31-43	44-56	57 and above
Number				

31. How many people get job opportunity in your enterprise other than the members?

0) No

1) Yes

If yes, discuss the type of job created and the number of people as specified below

32. Daily labor male _____ female _____

33. Contract labor male _____ female _____

34. Permanently employed male _____ female _____

35. What is the level of your enterprise?

01) Micro

02) Small

36. For how long do stay in business since establishment? _____

37. What was the amount of initial capital of your enterprise during establishment? _____

38. What is your main source of initial capital for your enterprise? (Multiple chooses possible)

01) Own source

02) Donation

03) Loan

04) Others specify _____

If the source of initial capital is combination of different sources, specify the percentage share of capital from each source

Share of initial capital	Own source	Donation	Loan	Other	Total

39. What was the amount of capital of your enterprise in 2016/17? Birr _____

40. What was the annual revenue of your enterprise in 2016/17? Birr _____

41. What was the annual cost of your enterprise in 2016/17? Birr _____

42. What was the annual profit of your enterprise in 2016/17? Birr _____

43. What was the annual loss of your enterprise in 2016/17 Birr _____

44. Did your enterprise withdraw money from the working capital for other purposes in 2016/17?

0) No

1) Yes

If yes, select the effect of withdrawal on profitability and financial performance of your enterprise? 01) Positive 02) Negative 03) No effect

45. Did your enterprise re-invest profit to build-up the financial performance of enterprise in 2017? 0) No 1) Yes

If yes, select the effect of re-investment of profit on the profitability and financial performance of your enterprise?

01) Positive 02) Negative 03) No effect

46. How was the financial performance of your enterprise in 2016/17?

01) Good /profitable 02) Bad /loss

If your answer is bad/loss, select the main source of loss of profit and bad financial performance of your enterprise related with

01) Manger 02) Operator 03) Enterprises

04) External 05) others
specify _____

47. Did your enterprise experience any challenges which hinder the financial performance of your enterprise? 0) No 1) Yes

If yes, discuss the main challenges that your enterprise faces?

.....
.....
.....

48. Do you have recommendations which use to improve the financial performance of enterprise?

0) No 1) Yes

If yes, list some of them.

.....
.....
.....

8. How many years of farming experience do you have? _____ years

9. Do you have off/non-farm income source? 1) Yes 0) No

If yes, estimate the annual income form off/non-farm activities?

No	Source	No of household engaged	No of days worked	Income per working day	Total annual income
1	Daily labor				
2	Selling local drink				
3	Selling fire wood				
4	House servant				
5	Pension payments				
6	Carpenter				
7	Rent from assets				
8	Trading				
9	Clothes making				
10	Remittance				
11	Others				

10. Estimated cash farm income earned during 2016/17 production season? _____ Birr

Types crop grown	Annual harvest	Consumed	Gift	Sold	
				Amount Unit	price
Wheat					
Maize					
Sorghum					
Coffee					
Chat					
Vegetables					
Fruits					
Others					
Total					

11. Estimated cash income from sale of livestock 2016/2017

Animal type	Number sold	Unit price	Purpose
Oxen			
Cows			
Heifers			
Bull			
Calves			
Goats			
Sheep			
Donkey			
Horse			
Poultry			
Others			
Total			

12. Estimated cash income from sale of livestock products 2016/2017

Product Type	Collected amount	Consumed	Sold	Unit Price	Purpose of sale
Milk					
Butter					
Others					

13. Did you obtain credit in 2016/17 production year? 1) Yes 0) No

If yes, credit is given in what form? (Multiple answers possible)

01) Seed 02) Cash 03) Fertilizer

14. Amount of credit received: In cash _____ Birr, in kind _____

15. Which organization gives you credit? (Multiple answers possible)

01) Microfinance 02) Friends and relatives 03) Farmer cooperatives

04) Formal financial institutions 05) Other, Specify _____

16. For how many years did you received credit? _____ years

If you have not received credit, what are the reasons?

01) Fear of risk 02) Not qualified 03) Reason not known 04) Religion
 05) Credit service not available 06) Others, specify _____

17. Have you ever received training about enterprises? 1) Yes 0) No

18. Are you a member of any other associations other than enterprises? 1) Yes 0) No

19. Did you have livestock? 1) Yes 0) No

If yes, please fill the following Table

Types of Animal	Number	Types of Animal	Number
Oxen		Donkey (adult)	
Cow		Donkey (young)	
Heifer		Sheep (adult)	
Calve		Sheep (young)	
Weaned calves		Goat (young)	
Mule		Goat (adult)	
Horse		Chicken	

20. Have you information access? 1) Yes 0) No

If yes, please specify your information source? (Multiple answers possible)

No	Types of information assets owned	Yes	No
1	Mobile phone		
2	Television		
3	Radio		

21. Do you have market access for your products? 1) Yes 0) No

22. How many family members live together in your household? _____ number

Part three: Data related to employment creation impact evaluation of enterprises

1. Are you employed in enterprise in 2016/17?

0) No 1) Yes

2. How you were worked in the enterprise in 2016/17?

01) Working full time 02) Working part time

3. What was the number of employees in your enterprise in 2016/17? _____

4. Does your membership in enterprise create job opportunity for your family member?

0) No

1) Yes

If yes, discuss the type of job created and the number of family as specified below

5. Daily labor male _____ female _____

6. Contract labor male _____ female _____

7. Permanently employed male _____ female _____

8. Did your enterprise create job opportunity other than members of enterprise in 2016/17?

0) No

1) Yes

If yes, select the number of workers that job created in your enterprise?

01) Less than 10

02) Between 10-50

03) Above 50

9. Do you think that your enterprise job creation is inadequate in 2016/17?

0) No

1) Yes

If yes, explain the main reasons for the inadequacy of your enterprise in job creation?

.....

Part three: Data related to income generation impact evaluation of enterprises

1. What was the amount of your annual income in 2016/17? _____

2. What was the amount of your annual cost in 2016/17? _____

3. What was the amount of your annual net income in 2016/17? _____

4. What was the amount of your annual loss in 2016/17? _____

5. What was the source of your income in 2016/17? (Multiple chooses possible)

01) Enterprises

02) Crop

03) Livestock

04) Remittances

05) Others specify _____

If the source of income is combination of different sources, specify amount of your income from each source

Amount of income in birr	Enterprises	Crop	Livestock	Remittances	Others	Total

6. Do you think that your enterprise income generation is insufficient in 2016/17?

0) No

1) Yes

If yes, explain main reasons for the insufficiency of your enterprises in income generation?

.....

7. Do you have recommendations use to improve the impact of enterprises on employment creation and income generation?

0) No 1) Yes

If yes, list some of them.

.....

Key informant and focus group participant discussion guiding checklist

1. What should be done for the enterprises to be efficient in their business?

2. Why did some enterprises efficient and others inefficient in their business?

3. Does enterprises experience any challenges which hinder their production efficiency?

0) No 1) Yes

If yes, mention the main challenges that enterprises faces in the study area?

4. How to improve the production efficiency of enterprises to be efficient in their business?

5. Why did some enterprises have good financial performance while the others have badly?

6. Why did some enterprises successful and others fail to continue in the business?

7. How could some enterprises of the same area survived in the business?

8. What should be done for the enterprises to continue successfully in the business?

9. Does enterprises experience any challenges which hinder their financial performance?

0) No 1) Yes

If yes, mention the main challenges that enterprises faces in the zone?

10. How to improve the financial performance of enterprises to be successful in their business?

11. Does enterprises are the main solution for alarming rate of unemployment?

0) No 1) Yes

If yes, discuss the impact of enterprises on employment creation in the zone?

12. Does enterprise serve the society as the main source of income?

0) No 1) Yes

If yes, discuss the impact of enterprises on income generation in the zone?

.....

GOOD LUCK!!!