UNIVERSITY OF ZIMBABWE


By KEYASI SARANJII

Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Business Administration, Graduate School of Management, University of Zimbabwe

 Supervisor: Dr S Ruturi

February 2013
DECLARATION

Student’s Declaration- I, Saranji Keyasi do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the Acknowledgements, References and by comments included in the body of the report, and that it has not been submitted in part or in full for any other degree in any other university.

Signature_________________________    Date_________ __

NAME: Student’s Names :  Saranji Keyasi
STUDENT NUMBER :  R900724G

Supervisor Declaration-I Dr. Samson Ruturi confirm that the work reported in this dissertation was carried out by the candidate under my supervision as School supervisor. This dissertation has been submitted for review with my approval as school supervisor.

Signature  ……………………………    Date…………………………

NAME: DR. S. RUTURI
Dedication

This study is dedicated to men and women who are working tirelessly either directly or indirectly in ensuring that there is adequate food on the table for all the people in Zimbabwe.
Acknowledgement

I would like to thank my supervisor Dr. S. Ruturi for guiding me in carrying out this study. I would also like to thank Mr Munangi from Nyarungu ARDA DDP for welcoming me to undertake this study. I would like to thank members of Nharira dairy for their cooperation and willingness to work with me. Finally I would like to thank my colleagues, Mr Ratsakatika and Mr Muzenda from the Livestock Production Department in Chivhu for assisting me with valuable livestock production information.
Abstract

The aim of this study is to find out if members of Nharira dairy project are benefitting from the forward vertical integration strategy pursued by their organization. The reason for carrying out this study is that Nharira dairy project is beset with a number of problems which include declining revenue against a background of escalating costs, decline in milk intake and failure to fulfill customer requirements, decline in the number of registered members and failure of the project centre to repair the dairy infrastructure despite a number of intervention measures.

The objectives of this study are: to assess the perception of Nharira dairy farmers on the benefits of forward vertical integration in dairy farming operations; to determine the nature of costs and returns from forward vertical integration by Nharira dairy farmers; to determine a turnaround strategy for Nharira dairy farmers that takes into account dairy farming management; to determine whether forward vertical integration by Nharira dairy farmers is addressing issues of dairy farming technology; and to assess how forward vertical integration by Nharira dairy farmers is addressing issues of environmental sustainability.

A case study approach is used in this investigation. Stratified random sampling is used in this study to select a representative sample of farm owners, administration and staff, workers and family members.

Research findings indicate that Nharira dairy farmers perceive forward vertical integration as beneficial. The researcher concludes that Nharira dairy should continue with its forward vertical integration strategy. The researcher recommends further study in how forward vertical integration in dairy operations can assist in addressing issues of environmental sustainability in the Nharira farming community.

The keywords in this research are benefits, vertical integration strategy, dairy farming management, dairy technology and environmental sustainability.
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Abbreviations/Acronyms

AGRITEX: Agricultural Technical and Extension Services

ARDA DDP: Agricultural and Rural Development Authority Dairy Development Programme

BF: Butter Fat

CCZ: Consumer Council of Zimbabwe

FAO: Food and Agriculture Organisation

FVI: Forward Vertical Integration

Govt: Government

Fig. Figure

HACCP: Hazard Analysis Critical Control Point

IDF: International Dairy Federation

IMF: International Monetary Fund

ISO: International Organisation of Standards

LCA: Life Cycle Assessment

LPD: Livestock Production Department

NADFZ: National Association of Dairy Farmers of Zimbabwe

NGO: Non-Governmental Organisations

OECD: Organisation of Economic Cooperation and Development

PDF: Precision Dairy Farming

PEST: Political, Economic, Social and Technological

rBGH: recombinant Bovine Growth Hormone
RDC: Rural District Council
SADC: Southern Africa Development Community
SNF: Solids Not Fat
SCC: Swedish Cooperative Centre
SWOT: Strength, Weaknesses, Opportunities and Threats
US: United States of America
USDA: United States Department of Agriculture
VEST: Value of Equity Outstanding
WTO: World Trade Organisation
CHAPTER ONE: INTRODUCTION

1.1 Introduction

The topic under investigation is a study of the benefits of forward vertical integration in dairy farming operations with a focus on the case of Nharira Dairy for the period 2010-2012.

Forward vertical integration is when a firm owns vertically related activities and disposes its own products (Grant, 2005). Gilles (2010) argues that a dairy farm can vertically integrate with a milk processing plant to provide long term sustainability in the dairy industry. Barney and Hesterly (2011) assert that forward vertical integration creates value because the whole business which has forward vertically integrated is worth more than individual business units. The value is created as a result of synergies created by the vertically integrated business units. In forward vertical integration of dairy farming operations farmers have got complete control over the value chain system. From the supply of inputs to the processing of milk up to the distribution of the product to the end consumer everyone must benefit. Ruffin (2008) states that vertical integration is highly profitable and reduces the price of the final product. Gilles (2010) is also of the same view that vertical integration reduces transfer costs often associated with the procurement of milk. The net result is that customers pay low prices for processed milk products.

The chapter highlights the background of the study followed by a general overview after which a background of Nharira Dairy is given. A statement of the problem for Nharira Dairy has been made from which research questions have been formulated. Research questions have been used to derive research objectives. A research proposition has been stated. The scope of the research is indicated together with the justification of the research. The limitations of the research and ethical issues are shown. A conceptual framework of study is shown. Finally the dissertation structure and chapter summary are highlighted.
1.2 Background of the study

Nharira Dairy was formed in 1986 as part of the Agricultural and Rural Development Authority’s Dairy Development Programme. The aim of the programme is to generate sustained employment for people in rural areas and improve their living standards. The model of business adopted by the project is forward vertical integration. Farmers deliver their milk to the milk collection centre at Nharira milk collection and processing centre. The milk is processed into sour milk, yoghurt and fresh milk. The processed milk products are distributed to retailers like supermarkets in Chivhu and some boarding schools in the local areas. Consumers also make their purchases directly from the milk processing centre. Figure 1.1 shows a set up of the forward vertical integration strategy for Nharira Dairy. The Mckinsey 7-S model consisting of seven elements, namely structure; strategy; systems; shared values; style; staff and skills has been used by the researcher as a diagnostic tool for assessing the organizational effectiveness of Nharira Dairy. Effective organizations achieve a fit between these seven elements (Peters, Waterman and Philips 1980; Peters and Waterman 1982).

Figure 1.1 showing a set up of Nharira Dairy’s forward vertical integration strategy
1.2.1 Strategy
The vision of Nharira Dairy is to create employment for people living in the Nharira farming area of Chikomba rural district. The mission of Nharira Dairy is to produce and process milk into fresh milk, sour milk and yoghurt through the use of low cost and simple technology. The corporate strategy of Nharira Dairy is growth, survival and profitability using low cost and simple technology. The processed milk is distributed to retail outlets. In previous years the project truck was used to distribute the products to customers. Currently customers come to collect the processed milk. The project truck is need of repair.

1.2.2 Structure
The Agricultural and Rural Development Authority Dairy Development Programme has the overall responsibility of advising Nharira Dairy farmers. A management committee elected by farmers is responsible for the day to day management of the milk collection and processing plant. A full time supervisor and five permanent workers report to the management committee. The management committee consists of the chairperson, vice chairperson, treasurer, secretary, vice secretary and two committee members. A district management team consisting of personnel drawn from the District Administrator’s office, Rural District Council, Ministry of Health, Ministry of Home Affairs, Ministry of Roads, Ministry of Small and Medium Enterprises, Departments of Agricultural Technical and Extension Services (AGRITEX), Veterinary Services, Livestock Production Department (LPD) and Social Welfare provides advice to the management committee. Non-governmental organizations work with virtually everyone involved in the dairy project. An organizational chart of Nharira Dairy is shown in figure 1.2
Figure 1.2: Organizational structure of Nharira Dairy
1.2.3 Systems

A total of about seventy farmers registered with Nharira Dairy produce milk and deliver it to the milk processing centre at Nharira Business Centre. Most of the farmers have got one dairy cow and in calf heifers. A smaller number of the farmers have got about four lactating cows. The milk is put in special milk cans. Bicycles are used to ferry the milk to the processing centre. In the past years a motor cycle drawing a trailer was used to carry milk from the farms to the centre. This motor cycle needs repair. The dairy breeds used by farmers are Holstein, Friesland, Red-Dane and cross breeds of Brahman, Tuli and Jersey. Milking is done once per day. The average amount of milk delivered at the centre daily is about 300 litres of milk. This milk is produced by farmers who are registered as members of the project. The total number of registered members fluctuates between seventy and eighty. Some individual farmers deliver about thirty litres of milk everyday for processing at the centre. Other farmers deliver about ten litres of milk everyday for processing. Farmers are also raising their own replacement heifers. Some of the farmers use bulls in their breeding programmes while others have been trained in artificial insemination techniques.

Nharira dairy farmers practice zero grazing with their dairy cows. Some of the farmers make maize silage and hay from veld grass. Maize silage is prepared using a maize chopping machine owned by Nharira Dairy. Green veld grasss is cut using sickles and slashers and left to dry naturally. The dry grass is put in pits and compressed into bales which are tied with strings. Cotton concentrates mixed with crushed maize is fed to lactating cows during milking. However this is not done by all farmers. Only a few of the farmers feed their dairy cows with cotton concentrate. The rest of the farmers do not have hay, silage, cotton concentrate or even maize stover to feed their cows during the dry season. Some of the successful dairy farmers treat maize stover with urea to make it palatable and also to raise its protein content.
At the processing centre milk is packaged into fresh milk, yoghurt and sour milk. Farmers receive payments on the volume of milk delivered after every two weeks.

1.2.4 Staff
The management committee is the decision making authority of Nharira Dairy. The committee is mandated to make decisions by registered farmers of the dairy project. The centre supervisor is responsible for the day to day management of the centre. The supervisor is responsible for every routine work at the centre. The duties of the supervisor are managing permanent workers employed at the centre, organizing the marketing and sales functions.

1.2.5 Skills
The dairy industry requires skilled people. Farmers and staff of Nharira Dairy receive training from non-governmental organizations and sector ministries such as agriculture and the small and medium enterprises. The breakdown of the centre truck, motor cycle and bulk milk chiller is an issue of concern. There is suspicion that members responsible for handling these equipment were not adequately skilled. The National Association of Dairy Farmers of Zimbabwe (NADFZ) plays an active role in training farmers in all aspects of dairy production.

1.2.6 Style
The style of management and leadership is based on cooperative principles. Farmers produce milk individually and process and market the milk collectively. The management committee acts on behalf and in the best interests of farmers. The management committee is responsible for monitoring the performance of the centre supervisor and his workers.

1.2.7 Shared values
Nharira Dairy farmers have a high regard for collective action and responsibility especially in the processing and marketing of their milk products. Nharira Dairy farmers recognize the importance of also sharing
information with other farmers nationally. All members of Nharira Dairy are members of NADFZ.

1.2.8 Stakeholder segments

The government’s goal as a stakeholder in the Nharira Dairy is to create employment and improve standards of living of people in rural areas. The government is represented by the District Management Committee. The District Management Committee is composed of personnel from the Chikomba District Administrator’s Office, the Chikomba Rural District Council, the government Departments of AGRITEX, LPD, Veterinary Services, Ministries of Health, Small and Medium Enterprises, Youth, Gender and Home affairs. Each of these ministries and departments offer advice on matters of concern to the dairy project. The rural district council offer advice on matters of rates payment. AGRITEX and LPD offer advice on crop and animal production techniques respectively. Veterinary services and Home affairs offer advice on treatment of animal diseases and clearance of cattle changing ownership respectively. The presence of each ministry or department on the District Management Committee is meant to ensure the success of this dairy project. The health ministry offer advice on food safety and handling. The Ministry of Small and Medium Enterprises provide both business advice and financial assistance. The Ministry of Youth targets young people who want to venture into business undertakings. The Ministry of Gender makes every effort to safeguard against factors which inhibit women in particular from venturing into businesses of their choice. The success of Nharira Dairy depends on the number of farmers who are active members. Membership is vital because of the seventy seven registered members slightly above thirty members are consistently delivering their milk to the processing centre. Those farmers who have de-registered and are not delivering milk to the centre allegedly accuse the management committee of lack of transparency in administrative issues. These breakaway farmers are presumed to carry out side marketing.
Customers are important stakeholders in the Nharira Dairy Development Programme. The bulk of the customers are local end consumers. All customers come to the centre to buy their products. Donors are a very important segment of stakeholders. Many donors have provided financial, material and technical advice to the dairy farmers. Donors include organizations such as the Swedish Centre for Cooperative Development and Land O Lakes. Donors work with almost everyone in the dairy value chain. Farmers have also been trained in dairy herd management and this includes artificial insemination, animal nutrition and the general health of the animal.

It is the responsibility and mandate of ARDA DDP to ensure that smallholder dairy farmers are capacitated. Over the years ARDA has provided training in all aspects of milk production and processing at its training centre near Chitungwiza.

1.3 Macroenvironmental factors
1.3.1 External analysis (Political, Economic, Social and Technological)
1.3.1.1 Political
The dairy industry in Zimbabwe is deregulated and is not subsidized by the government. There is no restriction by the government on imports of dairy products. Some commercial white dairy farmers are not sure about their continued stay on farms. The Zimbabwe government is yet to officially conclude its land redistribution process. Zimbabwe is a member of the World Trade Organisation (WTO) and the Southern Africa Development Community (SADC). Member states of these trading and political blocs respectively are required to engage in open and free trade. This would appear to offer some explanations on why Zimbabwe is flooded with dairy imports. Some of the imported dairy products are relatively cheaper than locally produced dairy products.
1.3.1.2 Economic factors

According to the International Monetary Fund (2012) the inflation rate is about five percent while the unemployment rate is around 86%. Utility charges especially electricity are very high. The problem of high electricity tariffs is further compounded by frequent power outages. Electricity is vital in milk supply chain from the cow up to the end consumer. Wages and salaries of workers have not kept pace with productivity. Capacity utilization has not shown drastic improvements. Commercial lending rates are very high. Financial institutions are charging high interest rates making it hard for dairy farmers to access loans.

Despite the high rate of unemployment the low level of inflation has generally meant increased consumer purchasing power. The supply of dairy products in Zimbabwe has not kept pace with demand as shown in table 1.1

**Table 1.1 Milk output, estimated demand and actual consumption for the period July 2012.**

<table>
<thead>
<tr>
<th>Raw milk production</th>
<th>4.5 million litres per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated demand</td>
<td>7.5 million litres per month</td>
</tr>
<tr>
<td>Per capita milk consumption</td>
<td>8 litres</td>
</tr>
<tr>
<td>Estimated per capita milk consumption</td>
<td>25 litres</td>
</tr>
</tbody>
</table>

**Source: NADF, 2012.**

The demand for milk and dairy products is greater than supply as shown in Table 1.1. Local dairy producers and processors appear to be failing to meet local demand and this has seen a rise in imported dairy products.

1.3.1.3 Social factors

Generally the number of educated people is high in Zimbabwe. These people appreciate the nutritional value and health benefits obtained from dairy products. Well educated and high income earning people are prepared to pay high prices for premium quality dairy products (Mano, 2010), but in rural areas people are not prepared to purchase packaged milk. Generally these people
prefer milk straight from the cow. However not all people in rural areas have got milk producing cows.

1.3.1.4 Technological factors
Technology has also found its way in the dairy industry. Milking on some commercial farms has become not only mechanized but also computerized. The processing of milk is also a high technology operation. Milk can now be processed, packaged and distributed to customers as per customer requirements.
The level of technology in the dairy industry is advancing rapidly. At the farm level milk recording and feeding have become computerized rather than manual.

1.3.1.5 PEST Analysis
Table 1.2 shows elements of political, economic, social and technological factors. The elements of the factors have been ranked to indicate whether each element is a threat or opportunity.
### Table 1. 2PEST Analysis

<table>
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<tr>
<th>Factors</th>
<th>Opportunity</th>
<th>Threat</th>
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<tr>
<td></td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Political</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Free trade</td>
<td></td>
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<tr>
<td>✓ De regulation</td>
<td></td>
<td></td>
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<tr>
<td>✓ Land redistribution</td>
<td></td>
<td></td>
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<tr>
<td>✓ Indigenization</td>
<td></td>
<td></td>
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<tr>
<td>✓ Gender equality</td>
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<tr>
<td>✓ Empowerment</td>
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<tr>
<td><strong>Economic</strong></td>
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<tr>
<td>✓ Low inflation rate</td>
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<tr>
<td>✓ High interest rates</td>
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<tr>
<td>✓ High unemployment</td>
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<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
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<tr>
<td>✓ Increased education levels</td>
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<td></td>
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<tr>
<td>✓ Increased health knowledge</td>
<td></td>
<td></td>
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<tr>
<td>✓ High urbanization</td>
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<tr>
<td><strong>Technological</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Dairy cow nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Milk production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Product packaging and labeling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1.3.2 Industry Analysis

Stakeholders in the dairy industry in Zimbabwe consist of farmers, domestic milk processors, input suppliers, the government, financial institutions, foreign based dairy companies, retail supermarket chains, non-governmental organizations and consumers.

Dairy farmers in Zimbabwe are represented by the National Association of Dairy Farmers (NADF). The NADF compiles facts and figures on the number of registered dairy farmers in the country, the total estimated national dairy herd,
the total estimated number of cows in lactation and national milk output (Tables 1.3 and 1.4 respectively).

**Table 1.3 Registered dairy farmers, estimated dairy herd and cows in lactation**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered dairy farmers</td>
<td>223</td>
</tr>
<tr>
<td>Estimated national dairy herd</td>
<td>26000</td>
</tr>
<tr>
<td>Estimated national cows in lactation</td>
<td>12000</td>
</tr>
</tbody>
</table>


The total number of registered dairy farmers in Zimbabwe consists of small scale and large scale commercial farmers. The NADF has expressed the desire to see an increase in the national dairy herd. During the 1990s the estimated number of cows in milk was about 50000 cows (NADF, 2012). A combination of drought and the government’s land reform process has been attributed for the decline in the national dairy herd.

**Table 1.4 Annual milk production in million litres**

<table>
<thead>
<tr>
<th>Years:</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual milk production:</td>
<td>47</td>
<td>50.6</td>
<td>51</td>
</tr>
</tbody>
</table>


Dairy farmers in Zimbabwe are facing challenges in milk production. Large scale commercial milk producers are citing lack of security of tenure. These farmers are not sure about their future because their farms can be acquired by the government for resettling landless indigenous Zimbabweans. Other challenges include high production costs particularly stock-feeds, high electricity costs coupled with frequent power outages and lack of credit facilities or the high cost of financing operations.

Domestic milk processors consist of stand-alone milk processors like Dairiboard Zimbabwe Limited and Nestle Zimbabwe (Private) Limited. The operations of these companies are international in outlook. These organizations can import
products to meet their manufacturing needs. These organizations have also adopted a backward vertical integration strategy where dairy farmers are provided with dairy cows and inputs like stock-feeds. The dairy farmers in turn supply milk on contract to these processors. Another category of domestic milk processors are dairy farms which have vertically integrated. In this category are Kefalos which vertically integrated with Red Dane Dairy farm near Harare, Den dairy which has vertically integrated with a group of farmers in the Kwekwe farming area, Nharira dairy in Chikomba district, Nyarungu Agricultural and Rural Development Authority (ARDA) Dairy Development Programme (DDP), Dorking dairy in Concession. According to the Herald, July 5 2012 Alpha Omega is another dairy farm located in Mazoe which has forward vertically integrated. The dairy farms which have vertically integrated compete with stand-alone milk processors. Some of the vertically integrated dairy farms like Kefalos purchase milk from other dairy farms for processing at their factories. Generally prices paid to farmers who deliver their milk to Kefalos do not differ from that paid by Dairiboard. This practice of paying uniform prices to farmers raises suspicion of collusion or cartel pricing by the milk processors. Nharira dairy and others like Nyarungu ARDA DDP process milk produced on their own farms only.

<table>
<thead>
<tr>
<th>Name</th>
<th>Area of location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairiboard Zimbabwe Limited</td>
<td>Harare, Bulawayo, Gweru, Mutare, Chipinge</td>
</tr>
<tr>
<td>Nestle Zimbabwe (Private) Limited</td>
<td>Harare</td>
</tr>
<tr>
<td>Revive</td>
<td>Harare</td>
</tr>
</tbody>
</table>

Source: Charimba, 2012. Swedish Cooperative Centre, Southern Africa

Stand alone milk processors buy raw milk from dairy farmers. These companies process a range of diversified products. These companies also use other raw materials besides milk when manufacturing their products.
Table 1.6 Dairy farms which have forward vertically integrated

<table>
<thead>
<tr>
<th>Name</th>
<th>Area of location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kershelmar</td>
<td>Bulawayo</td>
</tr>
<tr>
<td>Dunluce</td>
<td>Mahusekwa</td>
</tr>
<tr>
<td>Clavelshay</td>
<td>Kadoma</td>
</tr>
<tr>
<td>Sedgemoor; Crofthead; Nondweni</td>
<td>Bulawayo</td>
</tr>
<tr>
<td>Dorking</td>
<td>Concession</td>
</tr>
<tr>
<td>Kefalos</td>
<td>Marirangwe, Mhondoro</td>
</tr>
<tr>
<td>Lorna Doone</td>
<td>Hatcliffe, Harare</td>
</tr>
<tr>
<td>Africa University; Nyamoro</td>
<td>Mutare</td>
</tr>
<tr>
<td>Nharira</td>
<td>Nharira, Chivhu</td>
</tr>
<tr>
<td>Nyarungu</td>
<td>Chitungwiza</td>
</tr>
<tr>
<td>Size</td>
<td>Gweru</td>
</tr>
</tbody>
</table>

Source: Charimba, 2012. Swedish Cooperative Centre, Southern Africa

Dairy farms which have forward vertically integrated process milk produced on their farms into cheese, ice cream, yoghurt, fresh milk and other dairy related products. Some of these farms also purchase milk from other dairy farms.

Input suppliers are the providers of stock-feed, milking machines, milking cans, veterinary drugs, cleaning detergents, packaging materials, fuel and electricity. The cost of these inputs is generally high. These input suppliers have pointed out that production costs are high because of old technology coupled with the difficulty of obtaining favourable credit conditions.

The government as a stakeholder in the dairy industry plays a broad role. It is responsible for crafting rules, regulations and guidelines for the smooth and efficient functioning of the dairy industry. Dairy farmers must observe all aspects of the Dairy Services Act and the Public Health Act. The government’s many departments such as Agricultural Technical and Extension Services (AGRITECH), Veterinary Services, Livestock Productivity Department (LPD), ARDA DDP and many training institutes play critical roles in the dairy industry. The government requires adequate funds to ensure that there is adequate service provision. However sometimes funds may not be available resulting in low quality service delivery.
Financial institutions are critical in ensuring that there is credit for financing dairy operations. However financial institutions have pointed out that credit availability is very tight. In an effort to minimize risk the financial institutions are cautious in lending their finances. The result of this cautious approach by financial institutions has been negative for the dairy industry.

Foreign dairy companies are exporting their dairy products to Zimbabwe. Local dairy milk processors will have to design and put in place strategies that draw customers to their side. An appeal to the government for protection against imports of dairy products may not be in the best interest of the local dairy industry. Free trade in dairy products is becoming a global trend.

Retail supermarkets are an important link in the distribution chain of dairy products. The retail supermarkets in Zimbabwe offer for sale both local and imported dairy products. Apart from selling dairy products, retail supermarkets provide vital information on customer buying habits and preferences. Some of the milk processors by pass retail supermarkets and sell directly to consumers. Consumers refer to both individual people and institutional bodies like hotels, hospitals and educational institutions such as schools and universities.

Non-Governmental Organizations (N.G.Os) play a significant role particularly in the small holder dairy farming sector. N.G.Os assist small holder farmers with vital equipment needed to successfully run a dairy enterprise. These civic organizations work in association with relevant government departments such as AGRITEX, LPD, Rural District Councils and parastatal bodies like ARDA DDP.

Consumers are an important and critical component of the dairy supply chain management. The monitoring of consumer buyer behavior is important. Consumers are becoming powerful in dictating the strategy taken by companies. Consumers’ interests have now widened to include issues such as traceability, impact on the environment of production technologies and how organizations treat their workers. In Zimbabwe the Consumer Council of Zimbabwe (C.C.Z.) is a consumer watchdog group which highlights issues like unfair prices, packaging
and labeling, product safety and the shelf life of food products. The C.C.Z. has in the past generally raised concern over the high price of Zimbabwean dairy products while at the same time expressing concern about the bio-safety of imported dairy products.

1.3.2.1 Customers

Retail chain supermarkets have high bargaining power when purchasing dairy products. The retail supermarkets purchase dairy products in large quantities at discounts. There are other institutional customers like hotels, restaurants, hospitals and schools. These institutional customers do not have much bargaining power compared to retail supermarkets. Retail supermarkets have high overheads which they tend to pass on to end consumers. End consumers have no bargaining power when purchasing dairy products from retail supermarkets.

1.3.2.2 Suppliers

Suppliers in the dairy industry are manufacturers of drugs, chemicals, stock feeds and machines for milking cows and processing the milk. Stock feeds are manufactured by a few companies. The dairy industry has no bargaining power over suppliers of stock feeds and drugs. These manufacturers supply similar drugs and stock feeds to other livestock such as poultry, sheep, beef cattle and pigs.
1.3.2.3 Availability of substitutes

Substitutes that may pose a threat to dairy products are plant based products. These plant based products are soy milk, soy yoghurt and margarine. Some health conscious consumers prefer plant based products. These consumers argue that dairy products are rich in cholesterol. Cholesterol is blamed for heart related ill health.

1.3.2.4 Competitors

Competitive rivalry exists among processors of milk. Big and powerful companies compete against each other and against small companies. Local dairy industries also face strong competition from cheap imported dairy products. Exit barriers for local dairy processors appear to be high because some of the companies invested heavily in plant and equipment. A few large dairy companies have integrated backwards with farmers. Dairy farmers on the other hand cooperate on vital issues of production.

1.3.2.5 Threat of new entrants

The dairy industry has high capital requirements. New entrants to the dairy industry face high capital requirements. Government regulations, particularly the Dairy Act and the Public Health Act impose stringent requirements which make it hard for new players to enter this industry. New entrants need to overcome barriers associated with economies of scale, and access to distribution channels.

1.3.2.6 Competitive Forces Analysis

Understanding of competitive forces helps to show if the current industry is profitable (Porter 1979), and the strongest competitive force or forces determine the profitability of an industry and become the most important to strategy formulation. Retail supermarket chains as customers of dairy products and
suppliers of inputs in the dairy industry have high bargaining power. Competitive rivalry against local and foreign dairy companies is also high.

Table 1.7 Competitive Forces Analysis

<table>
<thead>
<tr>
<th>Force</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Strategic defence move</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1- Customer bargaining power</strong></td>
<td></td>
<td></td>
<td>✓</td>
<td>Strong brand, open specialty shops e.g. milk shop</td>
</tr>
<tr>
<td>Retail supermarkets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotels, restaurants</td>
<td>✓</td>
<td></td>
<td></td>
<td>Switching costs</td>
</tr>
<tr>
<td>End consumers</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2- Supplier bargaining power</strong></td>
<td></td>
<td></td>
<td>✓</td>
<td>Backward integrate make your own feed of cows</td>
</tr>
<tr>
<td>Stock feed manufacturers</td>
<td></td>
<td></td>
<td>✓</td>
<td>Use of cross bred dairy cows with high disease resistance</td>
</tr>
<tr>
<td>Veterinary chemicals</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Dairy cows replacement</td>
<td></td>
<td></td>
<td></td>
<td>Rear your own calves</td>
</tr>
<tr>
<td><strong>3- Availability of substitutes</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td>Monitor price performance of substitutes, buyers switching</td>
</tr>
<tr>
<td>Soy milk</td>
<td></td>
<td></td>
<td></td>
<td>costs, product differentiation.</td>
</tr>
<tr>
<td>Soy yoghurt</td>
<td>✓</td>
<td></td>
<td></td>
<td>Monitor price performance of substitutes, buyer switching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>costs, product differentiation.</td>
</tr>
<tr>
<td><strong>4- Competitors</strong></td>
<td></td>
<td></td>
<td>✓</td>
<td>Quality improvement; product promotion; increase advertising.</td>
</tr>
<tr>
<td>Local dairy processors</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td></td>
<td></td>
<td>✓</td>
<td>Product promotion, increase advertising, quality improvement.</td>
</tr>
<tr>
<td><strong>5- Threat of new entrants</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td>Patents, brand equity.</td>
</tr>
</tbody>
</table>
1.3.3 Strengths, Weaknesses, Opportunities, Threats (SWOT).

1.3.3.1 Strengths

The strengths of Nharira Dairy lie in its production systems. Simple and appropriate technology is used by farmers to produce milk. The farmers use their hands to milk their cows. The average number of cows per farmer is three and one worker can easily do the task. The processing of raw milk into sour milk, yoghurt and fresh milk makes use of simple technology. The production systems at Nharira Dairy are designed to make optimum use of locally available materials and human capital.

Members of Nharira Dairy work as a team on matters of milk processing and marketing. Nharira Dairy strictly produces milk related products without any additives or artificial flavours. Consumer tastes and preferences are strongly in favour of processed food in its natural form.

1.3.3.2 Weaknesses

Nharira Dairy has a limited range of dairy products. The dairy is producing fresh milk, yoghurt, sour milk and whey. The dairy can expand to produce other products like ice cream, dairy drinks and cheese. The bulk milk chiller at the centre is in need of repair. Farmers are forced to milk their cows once per day. The inability to repair the bulk milk chiller is therefore limiting capacity utilization. The packaging of yoghurt in sachets is not appealing to consumers. Consumers openly express their disapproval of the sachet package for yoghurt.

1.3.3.3 Opportunities

The global liberalization of trade in dairy products offers an opportunity for Nharira Dairy to enter the global dairy markets. Nharira Dairy has had the opportunity of receiving financial and material support from Non-Governmental Organizations. This assistance is critical because the cost of finance is beyond the reach of many organizations. The market demand of dairy products is
expected to grow. This is an opportunity for Nharira Dairy to expand its business operations and exploit this potentially huge market.

1.3.3.4 Threats

Rapid technological advances and improvements pose a threat to Nharira Dairy’s survival, growth and profitability. Like other local dairies Nharira faces threats from cheap imports of dairy products. Issues related to environmental management, standards, certification and food safety are becoming increasingly important for dairy farmers and dairy processors.

Table 1.8 Strengths, Weaknesses, Opportunities and Threats (SWOT) for Nharira Dairy

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low capital intensity</td>
<td>Limited range of products</td>
</tr>
<tr>
<td>Simple technology</td>
<td>Back chiller not functional</td>
</tr>
<tr>
<td>Low energy bill</td>
<td>Packaging of yoghurt is in unattractive sachets</td>
</tr>
<tr>
<td>Captured local market share</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favourable credit and material finding from donor organizations</td>
<td>Rapid pace of technological advancement</td>
</tr>
<tr>
<td>Growing demand for dairy products globally and locally</td>
<td>Greening of the environment</td>
</tr>
</tbody>
</table>

1.4 Statement of the Problem

The overall problem to be addressed in this study is that despite the significant amount of resources invested in the establishment of Nharira Dairy Centre by ARDA and other donor agencies the dairy centre is currently facing imminent collapse yet little has been done to investigate the underlying reasons and causes threatening the continued viability of this project.

During the years 2000-2005 the centre used to process about 1500 litres to 2000 litres of milk per day but this declined to 300 litres of milk per day. Generally
farmer apathy has set in thereby resulting in registered membership decline from more than one hundred in 2005 to seventy seven in 2012. Administrative costs have continued to escalate against a backdrop of a declining revenue base. The average milk delivered per day by each farmer has declined from about twenty seven litres per day in 2005 to about ten litres per day in 2012. The infrastructure at the dairy is in a state of disrepair. The management at the centre adopted a number of interventions in the past in an attempt to resuscitate the decaying infrastructure but without any success. Nevertheless, despite all these stated problems little has been done to adopt strategies that would see the centre being restored to its original vibrant position.

If the general malaise and state of decline in the operations of the dairy is not addressed opportunities that would otherwise have been available to the Nharira Community to improve the general wellbeing and living standards would become foreclosed, due to the Nharira Community's inability to sustain themselves. This in the long run will make it difficult for Zimbabwe to achieve food security and job creation especially in rural areas.

1.5 Research Objectives

1 To assess how Nharira dairy farmers perceive the benefits of forward vertical integration in dairy operations.

2 To determine the nature of costs and returns from forward vertical integration by Nharira dairy farmers.

3 To determine a turnaround strategy for Nharira dairy farmers that take into account forward vertical integration in dairy and its effect on dairy farm management.

4 To determine whether forward vertical integration by Nharira dairy farmers is addressing issues of dairy farming technology.
5 To assess if forward vertical integration by Nharira dairy farmers is addressing issues of environmental sustainability.

1.6 Research questions

The research questions which are being addressed in this study are:

1. How do Nharira dairy farmers perceive the benefits of forward vertical integration in their dairy operations?

2. What are the nature of costs and returns from forward vertical integration by Nharira dairy farmers?

3. What turnaround strategy can Nharira dairy farmers adopt that take into account forward vertical integration in dairy and its effect on dairy farm management?

4. How is forward vertical integration by Nharira dairy farmers addressing issues of dairy farming technology?

5. How is forward vertical integration by Nharira dairy farmers addressing issues of environmental sustainability?

1.7 Research proposition

The researcher is proposing that forward vertical integration strategy is assumed to benefit to Nharira dairy farmers.
1.8 Scope of the research study

The study is targeted at Nharira dairy which is located 170 kilometres south east of Harare. The study covers the years 2010 to 2012. Costs of production and returns for the period 2010 to 2012 for Nharira dairy are going to be compiled. The respondents in this study are farmers of Nharira dairy development programme.

1.9 Justification of the research/Rationale or Significance of the Study

The dairy industry in Zimbabwe used to be dominated by large scale white commercial farmers. Following the land reform programme the number of large scale white commercial farmers declined together with milk production. It is therefore important to study the operations of small-holder dairy farmers like Nharira because these farmers are generally expected to fill the production vacuum left by former white commercial farmers. When Nharira dairy was provided with credit by the Swedish Centre for Cooperative Development the general expectation was that milk output processed at the farmers’ dairy was going to rise. It is therefore important and justified to find out why the amount of milk processed is not rising and how benefits from forward vertical integration of these dairy operations are being affected.

Agricultural experts and farmers complain that farmers have no influence in the processing and marketing of their produce and the result is that they become price takers (Colman and Young, 1997:30; Johnson, 1990:324; Rukuni, 2001:35). The issue of forward vertical integration in dairy farming is regarded as a way of dealing with marketing imperfections. When considering forward vertical integration the assumption is that there are problems with downstream or there are opportunities in the downstream value chain. It is therefore justified to carry out this study and find out those factors which affect the benefits of forward vertical integration in dairy farming. Haggblade (2011) suggests that Africa’s agri-business stand poised for exceptionally rapid growth for the next forty years and
research is therefore important to provide empirical evidence of value chain models which can be easily used by poor rural African farmers so that they can benefit from this projected growth.

The targeted audience of this study is Nharira dairy farmers and others who may be thinking of forward vertically integrating their dairy operations. The study is also meant to find information on aspects of dairy operations which may be of interest to donor organizations and agricultural experts who include research scientists, educationists and extension staff.

1.10 Limitations of the research study

The study is targeting active members of Nharira dairy development programme. The project has some members who are no longer active and these members are not included in the study. The omission of these farmers might appear to be bias towards active members only. Those farmers who are no longer active are not easy to access. This study is limited to one small-holder dairy project which has forward vertically integrate its dairy operations, rather than a number of small-holder dairy projects pursuing forward vertical integration. The reason for studying one organization is an attempt to find detailed information from one organization which may be applied to other similar organizations.

1.11 Ethical issues to consider in the research study

According to [www.bioethics.umn.edu](http://www.bioethics.umn.edu) (21 September, 2012) there are certain ethical issues which need attention during research. The researcher followed applicable guidelines as outlined in the above website of the University of Minnesota on guidelines to bioethics. These guidelines are: ensuring that participants must consent voluntarily in the research participation; the research aims should contribute to the good of society; the degree of risk taken by those participating in the research must not exceed the anticipated benefits of the results; obtaining informed consent from the research participants; truthful reporting of results; ethical and truthful collection of reliable data, retaining data and sharing access to collected data with colleagues and the public; and a clear,
responsible, ethically sound and carefully outlined plan for data management at the beginning of the research to prevent all manners of conflict and inappropriate research methods including the avoidance of infringements on intellectual property rights and the use of patents and trademarks without taking the proper channel.

1.12 Conceptual framework of the study

The researcher defined the concept of forward vertical integration in dairy farming operations. The various types of forward vertical integration in dairy farming operations were outlined. In this study the notion is that a dairy farm can forward vertically integrate with a milk processing plant.

The researcher presented an overview of the global dairy industry. Current trends in the global dairy industry including the Zimbabwean dairy industry were noted. Current global milk production and milk processing technologies were reviewed. The researcher carried out an empirical study to find out how Nharira dairy farmers are producing, processing and marketing their milk under forward vertical integration. Self administered questionnaires were used to identify managerial, leadership and skills demonstrated by Nharira dairy farmers in the production, processing and marketing of their milk under forward vertical integration. The empirical study was used to determine if the perception of Nharira dairy farmers on forward vertical integration can be explained by theories of forward vertical integration and current trends in global milk production and processing.

Conclusions and recommendations were made on the basis of the empirical study, current trends and theories of forward vertical integration in dairy farming operations. Figure 1.3 shows the research approach used in this investigation.
2010-2012
Nharira Dairy Development Programme

Benefits of forward vertical integration in dairy operations

- Definition of Forward Vertical Integration (FVI)
- Theories of FVI
- Trends of FVI in dairy operations.
- Global perspective of dairy industry.
- Zimbabwe perspective of the dairy industry.
- Milk production technologies.
- Milk processing technologies.
- Benefits of FVI in dairy operations.
- Drawbacks of FVI-Skills, leadership, management.

Questionnaires to find how Nharira dairy farmers perceive FVI;
- Costs and returns;
- Questionnaires to find managerial, leadership, vision, and skills in aspects of dairy operations including milk production, processing and environmental sustainability. Determine if the perception of Nharira dairy farmers on FVI can be explained by theories and trends of FVI, and also by modern trends in milk production and processing.

Conclusions and Recommendations

Figure 1.3 Research approach in undertaking research
1.13 Dissertation structure

Chapter one of the study deals with the introduction to the study which is basically a summary introduction of the research topic followed by a background to the study; the research problem; research questions and research objectives; hypothesis; justification or significance or rationale of the study; scope of the study; limitations of the research; ethical issues; conceptual framework and chapter summary.

Chapter two covers the literature review which has an introduction followed by the main discussion and a chapter summary. Chapter three is about the research methodology which comprise of an introduction, the research design, research philosophy, research strategy, population and sampling techniques, data collection methods, research procedure and research limitations.

Chapter four is about the results and the discussion which accompanies the results. This chapter contains the introduction followed by the relevant statistics, figures and tables. The interpretation of results is followed by analyzing the implications and making of intellectual inferences. Literature is used to reinforce interpretation of the findings.

Chapter five contains the recommendations and conclusions. In the chapter there is an introduction followed by specific conclusions for each concept. Recommendations have the same structure or numbering as for conclusions. This chapter also contains areas for further study, a page for references and other pages for appendices.
1.14 Chapter summary
The topic under investigation is a study of the benefits of forward vertical integration in dairy operations: a case for Nharira dairy for the period 2010 to 2012. A general overview of the dairy industry in Zimbabwe has been given followed by a SWOT analysis of Nharira dairy. The SWOT analysis is done to determine the attractiveness of the dairy industry sector in Zimbabwe and to enable Nharira dairy to take stock of its managerial competencies for long term planning. Despite financial and technical assistance Nharira dairy has not been able to increase the amount of milk it is processing. The objective of this study is to therefore assess how Nharira dairy farmers perceive the concept of forward vertical integration in dairy operations, together with a study of those factors which influence forward vertical integration in general but with a focus on Nharira dairy. These factors which influence forward vertical integration in general will be covered in detail in Chapter two on literature review.
CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The problem elements confronting Nharira Dairy Project as already pointed out in (Chapter 1) are a decline in milk deliveries from 1500 litres per day to the current 300 litres per day, reduced membership of registered farmers and escalating administrative costs against a backdrop of a declining revenue base. These problem elements have persisted despite a number of intervention measures being taken. It is hoped that a review of literature on the benefits of forward vertical integration in dairy farming operations provides an insight into some of the problem elements identified in this study. Solutions to the problem elements identified in this study can also be gathered from this literature review so that Nharira Dairy Project is not allowed to collapse. Forward vertical integration strategy in respect of Nharira dairy farmers is supposed to address issues of declining milk productivity, reduced membership of registered dairy farmers, escalating costs and declining revenue.

The chapter shows the historical background of the study, the benefits of dairy operations, vertical integration in dairy operations and dairy operations. An assessment of stakeholder perception on forward vertical integration in dairy operations is provided. Forward vertical integration business strategy is defined. Theories of vertical integration are explained and their relevance to dairy farming operations also highlighted. The benefits and limitations of forward vertical integration in dairy operations are illustrated. Metrics used to measure these benefits are also indicated. The financial performance of dairy farming operations which have integrated downstream or forward is discussed.

Forward vertical integration is also discussed in this chapter in relation to dairy farming management, dairy technology and environmental sustainability.
2.2 General Overview

Peters, Waterman and Philips (1980) and Peters and Waterman (1982) point out that it is those organizations which achieve a fit between the McKinsey 7-S that are effective. The seven elements are strategy, structure, skill, style, staff, system and shared values. The strategy of Nharira Dairy Project is to process milk and distribute it to customers. The organizational structure of Narira Dairy Project is flat or horizontal. This is a producer owned organization where every member is treated equally. Nharira Dairy Project members emphasize shared values of collective responsibility, cooperative style of leadership, simple production systems using cheap, locally available and appropriate skills. The global dairy market on the other hand is expected to offer strong growth prospects in the coming five years thus creating challenges and opportunities for key players along the dairy supply chain (www.rabobank.com 19 August 2012). The implications of this global report on Zimbabwean dairy players in general and Nharira Dairy Project in particular means that they have to adequately and strategically position themselves. For members of Nharira Dairy Project it is vital to take advantage of this opportunity while at the same time paying heed to the problem elements of declining productivity, escalating costs, diminishing membership and revenue base.

From the global perspective the global dairy products markets is estimated to reach US $494 billion by 2015, suggesting that the demand for dairy products is on an upswing driven by the advent of functional dairy protein products such as ice cream, frozen desserts, yoghurt and cheese (Global Industry Analysts Report, 2012). This report is optimistic but the challenge for dairy producers come from failing to meet both local and global demand like what Nharira Dairy Project is currently experiencing. Business opportunities are missed and it also becomes difficult to achieve organizational fit between strategy and structure.

2.2.1 Benefits of Dairy Operations

Generally what comes to mind when the word dairy is mentioned, is milk. Ruby (2012) emphasizes the importance of dairy operations by pointing out that in the USA dairy is
much more than milk and the ripple effect on the economy and the economic wellbeing of rural America is worth billions of dollars in economic output, household earnings and job creation basing on economic analysis of direct and indirect economic impact of US dairy farming. Even in a country like Zimbabwe it is also apparent that dairies create jobs for people such as veterinarians, machinery manufacturers, packaging manufacturers, distribution and also retail agents.

Mahmood and Ali (2011) point out in their study that dairy production contributes significantly to the incomes of small households in Pakistan where each household generates a monthly income ranging from US$60-$240 for smallholders owning one to four dairy animals. It thus becomes no surprise at all to find donors here in Zimbabwe funding projects like that at Nharira because the belief is that enhanced dairy production will improve the incomes of marginalized poor farmers including women.

Dairy farm operations have an impact on their rural communities far beyond providing high quality nutritious products, with job creation, investment in the local community with the attendant multiplier effect on the economy and reduction of tax burden on the local economies being some of the benefits which go beyond mere milk production (Coolidge, 2010).

Jan (2012) describes how dairy farming operations have contributed in opening up food marketing opportunities in Poland although there is no compelling evidence that dairy farming alone is responsible for ensuring adequate food in that country. Janis (2010) emphasizes that dairy is an important part of the sector of the economy of Baltic States as a provider of work in rural areas. Brooke (2008) describes dairy farming operations in the USA as enablers of farmers to venture into manufacturing their own branded products like cheese and butter. Wiley (2007) emphasize the positive effects of milk on child growth despite the current debates still going on as to whether processed milk is really a suitable food for children.

Hillbom (2011) describes how technological and institutional change in Tanzania has turned milk into one of the most reliable and important sources of income for small holder households. In India a study done by Mahalati and Mishra (2008) proved that
taming dairy animals not only generate substantial income but also has the potential to create more income because it was found that dairy enterprises not only earn profit for cattle breeders, but also utilize idle resources like crop residues and idle labour force.

2.2.2 Vertical Integration in Dairy Operations

Clemens (2012) attributes milk price regulation and antitrust legislation as two critical factors which prevent most US farmers from vertically integrating their dairy operations although an antitrust exemption has enabled dairy farmers to market products collectively under umbrella organizations in a form of partial vertical integration. Brown, Hall, Kerr and Valladares (2008) describe a vertically integrated dairy company as one which procures most of its milk from its own dairy herd and processes it into a number of dairy products at its own plants which are then distributed to independent grocery stores, supermarkets, institutions as well as the company’s own stores. In Zimbabwe there are some dairy companies which qualify under this explanation and Nharira Dairy is one such organization. Atalay, Hortascu and Syverson (2012) assert that vertical integration is not primarily about transfer of goods along the production chain but it is also about the transfer of intangible inputs rather than physical ones but does not preclude the use of farmers’ skills to produce crops which are fed to cows.

2.2.3 Dairy Operations

FAO and IDF (2011) define dairy operations as the production of safe quality milk from healthy animals using management practices that are sustainable from an animal welfare, social, economic and environmental perspective. In Zimbabwe there is an estimated 300 registered commercial dairy farmers producing about 40 million litres of milk against an estimated requirement of 100 million litres of milk per year (NADF, 2012). Within this registered number the farmers are arbitrarily categorized into large scale and small scale commercial farmers. The criteria used to group these farmers include size of land holding, number of cows milked, amount of milk produced, production technology used and general level of farm management expertise.
In some western countries like Denmark, Sweden, Germany and the USA the concept of family farms and corporate farms takes precedence over scale, with Arla Foods Amba being an example of a global dairy company and cooperative owned by about 8000 Danish, Swedish and German dairy farmers (www.marketlineinfo.com February 2012). Another example of a global dairy company is Almarai which is a Saudi based company and it is the world’s largest dairy farming and processing operation (Strategic Direction, 2008).

From the above mentioned cases of dairy cooperatives in Western Europe and the global dairy farm in Saudi Arabia it is apparent that dairy farming is no longer confined to the farm only. The connection with the global economy has become stronger than ever. This connection with the global economy may pose challenges and opportunities for dairy organizations especially local dairies like Nharira dairy project.

2.3 Stakeholder Perception on Forward Vertical Integration in Dairy Operations

Harvard Business School (1997) classifies stakeholders into two broad groups, namely primary and secondary stakeholders who are then collectively defined as user groups, interest groups, beneficiaries, decision makers and those often excluded. In this study of Nharira dairy project the primary stakeholders are the farmers who benefit from or are adversely affected by any activity. Secondary stakeholders in this study are other people and institutions with an interest in the resources or area being considered. Donor organizations, government departments and ministries are examples of these secondary stakeholders. It is vital to consider stakeholder perception of forward vertical integration in dairy operations if the organization is to achieve its objectives. In this study one of the problem elements which are confronting Nharira Dairy Project is a decline in the number of its registered members. Surprisingly those people who are de-registering are the primary stakeholders who are expected to have a better perception of the project’s business philosophy of forward vertical integration.
2.3.1 Definition of Forward Vertical Integration

There is no single definition of forward vertical integration from the broad field of vertical integration. Mayen, Balagtas and Alexander (2009) define forward vertical integration as the involvement of a firm in two or more adjacent stages with output from the first stage transferred within the firm as an input for the subsequent stage. In the context of forward vertical integration in dairy operations, milk for instance would be produced and processed into cheese, yoghurt, ice cream and cultured milk at the same farm. Johnston and Lawrence (1988) assert that the greater the firm’s ownership and control over each successive stage of the value chain process the greater the degree of vertical integration. Ling and Liebrand (1995) with reference to the United States of America define forward vertical integration as farmer owned, farmer controlled and farmer used dairy cooperatives whose main objectives are to bargain for farmers’ milk prices only without any concern for further processing the milk and or to manufacture dairy products from milk in their cooperative plants. The bargaining for farmers’ milk prices only as mentioned in the above statement does not apply to Nharira dairy project. The entire milk at Nharira dairy is processed into fermented milk and yoghurt and this is the forward vertical integration under focus in this study.

In Zimbabwe there are some farmers including Nharira Dairy farmers who have forward vertically integrated. A definition of forward vertical integration that appear to apply to Zimbabwe is that from Nicholson and Stephenson (2007) where it is defined as the value addition of milk on the farm driven by consumer characteristics and the desire to capture a larger share of the consumer dollar. Boland, Barton and Domine (1999) are not necessarily convinced that forward vertical integration occurs only on the farm and in their definition they describe forward vertical integration as a method of vertical coordination representing the greatest degree of control that a firm can gain over the output from another stage of production under one common ownership and management.

Rotharermel, Hitt and Jobe (2006) use another term called taper integration to define forward vertical integration, which they refer to as the sourcing of inputs externally from independent suppliers as well as internally within the boundaries of the firm and
disposing of its outputs through independent outlets in addition to company owned channels. Dairy farmers for example at Nharira dairy project procure inputs like veterinary drugs, chemicals and stock-feed externally and sometimes also internally in the case of silage to produce milk which is processed internally to produce cultured milk, yoghurt and ice cream. The manufactured dairy products are distributed directly or indirectly to customers. This definition therefore conforms to the forward vertical integration strategy under investigation in this study.

**2.3.2 Vertical Integration Theories**

Different reasons have been advanced by different researchers to explain or justify why firms or organizations vertically integrate their operations. Roder(2007) posits that vertical integration theories (both forward and backward) generally analyze the way companies deal with different forms of market imperfections which may arise through incomplete contracting, industrial organization economics and the exclusionary market power approach and therefore vertical integration is regarded as a way of preventing problems that may arise through these market imperfections.

Rangan, Corey and Cespedes (1993) argue that vertical integration in firms occur where a company has a higher level of specific asset used in the production process and where there is greater uncertainty in the product market and also between the transacting parties. Dairy farming is an industry which makes use of specific assets like suitable dairy cow breeds and special milking and handling facilities in the production process. On this score of asset specificity dairy farming is potentially eligible for vertical integration. Rangan, Corey and Cespedes (1993) do not specify or quantify what they imply by greater uncertainty in product market or uncertainty between the transacting parties. Further research is needed in this area of uncertainty in the product market and transacting parties to identify their relevance and applicability to dairy operations with particular emphasis on forward vertical integration strategy.

Hart and Moore (1990) advance the argument that organizations vertically integrate their operations because they are not able to write contracts which govern their
relationship with outside parties. Besley (1995) explains that in most African countries land rights border between the traditional system (communal) and the claims of individuals such that there are varying results on whether property rights really matter when writing contracts. Nharira dairy project for instance is owned and managed by a group of communal farmers who have no title deeds on their properties. The fact that Nharira dairy project has forward vertically integrated does indeed support the argument put forward by Hart and Moore (1990). One of the problem elements confronting Nharira dairy project is failure to acquire credit from financial institutions due to lack of collateral security. Property rights therefore really matter when it comes to the ability of communal farmers or any other potential investor to enter into contracts with outside parties.

Hill and Jones (1998) propose a theory which accounts for the differences between reduced transaction costs brought about by vertical integration and the additional costs that arise from vertical integration. The basis of this theory is that an organization will vertically integrate its operations if the additional costs that arise from vertical integration are less than the reduced transaction costs brought about by vertical integration. The relevancy and applicability of Hill and Jones’ theory to Nharira dairy project’s forward vertical integration strategy needs further investigation. Nharira dairy’s strategy from its inception was forward vertical integration. The issue of reduced transaction costs and additional costs arising from vertical integration may be applicable and relevant to Nharira dairy project. Nharira dairy farmers may not incur higher transportation costs compared to farmers delivering their milk to Dairibord in Harare. However, what is at stake is that Nharira dairy project appears to have incurred additional costs from forward vertical integration.

Acemoglu, Aghion, Griffith and Zilibotti(2010) argue that vertical integration in a pair of industries is less likely when the supplying industry is less technology intensive, and is more likely where the processing industry is more technology intensive. A critique of the relevancy and applicability of this theoretical framework to dairy farming operations raises interesting observations. Generally commercial dairy farming is a technology intensive industry and usually dairy farmers appear not to forward vertically integrate
their operations. Most commercial and high intensive technology dairy farms in Zimbabwe supply their milk to Dairibord Zimbabwe, Nestle, and the National Dairy Cooperatives of Zimbabwe rather than process the milk on their farms (Mano, 2010). This practice by commercial dairy farmers is in agreement with the technology theory of vertical integration propounded by Acemoglu, Aghion, Griffith and Zilibotti (2010).

The industrial organization perspective argues that vertical integration is capable of achieving competitive advantage in imperfect markets as a result of benefits that arise from cost savings, economies of combined operations, economies of internal control and coordination and also economies of information and stable relationships (Porter, 1980). The relevancy and applicability of the industrial organization theory to Nharira dairy also require further investigation. Nharira dairy for instance is having problems of rising costs despite the purported benefits of economies from cost savings that arise from forward vertical integration.

Lajili, Madunic and Mahoney (2007) explain that vertical integration strategies are other forms of substituting contractual or market exchanges with internal coordination of transactions and also states that the increased frequency of market exchanges increases the likelihood of vertical integration. This theory merely corroborates earlier works of Rangan, Corey and Cespedes (1993) on transaction costs economic theory and Hart and Moore (1990) property rights theory.

Harrigan (1986) explains that full integration offers the best opportunities while taper integration could be as economic as full integration if reliable outside customers or suppliers are available to consume or provide the surplus or shortfall in the firm’s productive capacity. Generally the nature of agriculture and particularly dairy farming full integration may not be achieved. In dairy farming there is still need for sourcing external inputs which are needed to complete the production process.

Sierbert, Jones and Sporleder (1997) suggest an alternative analysis to vertical integration where farmers invest in publicly traded equities of companies which process
agricultural commodities. This model is not the focus of this study and therefore it is not being given much attention.

Cadeaux and Ng (2012) confirm in their studies that the transaction cost hypothesis and asset specificity favour forward vertical integration but in this new economy of widening globalization and rapid technological change an increasing number of industries may face high levels of uncertainty such that they become less manageable through forward vertical integration.

Ursino (2009) asserts that firms integrate to gain bargaining power and the ability to gain bargaining power enables the processor to appropriate a larger share of revenue which makes integration a profitable strategy for the processor.

Although different reasons have been put forward to explain why vertical integration is carried out by organizations, most vertical integration models mentioned in this study emphasize that it is done to deal with market imperfections.

2.3.3 Measures or metrics of dairy farm competitiveness

Generally it may not be easy for dairy farmers to know whether they are really competitive in their farming operations. Shoemaker, Eastridge, Breece (2008) have identified fifteen measures or metrics which represent key characteristics of most competitive dairy producers in the USA and these are rate of production; cost control; capital efficiency; profitability; liquidity; repayment schedule; solvency; mission statement; family’s standard of living and motivation of labour force.

Mcbride and Greene (2007) found that primary organic farm operators with less than a high school diploma were associated with lower economic costs. These researchers do not offer an explanation for this association between a lower level of education and lower economic costs. Bolton (2012) describes production, financial and risk management decisions as the three most important determinants of competitiveness in dairy farming operations. Bailey (2002) identifies feed expenses, labour management and herd replacement as critical factors for success on small dairy farms.
2.3.3.1 Benefits of forward vertical integration in dairy operations

Myers (2009) explains that forward vertical integration in dairy operations minimize the number of middlemen in the marketing process which results in increased farm profitability and viability. Bencke (2007) cites the benefits of forward vertical integration as: reduced transportation costs where there is common ownership of resources within a short distance; improved supply chain coordination; greater opportunities to differentiate products due to greater input control and an ability to capture downstream profit margins and distribution channels. Guan and Rehme (2012) assert that downstream integration provides access to both knowledge and information about customers. The knowledge referred to by Guan and Rehme (2012) gives an insight into what customers want, offers an in depth understanding of why particular offerings are seen as desirable by the customer, how best to provide customers and what future offerings might look like, the creation of powerful synergies and strategic partnerships with customers, penetrating into customer decision making processes, getting involved in customer inventory management and thus facilitating access to more timely and accurate information of customer demand thereby improving customer retention. A case in point is that of dairy farmer owned and forward vertically integrated cooperatives in the USA which have been able to use their market power and raise the farm price of milk by almost nine percent above marginal cost (Metin and Balagtas, (2012).

2.3.3.2 Limitations of forward vertical integration in dairy operations

Ting and Qun (2012) point out that vertically integrating business operations is not a guarantee for success but that there is need for greater innovation, creation of top brands, coordination with other enterprises, making full use of new scientific and technological achievements in order to realize the benefits of vertical integration which may not be easy to manage because management may become complex. McGuire and Staelin (2008) point out that in vertically integrated companies there is an increased risk of incurring more distribution and selling expenses. Vertically integrated companies may risk breaching antitrust regulations, resulting in vertical foreclosure where an actual or
perceived rival’s access to supplies or markets is hampered or eliminated (Spiegel, 2011).

Gilson, Sabel and Scott (2009) point out that these days producers cannot themselves maintain cutting technology in every field required for the success of their products and accordingly companies are increasingly electing to acquire by contract components that they would have made themselves. Instead of vertical integration there is now equilibrium vertical disintegration which occurs if and only if total industry profit is higher under vertical separation than under integration (Chen, 2005), and also Porter (1980) in earlier studies point out that vertical integration can cause damage from being cut off from outside intelligence. Harvard Business Review (1999) assert that vertical integration tend to consider market efficiency at the expense of the internal efficiency of the firm and the trend these days is refocusing and concentrating on core business rather than doing many things at the same time. The argument which can be put forward is that perhaps Nharira dairy project should concentrate on one line of business rather than doing many things. The dairy project has the choice of producing raw milk for sale or concentrate on milk processing only.

2.4 Financial performance of value added dairy operations

One of the problem elements facing Nharira Dairy Project is negative financial performance, and results of studies in the financial performance of value added dairy operations show varying results. Nicholson and Stephenson (2007) conclude in their survey study of farms in the USA that value addition on dairy farms is not a panacea for farmers who wish to enhance revenue from on farm milk processing. However in two case studies of Fonterra cooperative group owned by nearly 12000 dairy farmers (Strategic Direction, 2010) and Al marai (Strategic Direction, 2008) successes of forward vertical integration strategy have been recorded in these two vertically integrated dairy farming organizations. Another point to take note of is that governments in the United States of America, Europe, and Canada intervene heavily in their respective dairy industries with a combination of price supports, subsidies, purchases of surpluses,
import restrictions and export subsidies (Doyon, 2011). Australia and New Zealand, according to Doyon (2011) have deregulated their dairy industries.

Other studies point out that on farm milk processing offers sufficient scope for value addition and income generation, and show costs and returns that suggest that milk processing does considerable value addition, and offers good opportunities for income enhancement and employment generation (Kumar, 2010). In computing figures of net revenue for value added milk Kumar (2010) takes into consideration the amount of milk, the farm value of the milk, transport cost, additional materials, labour, rent/electricity, marketing/processing costs, gross expenditure and gross revenue. Considering the varying conclusions drawn from the financial performance of value added dairy operations it appears like there is no commonly accepted way of evaluating the financial performance of value added dairy operations.

Despite the findings of Nicholson and Stephenson (2007) that forward vertical integration in dairy farming has negative returns there is a list of dairy farms which have been successful by adopting this strategy. Boyce (2008) report that Shamrock farms in Stanfield, Arizona has been able to provide a wide variety of products from fresh milk produced on its farms. In addition to this the organization has successfully managed to focus on animal welfare, employee incentives, milk quality, customer service and community programmes. Another farm which has recorded success is Dale farm in the United Kingdom which sells fresh milk, cream, juice products, cheddar cheese, butter, spreads, yoghurts, yoghurt and probiotic drinks, desserts, ice cream, milk and whey powders, skimmed concentrate and cottage cheese (Farmer’s Weekly, 2009). In Zimbabwe, Mano (2010) identifies three forward vertically integrated dairy farms which have performed exceptionally well and these are Dendairy, Kefalos and Dorking dairies.

2.5 Forward vertical integration in dairy and its effect on dairy farm management

Dairy farming requires all round clock management. When the same dairy farmer ventures into milk processing through forward vertical integration dairy farming
management complexity may also increase. Nharira dairy project has not been spared from problems relating to management, leadership and administrative abilities.

Charimba (2012) catalogues dairy farms which have forward vertically their operations in Zimbabwe with consequent improvement in management, entrepreneurship, leadership and administrative abilities. Nharira dairy project on the other hand appears to be bedeviled by management problems despite having forward vertically integrated its operations. One of the management problems facing Nharira dairy project is lack of governance and this is threatening the continued survival of the project. The King Report on Governance for South Africa (2009) defines governance as effective leadership characterized by transparency and accountability. Farmers in New Zealand who have forward vertically integrated their dairy operations have resolved management and governance issues by electing a shareholder council which represents the interests of farmers (Dana and Schoeman, 2010). A shareholder council allows frees farmers from complex management and governance issues brought about by forward vertical integration. The situation for Nharira dairy project is that the same farmers are involved in milk production and milk processing.

Reynolds, Fischer and Hartmann (2009) highlight the importance of timely, frequent, relevant and reliable information and equal power distribution between members of agricultural cooperatives which have forward vertically integrated their dairy operations.

Financial management including the ability to mobilize finance is critical for the success of forward vertical integration in dairy farming operations. Nharira dairy project is facing financial viability problems stemming from the need to finance both milk production and processing. Turvey, Bogun and Yu (2012) point out that the ability to secure and manage credit facilities by small agricultural organizations involved in the processing of agricultural products is now possible. An organization like Nharira dairy project can secure credit basing on the quantity of its processed milk products.

Forward vertical integration in dairy operations may generate management problems of human resources. Bell (2009) asserts that when a dairy farm forward vertically integrates its operations those human resources that directly impact on the strategic
plan of dairy farming operations become critical, and there is need for a trained labour force and a succession plan so that business continuity is guaranteed. Clarke (2012) recommends that management, leadership and administrative problems in forward vertically integrated operations can be addressed through a high level of knowledge sharing among the farmers themselves. In Norway, Almas (2010) indicates that because of management problems brought about by forward vertical integration the dairy farmers have resorted to joint farming where more farmers establish a joint company and merge their resources and work together.

2.6 Forward vertical integration in dairy and its impact on dairy technology and marketing

Charimba (2012) makes the observation that dairy farms like Kefalos, Dendairy and Alpha and Omega which have forward vertically integrated their operations are making use of the state of the art technology to meet milk production, processing, hygiene, nutritional, institutional regulations and marketing requirements. Nharira dairy project on the other hand is one of those dairy operations with forward vertical integration in Zimbabwe using simple technology to meet its milk production, processing, hygiene, nutritional, institutional regulations and marketing requirements. Kolbach and Lyons (2012) agree that very few farmers are willing to use technology especially when they are not processing their own milk.

The need to ensure a continued supply of milk for processing on the farm has given rise to the use of technology on a very high scale (Eastwood, 2008; Bewley, 2010; Rodenburg, 2007; Schulze, Spilke and Lehner, 2007; Ishler, 2008). In an effort to increase milk production for processing at the farm some dairy farmers have resorted to the use of biotechnology in the form of recombinant Bovine Growth Hormone (rBGH), non-natural feed additives and supplements (Gould, 2007; Carmen, Clark, Daley, Benbrook, 2010; United States Department of Agriculture (USDA), 2000). Automatic milking of dairy cows is now a reality on dairy farms involved in forward vertical integration of their operations (Reinemann, Lind and Rodenburg, 2010; Jacobs and Siegford, 2012; de-Koning, 2010). Raghava (2012) points out that small scale dairy
farmers with forward vertical integration operations in India are now using hand operating milking machines instead of using hands to milk their cows.

The processing of milk on a large scale for public consumption is a technology intensive operation. Those dairy farms which have vertically integrated their operations must meet standards such as recommended butterfat (BF) and solids not fat (SNF) which require a high level of technology to achieve (Institute of Food Technologists, 2012; New England Cheese Making Supply Company, 2012; Dunkley and Bruhn, 1995; Fankhauser, 2001; Northeast Centre for Food Entrepreneurship; Kurwijila, 2006). The technology used in processing has also led to the determination of marketing methods of processed milk and dairy products. Nharira dairy project uses simple manual technology to process its milk and its method of marketing is predominantly sales which technically is not marketing. Kotler (2005) defines marketing as the science and art of exploring, creating, and delivering value to satisfy the needs of a target market at a profit by identifying a segment, measuring and quantifying unfulfilled needs and desires of this segment. Through forward vertical integration the use of technology is promoted giving rise to a wide range of dairy products (www.marketlineinfo.com February 2012; www.agmrc.org 2o December 2012). Scientific based guidelines and research using high technology are now being used to convince consumers that milk processed at the farm is safe for human consumption (Termini, Roberto and Hostetter, 2011; Li, Peterson and Xia, 2010; Codex Alimentarius Commission, 2001). www.dairyfoods.com (2010) confirms that forward vertical integration on dairy farms has enabled rapid adoption and use of technology to produce a number of dairy products with added dietary supplements. Despite the strong connection between forward vertical integration and technology it does not appear easy to point out if forward vertical integration has enhanced technology on dairy farms or the other way round. Further research is needed to clarify this position.
2.7 Forward vertical integration in dairy and its impact on the environment

One of the problem elements confronting Nharira dairy project is the inability of the farmers to obtain adequate fodder for their dairy cows from the local pastures. The dairy project is also using firewood to meet its energy requirements and this firewood is not available within the local vicinity. It is not easy to say with certainty that forward vertical integration has made the local environment unable to sustain the dairy project. There is need for further research to establish the connection between forward vertical integration and environmental sustainability for the Nharira community. In studies done in some countries where dairy farms process milk on the farm the dairy sector is of the view that if it does not take responsibility for its activities on environmental impact certain policymakers may be forced to take action (International Dairy Federation, 2010; International Organisation of Standards (ISO) 14063:2000; Organisation of Economic Cooperation and Development (OECD), 1999; ISO 14001:2004; ISO: 14064; Svensson and Wagner, 2012). The International Organisation of Standards (ISO) 14020:2000 stipulates that dairy farms which process milk should evaluate the level of environmental impact of their products based on quantitative data from a Life Cycle Assessment (LCA) of the product. The Innovation Centre for US Dairy (2012) highlights the fact that there is need for dairy farms that vertically integrate their operations to focus on energy management in dairy processing, packaging and distribution. Dairy farms which have vertically integrated their operations have been criticized for causing pollution and contributing to the greenhouse effect without taking preventative measures (www.busiessgreen.com/bg/newsFebruary22,2012; FAO, 2010).

2.8 Chapter summary and conclusion

The problem elements in this study are viability and possible collapse of Nharira Dairy Project’s forward vertical integration in dairy farming operations. Issues of membership loss through resignations, a decrease in milk production and processing capacity, escalating costs and revenue decline and inability to meet customer demands and satisfaction need to be resolved. The review of literature covered stakeholder perception on forward vertical integration in dairy farming operations; forward vertical integration in dairy and its effect on dairy farm management; forward vertical integration
in dairy and its impact on dairy technology and marketing; and forward vertical integration in dairy and its impact on the environment. However, there is need for primary research for solutions to problem elements in this study. This primary research is the subject matter of chapter three (3).
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction
The chapter covers the following areas in research methodology: research design; research philosophy; research strategy; population and sampling techniques; data collection methods; research procedure; and research limitations.

3.2 Research design
The research design issues considered by the researcher are selection of a representative sample of Nharira dairy farmers as respondents for purposes of obtaining valid, legitimate and reliable results even though time of research may change with the same or different researcher, and how to ask such that the information obtained is a true representation of reality. The target population is Nharira dairy project members consisting of farm owners, family members, farm workers and the milk processing centre workers. Proportional stratified sampling is used in this research to select a representative sample of the target population. A self administered questionnaire consisting of fifty questions which require respondents to choose one answer from a possible six choices based on a Likert measurement scale is used. There is also a total of ten open ended questions with at least two open ended questions for each objective. The questionnaire statements reflect current thinking in forward vertical integration and dairy operations as revealed by the review of extant literature in chapter two. The research design is therefore meant to measure the extent to which Nharira dairy farmers agree with the latest information on vertical integration theories in relationship to dairy farming as revealed in the literature review section in chapter two. Respondents are not asked to write their names or to reveal them in any way. This is meant to ensure anonymity of respondents and therefore encourages the respondents to feel confident in answering the questions.

3.3 Research philosophy
Research philosophy can influence the way in which the research is undertaken from design through to conclusions. It is therefore necessary to consider research approaches which are congruent to the nature and aims of the particular inquiry so that researcher biases are understood, exposed and minimized (Flowers, 2009:1). The research approach in this study considers the philosophical constructs of epistemology,
ontology or praxis, deductive and inductive logic, research strategies, time horizons, classification of research purpose and multi-purpose research methods.

3.3.1 Epistemology
Epistemology considers views about the most appropriate ways of enquiring into the nature of knowledge (Easterby-Smith, Thorpe and Jackson, 2008). Epistemology also refers to the nature of knowledge (Eriksson and Kovalainen, 2008). It is therefore important for this researcher to consider the various ways of enquiring into the nature of knowledge and also to understand about the nature of this knowledge because the researcher might hold some assumptions and beliefs which may influence epistemological choices such as positivism, realism, interpretivism or phenomenology and symbolic interactionism. In this investigation realism and symbolic interactionism appear not to deserve much consideration. Saunders, Lewis and Thornhill (2007) provide explanations on the nature of realism and Khaldoun and Le Navenec (2011) give some details on the philosophical concepts behind symbolic interactionism.

3.3.1.1 Positivism
Easterby-Smith, Thorpe and Jackson (2008) explain that positivism is based on the value of reason, truth and validity and that it is measured empirically using quantitative methods. The researcher in this investigation is also gathering quantitative facts and is therefore taking the positivist approach. The researcher is also testing a research proposition on the basis of the number of some recorded responses in the survey questionnaires. The researcher in identifying problem elements at Nharira dairy is applying positivist approach in quantifying the decline in the volume of milk processed at the centre, escalation in the costs of production, declining revenue base and a decrease in the number of registered members of the project.

3.3.1.2 Interpretivism
Denzin and Lincoln (2003) assert that interpretivists consider multiple realities. According to interpretivists all knowledge is relative to the knower, and therefore
interpretivists aim to work alongside others as they make sense of, draw meaning from and create their realities in order to understand their point of view and interpret these experiences in the context of the researcher’s academic experience (Hatch and Cunliffe, 2006). The close nature of the researcher and the researched in this paradigm and the risk that any interpretation is framed within the mind of the researcher means that the researcher take steps such as ensuring that: respondents remain anonymous to the researcher; open ended questions are used to capture the views of the respondents; self administered questionnaires are used to eliminate undue influence from the researcher, the population sample of Nharira dairy project is randomly selected and truly representative to avoid the researcher’s bias.

3.3.1.2.1 Phenomenology
Phenomenological research is a strategy of inquiry in which the researcher identifies the essence of human experiences about a phenomenon as described by participants (Moustakas, 1994). Researchers also set aside their experiences to understand those of the participants in the study (Nieswiadomy, 1993). In this study the researcher is using self administered questionnaires to inquire and capture the experiences of respondents from the sample survey questionnaires on their perception of forward vertical integration in dairy operations, the management of these dairy operations and their views and awareness on the impact of dairy operations on environmental sustainability. The researcher is also using open ended questions in this study in order to record and capture the research phenomenon as described by the respondents. The researcher in recording the experiences of Nharira dairy farmers as reflected by responses from the sample survey questionnaires is adopting a phenomenological approach in carrying out this study. The researcher’s experience of the research phenomenon is emanating from the review of extant literature on vertical integration theories, the benefits of forward vertical integration in dairy operations, costs and returns from vertical integration in dairy operations including the impact of dairy operations on environmental sustainability.
3.3.2 Ontology/Praxis
Blaikie (1993) defines ontology as the science or study of being that describes our view (claims or assumptions) on the nature of reality and further asks whether objective reality really exists, or there is only a subjective reality created in our minds. Hatch and Cunliffe (2006) also go further on the discussion of reality by asking whether it exists through experience of it (subjectivism) or it exists independently of those who live it (objectivism). In this study the researcher is embracing objectivism where the results of the research and their interpretation are not connected with the researcher’s assumptions or views about the nature of forward vertical integration at Nharira dairy but rather to extant literature on forward vertical integration theories in dairy operations, the benefits and limitations of forward vertical integration in dairy operations, managerial ability, costs and returns from dairy operations and the impact of dairy operations on environmental sustainability.

3.3.2.1 Pragmatism
Generally pragmatism arises out of actions, situations and consequences rather than antecedent conditions and Rossman and Wilson (1985) point out that while emphasizing the research problem researchers use all approaches available to understand the problem under investigation. Essentially researchers are not committed to any one system of philosophy and reality (Cresswell, 2008). The researcher in this study is making use of inquiries drawn largely from both quantitative and qualitative assumptions. In this study the researcher is making use of both quantitative and qualitative methods as reflected in the objectives and research questions of the study.

3.3.3 Research approaches (Deduction and Induction)
De Vaus (2001) also refers to deduction as theory testing or deductive logic and induction as theory building or inductive logic. The researcher in this study is using both deduction and induction research approaches.

3.3.3.1 Deductive Logic
The theoretical or conceptual structure developed in this study and investigation of Nharira dairy project which requires testing using deduction is whether Nharira dairy
project members are still benefitting from forward vertical integration in their dairy operations considering that: Nharira dairy project is no longer competitive and is in danger of imminent collapse considering that it used to process 1500 litres of milk per day but is now processing 300 litres of milk per day; Nharira dairy project is facing escalating costs against a declining revenue base; Nharira dairy project is failing to meet customer demand and satisfaction in terms of product quantity and quality. This theoretical or conceptual structure is tested through primary data collected from sample survey questionnaires and also from secondary data obtained from Nharira milk collection and processing centre.

3.3.3.2 Inductive Logic

In this investigation of Nharira dairy project the researcher is building or developing theory or a conceptual framework through collection and recording of responses from sample survey self administered questionnaires. The conceptual framework or theory in this study is developed from particular instances through primary data collection on how Nharira dairy project members manage their dairy operations and how they view the benefits of forward vertical integration in their dairy operations. The researcher in this study is collecting and recording primary data from the population sample of Narira dairy project members on their: perception on the benefits of forward vertical integration in dairy operations; on the costs and returns from their forward vertically integrated dairy operations; management and leadership capabilities; level of awareness of the impact of their dairy operations on environmental sustainability. On the basis of these particular instances measured and recorded from the sample of respondents in this study the researcher makes general statements on issues pertaining to forward vertical integration in dairy operations, management and leadership capabilities in forward vertically integrated smallholder dairy projects and level of awareness by the small scale dairy farmers of the impact of their dairy operations on environmental sustainability.

3.3.4 Research Strategies

There are several research strategies which can be used in carrying out research. These include experiments (Robinson, 2012); surveys (Sitzia, Kelley, Clark and Brown,
2003); case study (Robson, 1993:40); grounded theory (Glaser and Strauss, 1967); ethnography (Harvard Business Review, March 2009); action research (Huxham, 1996:240); (Zuber-Skerrit, 1996); and (Cunningham, 1995); archival research (Geiger and Moore, 2011); practitioner research (Cohen, Manion and Morrison, 2009) and (Mc Williams, 2004:113); and triangulation (Hussein, 2009). The researcher in this investigation is using the survey and the case study approaches, hence these strategies are receiving more attention than other strategies mentioned above.

3.3.4.1 Survey

Sitzia, Kelley, Clark and Brown (2003) define a survey as the selection of a relatively large sample of people from a predetermined population, followed by the collection of a relatively small amount of data from those individuals. In this study a sample of subjects is drawn from a population of Nharira dairy farmers and studied to make inferences about the population of Nharira dairy project farmers. Self administered questionnaires are used to collect primary data from respondents in the sample of Nharira dairy project members.

3.3.4.2 Case study

Robson (1993:40) defines a case study as the development of detailed, intensive knowledge about a single case or a small number of related cases. Yin (1984) also defines a case study as a research targeted to a limited number of events, conditions or entity together with their inter-relationships. Einsehardt (1989) also explains that a case study involves gathering detailed information about the unit being investigated. The researcher is using the case study approach research strategy in this investigation to generate data on the benefits of forward vertical integration in dairy operations in a small-holder dairy farming operation in Zimbabwe. Nharira dairy project was launched in 1986 but seem to have made little progress in terms of this forward vertical integration strategy in its dairy operations hence the case study of Nharira dairy project provides a deep probing that may yield solutions and also dispel myths and generalizations about other small-holder dairy operations in Zimbabwe which have forward vertically integrated their dairy operations. From this case study of Nharira dairy project it may
also be possible to obtain findings which may have some general applicability to other small-holder forward vertically integrated dairy farming operations in Zimbabwe.

3.3.5 Time Horizons
The time horizon considered by the researcher is a period of two years covering the years 2010-2012. The time when the self administered questionnaires are used to collect primary data is January 2013.

3.3.5.1 Cross-sectional study
This research study is largely cross-sectional. The study is looking at the concept of forward vertical integration in dairy operations for Nharira dairy project at a particular time of January 2013 but covering the years 2010-2012.

3.3.6 Classification of Research Purpose and Strategy
Research can be classified in terms of their purpose as well as by the research strategy used and the classification used is exploratory, descriptive and explanatory (Robson, 1993).

3.3.6.1 Exploratory Study
An exploratory study addresses a subject about which there are high levels of uncertainty and ignorance about the subject and when the problem is not very well understood (Robson, 1993:42). In this study the researcher is using exploratory research because it appears forward vertical integration in dairy operations among small-holder dairy farmers in Zimbabwe is still unfolding and yet very little factual information is known about this strategy in small-holder dairy operations. The researcher would therefore like to explore how Nharira dairy farmers are performing under this vertical integration strategy. The aim of the researcher is to identify any opportunities, problems or situations associated with this strategy of forward vertical integration in small-holder dairy operations.

3.3.6.2 Explanatory Study
Explanatory studies attempt to answer the why questions of research phenomena and therefore involve developing causal explanations (De Vaus, 2001). The emphasis by the researcher in this study is to investigate the problem elements or situation highlighted in this study such as declining amounts of milk processed per day, declining revenue and
escalating costs in order to explain any relationship between these variables and thus make valid inferences from the research design.

3.3.6.3 Descriptive Study

The object of descriptive study is to portray an accurate profile of persons, events or situations (Robson, 1993). The researcher in this study is portraying a picture of what is happening at Nharira dairy in terms of forward vertical integration as a business strategy. The researcher is offering a description of forward vertical integration strategy in dairy operations at Nharira dairy project to add to the shape of knowledge and nature about forward vertical integration in small-holder dairy farming operations. The descriptive study by the researcher of dairy operations at Nharira may help in proving or disproving commonly accepted assumptions about the way things are at Nharira dairy project.

3.3.7 Multipurpose Research Methods

Quantitative, qualitative and triangulation are research methods used by the researcher in this study. Quantitative research involves an objective way of studying phenomena while qualitative research assumes that studying of research is largely subjective (Saunders, Lewis and Thornhill, 2007).

3.3.7.1 Quantitative Research

The researcher is using quantitative research method in assigning numerical values to responses obtained in the sample survey questionnaires. The researcher is also using mathematical and statistical means to evaluate the responses given in the self administered questionnaires. In this study the researcher also employs quantitative methods when asking respondents in the self administered questionnaires to indicate the approximate annual gross incomes and expenditures from their dairy operations. The secondary data on the costs and returns of milk processing at Nharira dairy is also a quantitative approach in this study. Data on value of milk processed, the costs incurred in processing the milk and the payments made to farmers are recorded. The researcher also makes use of quantitative methods in the analysis of responses given by respondents in the questionnaires.
3.3.7.2 Qualitative Research
The researcher is also using qualitative research in this study. The self administered questionnaires contain qualitative questions which require descriptive responses from respondents. Responses are also recorded in descriptive forms where respondents provide answers to open-ended questions on how for instance, they have benefitted from forward vertical integration strategy pursued by their organization and other qualitative questions and statements on issues such as leadership capabilities of the management committee, impact of dairy operations on environmental sustainability and how cooperation may be enhanced among members of Nharira dairy project.

3.3.7.3 Triangulation
Hussein (2009) defines triangulation as the use of multiple methods mainly quantitative and qualitative methods in studying the same phenomenon for the purpose of increasing study credibility. The researcher in this investigation is also using triangulation as a research method. Primary data is collected from respondents using self administered questionnaires while at the same time secondary data is also collected from the milk collection and processing centre. The researcher therefore is using data triangulation in this study in the form of secondary data to validate primary data. The researcher is also employing both quantitative and qualitative methods in the collection of data. In quantitative methods the researcher is assigning numerical values to responses from what are descriptive questions making the research approach both quantitative and qualitative.

3.3.8 Population and Sampling Techniques
A population is a complete group and a sample is representative of the population (Mendenhall, Beaver and Beaver, 2009). The researcher is carrying out sampling because it would be impractical to survey the whole population; budget constraints prevent surveying the entire population; and time constraints prevent surveying the entire population. The researcher is using probability sampling because each farmer respondent in the population of Nharira dairy project members has an equal chance of being included in the sample. The population of Nharira dairy project registered members is seventy seven. The categories of the population segments are farm owners or household heads, farm workers, administration personnel and staff, and family
members. In view of the composite nature of the population proportional stratified sampling is adopted in this study. The reason for having this stratified sampling is to have a more efficient sampling than on the basis of simple random sampling. Random sampling error is reduced because these different groups or categories of the population and sample have internally homogeneous characteristics.

Table 3.1
Population and sample characteristics

<table>
<thead>
<tr>
<th>Category</th>
<th>Size</th>
<th>Gender</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>Size</td>
</tr>
<tr>
<td>Farm Owners</td>
<td>50</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Workers</td>
<td>10</td>
<td>10</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration and personnel</td>
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<td>6</td>
<td>Nil</td>
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<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Family members</td>
<td>11</td>
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<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>77</td>
<td>50</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 3.1 shows the population and sample characteristics of Nharira dairy project members. Each segment of the population is represented in the sample. For farm owners or households the subsample is drawn utilizing simple random sampling within this stratum. For administration and personnel, farm workers and family members systematic sampling is used because of the limited numbers of these categories of these population segments. The family members are mostly the children or in-laws of the farm owners. The population size of Nharira dairy project is always fluctuating because at any one time new members can join or old members can leave the project.
3.3.9 Data Collection Methods
Several methods are used to collect data and these include observation, interview, focused group discussions, experiments, questionnaires and bulletins, journals and statistical agencies in the case of secondary data (Hair, Celsi, Money, Samouel and Page, 2011). The researcher in this study is using self administered questionnaires to collect primary data from the population sample of Nharira dairy project members. The researcher is also using records kept at Nharira dairy project centre to collect secondary data.

3.3.9.1 Questionnaires
The researcher in this study is using a questionnaire to collect data. The reasons for using a questionnaire to collect data include: cost effectiveness, hence a large number of questionnaires are prepared at a very low cost; the questionnaires address a number of issues which may not be accomplished by, for instance interviews. It is also easy to guarantee anonymity of the respondents thus making them feel confident to answer all questions. Respondents receive identical sets of closed form questions enabling responses to be standardized. The questionnaires are self administered.

3.3.10 Research Procedure
The research procedure in this study is: preparation of the questionnaires; pilot testing of questionnaires on sample members drawn from the population of Nharira dairy project members; administering of the questionnaires to respondents drawn from the sample of Nharira dairy project members; and a description of methods used in analyzing data.

3.3.10.1 Preparation of questionnaire
The researcher in this study uses a questionnaire for each objective to give a total of ten closed questions and two open ended questions for each objective. The questionnaire has three sections which require each respondent to fill in his or her demographic information in the first section; questions or statements which require responses to be given based on a Likert’s scale in the second section; and two last open ended questions for each objective in the last section of each objective. All the questions in the
questionnaire reflect current thinking in forward vertical integration in dairy operations and also the latest trends in dairy operations as noted in the review of extant literature on vertical integration theories and dairy operations. The knowledge of respondents is measured against current practice in the dairy industry in different parts of the world. Those responses which indicate agreement with the statements in the questionnaire show that respondents have got an understanding of current trends in the dairy industry. Where respondents indicate that they do not agree or do not know or that they are neutral show that there is a mismatch in knowledge and understanding in forward vertical integration in dairy operations and in the dairy industry in general between sample members drawn from Nharira dairy project and current thinking in the dairy industry in general as indicated in the review of extant literature.

3.3.10.2 Pilot study
The questionnaires in this study are pilot tested to a group of randomly selected members of Nharira dairy project. The purpose of the pilot test is to find out if the questions are interesting to the respondents so that they are able to provide the required information. The questionnaires in this study are hand delivered to respondents either at their homesteads or at the milk collection and processing centre. After completing the questionnaires respondents deliver the questionnaires at the milk collection and processing centre. This is the approach which is also used in the collection of data in the main study. A total of about forty questionnaires are issued in the pilot study. Ten questionnaires are returned at the milk processing centre completely filled with all the relevant information. The other questionnaires are returned a week later. A total of five respondents indicate that they need assistance in responding to the questions because they have problems in reading and writing and the respondents requested that this information be kept confidentially. These five questionnaires were reissued to other respondents who volunteered to respond to the questions. In this pilot study the researcher analysed the responses on the questionnaires to identify possible inconsistencies like ticking all responses on each and every question. There was no case of inconsistency in the nature of responses captured on the questionnaires.
3.3.10.3 Methods used in analyzing data
The data in this study is manually and also computer processed using Excell. Pie charts and bar graphs are used to analyse results.

3.3.11 Research Limitations
The matters or issues of limitations which the researcher has no control has to do with the truthfulness of responses given by the respondents in the sample survey questionnaires. The researcher is also using data triangulation as a mechanism for verifying the accuracy of responses given by respondents in the sample survey questionnaires. The other limitation is that the researcher is using structured questions and statements in the survey questionnaire and thus may not capture all the respondents’ perspectives. The researcher is also using open ended questions as a way of capturing some of the respondents’ perspectives, attitudes, insights and behaviours on certain issues under research consideration. The other limitation is that certain constructs such as awareness and perception as they relate to objectives may not be measured objectively. The researcher is using both the quantitative and qualitative research approaches to come out with results which are reliable and also valid.

3.4 Chapter Summary
This chapter on research methodology deals with issues of research design which is very closely related with research philosophy. Research philosophy is explained and branches of philosophy in the areas of research are also highlighted. Research strategies, population and sampling techniques are explained in this chapter. The different types of data together with the data collection instruments are explained in this chapter. The procedure for carrying out the research is highlighted together with reasons why some of these procedures are followed. This chapter also highlights the methods of data analysis to be carried out on collected data. The last part of this chapter deals with research limitations and how the researcher deals with these limitations in order to come out with results which are valid and reliable and the next subject matter for discussion in chapter four is about research findings and analysis.
CHAPTER FOUR: RESEARCH FINDINGS AND ANALYSIS

4.1 Introduction

The chapter shows the response rate from the respondents of the sample survey questionnaires for Nharira dairy project. An analysis followed by the results and discussion in respect of each research objective is given, followed by the testing of the research proposition against findings for the primary investigation.

4.2 Response rate

The response rate in this case study on the benefits of forward vertical integration in dairy operations for Nharira dairy project is 100%. The self administered survey questionnaires in this study are hand delivered and also collected from the respondents either at their homesteads or at Nharira milk collection and processing centre.

4.3 Analysis, results and discussion

4.3.1 Objective 1: is to assess the perception by Nharira dairy farmers on the benefits of forward vertical integration in dairy operations.

4.3.1.1 Analysis

The analysis in this subsection relates to responses on statements and questions about forward vertical integration in dairy operations, the benefits and disadvantages of forward vertical integration in dairy operations as shown in Appendix 4 on data sheets.
Figure 4.1: recognized breeds of dairy cows are critical in forward vertical integration in dairy operations.

The result for figure 4.1 shows that 90% of the respondents agree that recognized breeds of dairy cows are critical in forward vertical integration in dairy operations. It appears that most members of Nharira dairy project basing on the responses acknowledge that recognized breeds of dairy cattle are critical for dairy farming operations including forward vertical integration in dairy farming operations. Dairy breeds are specific to dairy farming and this notion seems to be supported by Lajili, Madunic and Mahoney (2007) who in their findings assert that a high level of asset specificity tends to make vertical integration a likely choice.
Figure 4.2: An adequate number of milk cows are required for supplying milk.

The result for figure 4.2 shows that only 17% of the respondents agree that the number of their dairy cattle is adequate, while 75% of the respondents appear not to be satisfied with the number of their dairy cows. Most respondents generally have got two dairy cows per household or farm. The notion among these respondents and generally the Nharira dairy farmers appears as if a large number of dairy cattle may increase milk production. This notion may be misplaced because in dairy farming it is not the number of cows but how much milk can one cow produce. Shoemaker, Eastridge and Breece (2008) argue that what matters most is how much milk does the cow produce rather than the number of dairy cows. Hart and Moore (1990) in their property theory argue that organizations are not able to write contracts with outside actors because of property limitations and this tends to make them vertically integrate their operations, and this appears to be the same notion expressed by respondents who seem to suggest that they are not performing optimally because of property or asset limitation.
Figure 4.3: At least there is one cow producing milk at any given time of the year.

The result for figure 4.3 shows that 52% of the respondents agree that at least among themselves there is always one cow producing milk at any given time of the year. Continuity in the supply of milk to the processing centre is vital. The other 42% of the respondents do not appear to think that it is necessary to ensure that the processing centre receive a regular supply of milk from its members. The views of these respondents who disagree contrasts with notion put forward by Porter (1988) where he asserts that in a vertically integrated organization one of the benefits is the ability to organize the supply of critical inputs, yet at Nharira dairy about 40% of the respondents appear to be failing to organize cows which are regarded as critical input supplies in the dairy operations. The milk processing plant must receive milk everyday for processing. If most of the farmers’ cows are dry for a greater part of the year it means that the milk processing plant will close. The fact that 52% of the respondents have a cow producing
and supplying milk to the processing centre appear to confirm the reason why the milk processing centre is operating at half capacity. Gilson, Sabel and Scott (2009) point out that farmers may fail to meet production requirements on vertically integrated dairy farms.

Figure 4.4: At least one of the cows always produces a calf every year.

The result for figure 4.4 shows that 42% of the respondents agree that they have at least one cow which produces a calf every year, while 55% disagree. The issues raised in this discussion are basically those pointed out by Porter (1980) on the ability to organize the supply of critical inputs in the dairy farming operations.
Figure 4.5: Daily milking of lactating cows is done.

The result for figure 4.5 shows that 59% of the respondents agree that daily milking is done. The supply of milk to the processing centre is critical considering that Nharira Dairy requires milk for processing in order to fulfill all its customer requirements and also make full capacity utilization.

Figure 4.6 Milk is adequate for both feeding calves and supplying to the processing centre.

The result for figure 4.6 shows that 52% of the respondents agree that they can produce adequate milk for feeding calves and also delivering to the milk processing centre. Continuity in the supply of milk to the processing centre is vital. Continuity in the supply
of milk to the processing centre may also be guaranteed if long term strategies are in place to ensure that there is a deliberate and systematic herd building policy through sustained calf rearing.

Figure 4.7 Milk is delivered daily at the collection and processing centre

The result for figure 4.7 shows that only 43% of the respondents agree that they deliver milk daily at the milk processing centre while 51% disagree that they are supplying milk daily to the collection centre. In forward vertical integration it is vital that there should be continuity in milk deliveries to the centre and these deliveries must be consistent. Lajili,
Madunic and Mahoney (2007) point out that an increased frequency of exchanges has a tendency to increase the chances of vertical integration.

**Figure 4.8: All the milk is delivered at the processing centre and there is no side marketing of raw milk.**

The result for figure 4.8 shows that 74% of the respondents agree that all milk is delivered at the processing centre and that there is no side marketing. It would appear that members of Nharira dairy project are satisfied with marketing all their milk with the project centre. Harrigan (1986) in a forward vertical integration model asserts that full integration of 95% or above offers the best opportunities for forward vertical integration and it therefore appears like Nharira dairy farmers are enjoying the benefits of full integration.

**Figure 4.9: Constant communication between farmers and the milk centre.**
The result for figure 4.9 shows that 85% of the respondents agree that there is constant communication between farmers and the staff and management committee at the milk processing centre. Where there is an increased frequency of exchanges as already indicated by Lajili, Madunic and Mahoney (2007) the tendency to vertically integrate also increases. Farmers deliver their milk to milk processing centre and this arrangement is the whole essence of forward vertical integration. Lack of communication can cause misunderstandings leading to side marketing and possible collapse of the project. Clarke (2012) recommends that where a dairy farm has forward vertically integrated its operations complex management problems are best resolved through a high level of knowledge sharing and this is possible where there is constant communication between and among the farmers themselves.

**Figure 4.10:** Willing to contribute money and materials for smooth operation and running of the milk collection centre

The result for figure 4.10 shows that 91% of the respondents agree that they are willing to contribute money and materials for the smooth operation and running of the centre. It appears that members of Nharira dairy project are attached to this project and quite willing to ensure that there is continuity in this project. One of the problem elements confronting Nharira dairy is organising credit to refurbish the processing plant.
Figure 4.11: Benefits of forward vertical integration in dairy operations

The result for figure 4.11 shows that 26% of the respondents enjoy high income and are able to pay school fees for their children. This view seems to confirm the findings of Myers (2009) who points out that forward vertical integration eliminates middlemen which results in high income for farmers. Respondents also point out benefits such as easy access to markets, loan procurement, herd improvement or cow breeding, a regular stream of income and improved standard of living. In their findings and studies Kumar (2010), Bencke (2007), and Metin and Balagtas (2012) have also confirmed these benefits.
Figure 4.12: Disadvantages of forward vertical integration in dairy operations

The result for figure 4.12 shows that 62% of the respondents have no comment to make or write on the limitations or disadvantages of forward vertical integration in dairy operations. The analysis also shows that 29% of the respondents receive low payouts while 3% complain about late payments. Some of the comments expressed by the respondents are confirmed in the findings of Harvard Business Review (1999) that at times vertical integration tends to consider market efficiency at the expense of the internal efficiency of the firm.

4.3.2 Objective 2: is to determine the nature of costs and returns from forward vertical integration by Nharira dairy farmers.

4.3.2.1 Analysis

The analysis in this subsection relates to responses made on statements and questions about the nature and costs of dairy operations as well as returns from forward vertical integration in dairy farming operations as shown in Appendix 4 on the data sheets.
Figure 4.13: On farm costs are rising

The result in figure 4.13 show that a total of 87% of the respondents agree that on farm labour costs are high while the remaining 15% consists of 3% who disagree, 3% neutral and 9% who do not know. The results appear to indicate that these farmers are sensitive to costs of production and would probably do something to monitor these costs. Breece, Shoemaker and Eastridge (2008) point out in their studies that successful dairy farmers are sensitive to cost changes and take measures to control costs.
Figure 4.14.: Costs of providing water to cows are controllable

The result of figure 4.14 shows that 67% of the respondents agree that the costs of providing water to dairy cattle are controllable, while 21% of the respondents disagree. Generally the farmers consider water to be a free commodity and they appear not to cost it but the trouble comes during the dry season when water availability diminishes. The costing of water by Nharira dairy farmers is something which they regard as a zero cost product and one which they do not pay attention. These farmers believe they can control despite lack of evidence on control measures.

Figure 4.15.: Dairy equipment costs are a small fraction of total farm expenses

The result for figure 4.15 shows that 56% of the farmers agree that dairy equipment costs are a small fraction of total farm expenses, while 36% disagree that these are a small fraction of total farm expenses. It would appear like most of these respondents
have not invested in top notch dairy equipment. The farmers use simple technology which takes into account cost effectiveness and simplicity to operate.

Figure 4.16: The greatest challenge is financing feed costs

The result for figure 4.16 shows that 87% of the respondents agree that financing feed costs is the greatest challenge in their dairy farming operations while 9% of the respondents appear not to know. This might appear surprising but there are some farmers who resort to use of natural grass and cannot figure how to cost this food. Bolton (2012) also points out successful dairy farmers particularly those who process their milk pay attention to costs, financial and risk management decisions. If the cost of feed is beyond the farmer’s reach the returns from processing milk may not be viable thus threatening the forward vertical integration operations of the project.

Figure 4.17: Building the herd is costly and not affordable
The result for figure 4.17 shows that building the dairy herd is costly and not affordable to 73% of the respondents while only 15% of the respondents disagree. In terms of breeding dairy cattle and through natural mating and artificial insemination it would appear that very few of the farmers have interest. Herd building is an issue of urgency among the dairy farmers because it would not be possible to continually buy fully grown heifers and cows by these farmers.

Figure 4.18: Drugs, veterinary medicines and detergents seriously reduce profit margin

The result for figure 4.18 shows that 82% of the respondents agree that drugs, veterinary medicines and detergents reduce profit margins, while 15% of the respondents show that they do not know. Dairy require hygienic conditions as stipulated and if attention is not paid to issues such as detergents, disinfectants and drugs margins can be reduced. Bolton (2012) collectively refer to these costs as production costs.
Figure 4.19 Maintenance and repairs are costly in dairy operations

The result for figure 4.19 shows that 55% of the respondents agree that maintenance costs in dairy operations are costly while 36% disagree. It appears that among these farmers there are some who have invested in dairy equipment especially those who have got more than four cows. These farmers may encounter high maintenance costs while others have one or two cows and these farmers may not incur high maintenance costs.

Figure 4.20 Taxes, levies and depreciation require urgent attention

The result for figure 4.20 shows that only 32% of the respondents agree that taxes, levies and depreciation require urgent attention while the rest are showing that they do not agree and do not know. It would appear like these farmers have no appreciation of these financial aspects of their businesses of dairy farming. Kumar (2010) highlight the fact that one of the problems which cause dairy projects to collapse is failure to compute
figures of net revenue for value added milk and this must include taxes, levies and
depreciation which are often ignored by farmers.

Figure 4.21: Total milk processing costs are beyond farmer control

The result for figure 4.21 shows that 78% of the respondents agree that the total milk
processing costs are beyond the control of farmers. This is one area where farmers may
not have some control because some of the inputs used in processing milk are sourced
externally. The implication is that this is not a 100% forward vertical integration.

Figure 4.22: Income from processing milk is always favourable

The result for figure 4.22 shows that 30% of the respondents agree that income from
milk processing is always favourable while 61% of the respondents disagree that
income from processing milk is favourable. The nature of income might differ due to a number of factors such as quality especially diseases like mastitis which can result in the milk being condemned and therefore loss of income. Nicholson and Stephenson have also indicated in their studies that forward vertical integration in dairy farming operations is associated with negative returns. However other studies indicate that vertical integration in dairy farming operations is associated with positive results with Boyce (2008), Farmer’s Weekly (2009) and Mano (2010) providing practical examples of farms which have successfully integrated their operations.

Figure 4.23: Other types of dairy costs

The result for figure 4.23 shows that 79% of the respondents experience transport problems in ferrying their milk to the processing centre. There is no reliable form of transport but some of the farmers use bicycles, others use wheel barrows while others walk on foot, particularly those who deliver about two to five litres of milk per day. Ideally these farmers are not supposed to incur costs because the milk processing centre is within walking distance. Only those farmers who seem to have some strategic plans of building their herds have worries about the costs of artificial insemination and herd replacement.
Figure 4.24: Annual gross income and annual expenditure in US dollars shown against percentage of total respondents.

The result for figure 4.24 shows the gross income and expenditure on annual basis of respondents. The figures for income vary from slightly less than US $500 per year to about US$2500. Mahmood and Ali point out that in Pakistan the average income per year from one cow per farmer varies from US$60 to US$240.
Figure 4.25: Revenue, expenditure and farmer payouts for Nharira milk processing centre for 2010, 2011 and 2012

The result for figure 4.25 shows the revenue, expenditure and farmer payouts for the years 2012, 2011, 2012. After deduction of centre expenditure costs from revenue what is left are farmer payouts which are disbursed to farmers every fortnight. The dairy centre has not been able to retain revenues hence the intervention of donors like the Swedish Cooperative Centre, Southern Africa, and Land O Lakes from the USA. It does not appear surprising that Nharira Dairy is failing to recapitalize because of these problem elements as already highlighted.

Figure 4.26: Percentage share of costs at Nharira dairy for the year 2012
The result for figure 4.26 shows the percentage distribution of expenditure items for Nharira dairy for the year 2012. Packaging takes up 50% of the total expenditure and this appears to be an area where management has encountered challenges.

### 4.3.3 Objective 3:

To determine a turnaround strategy for Nharira dairy project that takes into account forward vertical integration in dairy and its effect on dairy farm management.

#### 4.3.3.1 Analysis

The analysis in this subsection relates to responses on statements and questions concerning how forward vertical integration has affected the managerial competencies of Nharira dairy farmers as shown in Appendix 4 in the data sheets.

![Pie chart showing responses to statements about governance, transparency, and accountability](image)

**Figure 4.27: Governance, transparency and accountability ensure success of forward vertical integration in dairy operations.**

The results for figure 4.27 shows that 88% of the respondents agree that good governance especially transparency and accountability appear to ensure succession of projects like that of Nharira dairy. The remaining 12% appear to be neutral or do not know about transparency and good leadership. The views of 88% of the respondents on good governance find support in the findings of Dana and Schoeman (2010) who
indicate that Fonterra dairy cooperative in New Zealand has been able to successfully promote the interests of its dairy farmers due its governance structures.

![Pie chart showing the results of a survey on communication in cooperative dairy projects.]

**Figure 4.28: Timely, frequent communication is common in cooperative dairy projects.**

The result for figure 4.28 shows that 82% of the respondents agree that there is timely, frequent communication among the members. This view is also shared by Reynolds, Fischer and Hartmann (2009) who also stress that communication and equal power distribution among business partners are the major determinants of sustainable business relationships.
Figure 4.29: There is equal power distribution between farmers, the management committee and workers.

The results for figure 4.29 shows that 88% of the respondents agree that there is equal power distribution between the farmers, management and workers. These views seem to show that there is an element of trust between the members and this might also demonstrate some understanding of governance issues.
Figure 4.30: The management committee and farmers are effective in organizing sources of capital.

The result for figure 4.30 shows that only 18% of the respondents agree with the assertion that the management committee and farmers are effective in organizing sources of capital. The remaining 76% disagree and the other 6% does not know. One of the problem elements confronting Nharira dairy is the inability to raise capital for financing major development projects. Financial challenges threaten the survival of Nharira Dairy.

Figure 4.31: Succession planning is widely talked about.
The result for figure 4.31 shows that only 18% of the respondents agree that succession planning is widely talked about. The data sheets on demographics indicate that some of the respondents are within the range of 60 years old and ideally should be retiring and paving way for young people so that there is business continuity. Bell (2009) recommends that succession planning is a key component to the long term survival of the dairy farm.

![Pie chart showing the responses to the statement that entrepreneurship and risk taking are characteristic among farmers.]

### Figure 4.32 Entrepreneurship and risk taking is characteristic among farmers

The result for figure 4.32 shows that only 27% of the respondents agree that entrepreneurship and risk taking are characteristic among the farmers. A total of 64% of the respondents disagree with the notion that there is entrepreneurship among farmers. Pyysiainen, Anderson, McElwee and Vesala (2006) argue that a strong entrepreneurial orientation and business like minds among farmers in some rural areas should be promoted.
Figure 4.33: Managerial rational business planning among dairy farmers is common.

The result for figure 4.33 shows that only 24% of the respondents agree that they carry out rational business planning in their dairy farming operations, while 67% of the respondents disagree that they carry out rational business planning in their dairy farming operations. It appears like some of the Nharira dairy project members do not have production and financial records to refer to when making decisions. In assessing their levels of income or expenditure they openly confess that they do not know or have forgotten because they do not have proper records or they do not have records at all.

Figure 4.34: Training helps farmers to develop into entrepreneurs
The result for figure 4.34 shows that 82% of the respondents agree that training helps farmers to develop into entrepreneurs. The importance of training to help farmers to become entrepreneurs is supported by Pssyiainen, Anderson, McElwee and Vesala (2006), although Timmons (1999) argues in his definition that a person does not become an entrepreneur on the basis of mere training but that it also involves dealing with unknown issues with ease, something which may not come from training.

Figure 4.35: Leadership skills shown through knowledge sharing among farmers.

The result for figure 4.35 shows that only 30% of the respondents agree that leadership skills are shown through knowledge sharing among farmers, while 36% of the respondents disagree. Considering the fact that Nharira Dairy project is a joint effort it may not be in the best interests of members to withhold information or knowledge since everyone has the potential to benefit or lose from cooperation or lack of it respectively.
Figure 4.36: Farmers in difficulties resort to joint farming with others

The result for figure 4.36 shows that only 10% of the respondents agree that farmers resort to joint farming with others in times of difficulties while 48% disagree. The nature of Nharira dairy project calls for collective effort among all the members but in reality the members would appear like they are highly individualistic when it comes to issues of collective effort. Almas (2010) recommends that joint farming in times of difficulties can resolve problems of declining revenues, labour shortages and depressed milk prices through pooling and merging of resources.

Figure 4.37: Responses on how cooperation can be achieved among the dairy farmers of Nharira dairy project.
The result for figure 4.37 shows that 34% of the respondents believe that cooperation among the dairy farmers can be achieved through field days, meetings or workshops, while 28% suggest that clusters or local associations of farmers can be formed to enhance cooperation. Other ways suggested by the respondents include regular communication, transparency, good leadership and training. There is also a fraction of the respondents who indicated that they have got no idea of how cooperation can be further enhanced among the members of Nharira dairy project.

![Figure 4.38: Responses on what sort of benefits can be realized from cooperation among farmers.](image)

The result for figure 4.38 shows that 58% of the respondents indicate low costs or cost savings as some of the benefits of the benefits of cooperation among farmers, while 23% of the respondents indicate high income benefits, and the remaining 19% indicating that they have no idea at all about the possible benefits that may be enjoyed by farmers if they cooperate.

4.3.4 Objective 4: is to determine whether forward vertical integration by Nharira dairy farmers is addressing issues of dairy farming technology
4.3.4.1 Analysis

The analysis in this subsection relates to how forward vertical integration by Nharira dairy farmers is addressing issues of technology in relation to production, processing, marketing and distribution marketing and compliance with institutional rules and regulations as shown in Appendix 4 on the data sheets.

![Pie chart showing responses to the question: Food nutrition technology moving towards chemical free and naturally grown food.](image)

Disagree 67%

Agree 24%

Neutral 3%

Do not know 6%

Figure 4.39: Food nutrition technology moving towards chemical free and naturally grown food.

The result for figure 4.39 shows that 24% of the respondents agree that food technology is moving towards chemical free and naturally grown food, while 67% of the respondents do not agree. The respondents’ views appear to indicate a gap between their practices and what is revealed in current studies. Gould (2007) and Carmen, Clark, Daley and Benbrook (2010) indicate in their studies the increasing importance of organically grown and chemical free food.
Figure 4.40: Dairy farmers now resorting to automatic oestrous detection and artificial insemination.

The result for figure 4.40 shows that 10% of the respondents agree that dairy farmers are now resorting to automatic oestrous detection and artificial insemination rather than use of natural breeding methods. Kolbach and Lyons (2012) point out that farmers are now in a position to take advantage of these automated breeding methods. At Nharira dairy members of the project make use of bulls while some have resorted to artificial insemination and others do not carry out breeding of dairy cattle at all.

Figure 4.41: Disease management now automatically monitored and preventative rather than treatment in nature.

The result for figure 4.41 shows that only 16% of the respondents agree that disease management is now automatically monitored and has become preventative rather than treating or curing the disease itself. Disease management of dairy cattle is a challenge
for members of Nharira dairy project and sometimes mortalities can be quite high. Bewley (2010) point out through use of technology dairy farmers can overcome this challenge associated with disease management.

![Figure 4.42: Automatic and robotic milking has become real rather than science fiction.](image)

The result for figure 4.42 shows that only 3% of the respondents agree that robotic milking and automatic milking of dairy cows is now a reality. de-Koning (2010) provides strong evidence on the feasibility of automatic and robotic milking of dairy cows. In terms of automatic and robotic milking the gap that exists between members of Nharira dairy and their dairy counterparts in countries such as Australia, North America and Western Europe appear to be wide basing on the studies done by researchers like Eastwood (2008).
Figure 4.43: Hand milking of cows is now replaced by hand milking machines in other parts of the world.

The result for figure 4.43 shows that only 16% of the respondents agree that hand milking of dairy cows is now replaced by hand milking machines in some parts of the world. Raghava (2012) points out that a hand milking machine is now available and is very user friendly and also relatively cheaper compared to other milking machines.

Figure 4.44: Timely processing of milk is not a challenge to farmers.

The result for figure 4.44 shows that only 26% of the respondents agree that timely processing of milk is not a challenge to farmers. Dairy processing technologies have vastly improved such that even at home people can now process milk into a variety of
products such as ice cream, cheese, yoghurt, ghee, butter, and dairy juices (North east Centre for Food Entrepreneurship, 2007); (New England Cheese Making Supply Company, 2012). Therefore the processing of milk is no longer a challenge because of improved technologies in food handling, storage and packaging.

Figure 4.45: Social media interaction and exchange of notes is improving dairy farming operations.

The result for figure 4.45 shows that only 7% of the respondents agree that social media interaction and exchange of notes is improving dairy farming operations. There is strong evidence from studies done in Australia that dairy farmers are benefitting from social media such as facebook, twitter and linked in (Kolbach and Lyons, 2012). In Zimbabwe generally people including farmers are now using mobile telephone which makes it easier to engage to exchange notes through social media interaction.
Figure 4.46: Automatic milking is available, affordable, user friendly and farmers are unwilling to use it.

The result for figure 4.46 shows that no one agrees that automatic milking of dairy cows is available, affordable, user friendly and farmers are unwilling to use it. In Zimbabwe it is not easy to say with certainty whether automatic milking is now available but researchers like Bewley (2010) provide compelling evidence on the user friendly features of automatic milking of dairy animals.

Figure 4.47: Development and production of new dairy products is the best way to remain competitive.

The result for figure 4.47 shows that only 22% of the respondents agree that the development of new dairy products is the best way to remain competitive. Nharira dairy
faces competition from other dairy companies which include both local and foreign companies. One method recommended to remain competitive is development of new dairy products (www.agmrc.org, 20 December 2012).

Figure 4.48: The Dairy Act and Public Health Act promote consumer confidence in dairy farming.

The result for figure 4.48 shows that 77% of the respondents agree that the Dairy Act and Public Health Act promote consumer confidence in dairy farming. These views are also expressed by Enderwick (2009), Semos and Kontogeorgos (2007), Kumar, Wright and Singh (2011) and Demirbas, Golge, Tosun and Cukur (2008) who argue that consumers need protection from pathogens and adulteration of milk and dairy products as a result of mistakes during milking and processing.
Figure 4.49: Responses on how dairy farmers can access technology.

The result for figure 4.49 shows that 30% of the respondents believe that technology can be accessed through networking and group farming, while 25% of the respondents believe that technology can be provided by the government. About 16% of the respondents believe that the government should provide training on technology, while 3% think that it is the duty of the government to disseminate information concerning technology. There is also a group of respondents, about 3% of the total who believe that donors should provide them access to technology. There are 23% of the respondents who indicate that they have no idea at all on how technology can be accessed by dairy farmers.
The result for figure 4.49 shows that 39% of the respondents believe that one of the benefits of technology is low costs of production, while 32% of the respondents indicate that technology is associated with high production. Another group of respondents (25% of the total) indicated that they had no idea at all about the possible benefits that can be brought about by dairy technology. Jacobs and Siegford (2012) also point out similar benefits indicated by respondents and these are increased milk production and decreased labour costs.

4.3.5 Objective 5: is to determine whether forward vertical integration by Nharira dairy farmers is addressing issues of environmental sustainability.

4.3.5.1 Analysis

The analysis in this subsection relates to the level of awareness by respondents on issues of environmental sustainability and how forward vertical integration in dairy farming operations is impacting on the environment as shown in Appendix 4 on the data sheets.
Figure 4.51: Dairy farming operations have a negative impact on the environment.

The result for figure 4.50 shows that only 7% of the respondents believe that dairy farming operations have a negative impact on the environment, while 56% of the respondents disagree that dairy farming has a negative impact on the environment. There seem to be a gap between current world trends on the impact of dairy farming operations and what is taking place at Nharira dairy. IDF (2009) acknowledges that dairy farming has its fair share of problems on environmental sustainability. The most important thing is for dairy farmers themselves to acknowledge the potentially damaging effects of dairy farming on the environment.
Figure 4.52: Manure from dairy cows require proper and speedy disposal because it is not environmentally safe.

The result for figure 4.51 shows that only 10% of the respondents believe that manure from dairy cows require proper and speedy disposal because it is not safe. In actual fact according to FAO (2010) dairy farming is responsible for major greenhouse gas emissions such as carbon dioxide, methane and nitrous oxide and sub-Saharan Africa is listed as the highest emitter of greenhouse gases. These are issues which Nharira dairy farmers need to be aware of because the issue of environmental sustainability is now a global phenomenon.
Figure 4.53: Production of maize for silage using artificial fertilizers is not encouraged due to the greenhouse effect.

The result for figure 4.52 shows that only 6% of the respondents agree that the production of maize silage using artificial fertilizer like ammonium nitrate is damaging to the environment with negative greenhouse effects. The Innovation Centre for US Dairy (2012) does not encourage dairy farmers to use these artificial nitrogenous fertilizers.

Figure 4.54: Environmental communication increases profits in dairy farming.

The result for figure 4.53 shows that only 13% of the respondents agree that environmental communication increases profits in dairy farming. IDF (2010) points out that if dairy farmers take the initiative in environmental communication they tackle these
issues without being forced to take some unpleasant action detrimental to their own interests.

Figure 4.55: Anaerobic digestion of cow manure produces biogas for electricity.

The result for figure 4.54 shows that only 10% of the respondents believe that anaerobic digestion of cow manure produces biogas for electricity. Studies done by FAO (2010) encourage dairy farmers to dispose dairy cow manure through biogas production which is used to produce electricity or power electricity generators.

Figure 4.56: Manure from dairy cows must not be exposed to outside environment due to the greenhouse effect

The result for figure 4.55 shows that only 7% of the respondents agree that exposing dairy cow manure to the environment produces the greenhouse effect. Studies carried
out by FAO (2012) have confirmed these findings which the majority of Nharira dairy farmers appear to disagree with.

**Figure 4.57: Applying cattle manure and urine on pastures is damaging to the environment.**

The result for figure 4.56 shows only 3% of the respondents agree that applying cattle manure and urine on pastures is damaging to the environment. IDF (2010) has done some studies which confirm that cattle manure and urine have damaging effects on pastures. IDF encourages dairy farmers to be aware of these environmental issues.

**Figure 4.58: Methane, Nitrogen and Carbon dioxide are generated by dairy farming and produce the greenhouse effect.**

The result for figure 4.57 shows that no one agree that methane, nitrogen and carbon dioxide are produced by dairy farming and are damaging to the environment. The findings of these studies have been confirmed by FAO (2010) despite all respondents ‘disagreement.
Figure 4.59: Processing of milk into yoghurt produces the greenhouse effect.

The result for figure 4.58 shows that no one agrees that the processing of yoghurt produces the greenhouse effect, but studies carried out by the Innovation Centre for US Dairy (2012) do confirm that the processing of yoghurt produces the greenhouse effect despite the denials of members of Nharira dairy project.

Figure 4.60: Dairy farmers are now taking a proactive approach with environmental groups for sustainable environment management.

The result for figure 4.59 shows that 19% of the respondents agree that farmers are now taking a proactive approach in environmental management programmes and this is the approach recommended by IDF (2010) and FAO (2010).
Figure 4.61: Responses on how environmental awareness can be raised among dairy farmers.

The result for figure 4.60 shows that 81% of the respondents believe that training, education and advice from the government can be used to raise awareness of environmental issues, while 19% of the respondents indicate that they have no idea at all on how environmental awareness can be raised among the dairy farmers. IDF (2010), FAO (2010) and The Innovation Centre for US Dairy (2012) insist that it is the responsibility of farmers to take the initiative in environmental issues rather than to let other parties take the initiative as this might have damaging effects on farmers.

Figure 4.62: Responses on how environmental sustainability can benefit dairy farmers.

The result for figure 4.61 shows that 58% of the respondents appear to have no idea at all about how dairy farmers can benefit from environmental sustainability, while 42% of
the respondents show that dairy farmers can benefit from environmental sustainability through high production and low costs of production.

4.4 Testing of Research Proposition

The research proposition in this study is that it is assumed that Nharira dairy farmers are benefitting from forward vertical integration in their dairy operations.

4.4.1 Objective 1

Objective 1 is to assess the perception by Nharira dairy farmers on the benefits of forward vertical integration in dairy farming operations.

The perception of the respondents in the sample survey questionnaire is that forward vertical integration for Nharira dairy is beneficial. Basing on the responses from the survey sample questionnaires a total of 90% respondents indicate that they are benefitting from forward vertical integration. On the basis of these 90% respondents the researcher accepts the proposition forward vertical integration is beneficial to Nharira dairy farmers. However, the researcher cannot make a definite conclusion on this objective by saying that they are benefitting equally. Although most farmers are benefitting, others appear to be benefitting more than others as indicated in the responses by the farmers.

4.5 Chapter Summary and Conclusion

The chapter deals with research findings, analysis and discussion on each of the five objectives considered in this study. The researcher accepts the research proposition in respect of objective 1 on the basis of responses from the sample survey questionnaires indicating that most of the respondents are benefitting from forward vertical integration but cannot make a conclusion because the nature of benefits appear to differ between the individual respondents.
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter marks the end of the research investigation begun in Chapter 1. The aim in this chapter is to find answers to the research questions raised in Chapter 1, with suggestions for further areas of study that may assist in providing solutions to problems.

5.2 Conclusion

5.2.1 Question 1: How do Nharira dairy farmers perceive the benefits of forward vertical integration in dairy operations?

The researcher makes the following conclusions regarding how Nharira dairy farmers perceive the benefits of forward vertical integration in dairy operations:

5.2.1.1 The farmers are now having an easy access to the market for their milk product.

5.2.1.2 Some of the farmers have been able to procure loans which they have used to purchase dairy cows and bulls for breeding purposes.

5.2.1.3 The farmers are enhancing their incomes through value addition to their milk and spreading of fixed costs through collective marketing of milk.

5.2.1.4 The farmers are now enjoying a regular stream of income after every fortnight and are now able to pay school fees for their children and also enjoy a better standard of life.

5.2.2 Question 2: What are the nature of costs and returns from forward vertical integration in dairy operations by Nharira dairy farmers?

The researcher makes the following conclusions regarding the nature of costs and returns from forward vertical integration in dairy farming operations.

5.2.2.1 The main cost items for Nharira dairy farmers are feed for livestock, veterinary drugs, detergents, transport for ferrying milk to the processing centre and on farm labour.
5.2.2.2 The main cost item at the milk processing centre is packaging material followed by electricity.

5.2.2.3 Financial returns from Nharira dairy are realized through the sale of culture milk and yoghurt.

5.2.3 Question 3: What turnaround strategy can Nharira dairy farmers adopt that take into account forward vertical integration in dairy farming and its effect on dairy farm management?

The researcher makes the following conclusions regarding a turnaround strategy that takes into account forward vertical integration and its effect on dairy farm management;

5.2.3.1 A common managerial rational business plan done by all the Nharira dairy farmers together with Nharira dairy project management committee.

5.2.4 Question 4: How is forward vertical integration by Nharira dairy farmers addressing issues of dairy farming technology?

The researcher makes the following conclusions regarding production technology, marketing and institutional rules and regulations;

5.2.4.1 Nharira dairy farmers still rely on simple low cost technology in the production and processing of their milk.

5.2.4.2 Nhaira dairy farmers produce a narrow range of dairy products which are offered to consumers using the traditional sales team approach rather than a coordinated marketing approach.

5.2.5 Question 5: How is forward vertical integration by Nharira dairy farmers addressing issues of environmental sustainability?

5.2.5.1 The researcher concludes that forward vertical integration by Nharira dairy farmers has not addressed issues of environmental sustainability.
The researcher also concludes that most members of Nharira dairy project do not believe that their business can benefit from environmental sustainability, although a few of the members think they can benefit from high production and low costs of production.

5.3 Validation of Research Proposition

The researcher accepts the research proposition in respect of objective 1 on the basis of responses that most of the members perceive forward vertical integration in dairy as beneficial although some members appear to benefit more.

5.4 Recommendations

5.4.1 Strategy choice

The researcher recommends that Nharira dairy project continue pursuing forward vertical integration in dairy operations for the reason that the farmers are benefitting from the processing of their own milk.

The researcher recommends that for Nharira dairy to realize the full potential of forward vertical integration it must move from a strategy of low cost and simple technology to one of high technology. It is presumed that if Nharira acquires high technology in terms of both milk production and processing capacity it may be able to diversify its range of products from cultured milk and yoghurt to say cheese, ice cream, butter and dairy drinks.

5.4.2 Cost control and monitoring

Forward vertical integration as strategy is associated with high packaging costs. The researcher recommends the milk processing centre to pay attention to cost control measures. Packaging costs are very high and eat a huge chunk of the expenses items. Nharira dairy can enter into a very long term contract with a packaging company that can supply it with recyclable containers for its products. The current products on offer at Nharira require expensive packaging which is also non- recyclable and also not easily
biodegradable. Recyclable containers that attract an incentive for the user who returns the container can be introduced to consumers. The centre can also save energy costs by installing a bio-gas production unit for producing methane gas which is also used for powering electricity generators rather than relying on firewood as a source of energy.

5.5 Area of further study

5.5.1 Forward vertical integration in dairy operations and its effect on environmental sustainability

Nharira dairy project utilizes mostly inputs sourced from the local environment. There is need to investigate how forward vertical integration of Nharira dairy has impacted on the environment and how this forward vertical integration can be used to address issue of environmental sustainability.
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*ISO 14064* Green House Gas Emission Accounting and Certification


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Roder, F. 2007. *Strategic Benefits and Risks of Vertical Integration in International Media Conglomerates and their Effect on Firm Performance.* Dissertation of the University of St Gallen Graduate School of Business Administration, Economics, Law and Social Sciences (HSG) to obtain the title of Doctor Oeconomiae. Switzerland.


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**APPENDIX 1: SUMMARY CONCEPT OF RESEARCH DESIGN FOR CHAPTERS ONE (1), TWO (2) AND THREE (3).**

<table>
<thead>
<tr>
<th>Objective: Chapter One (1)</th>
<th>Theory From Literature: Chapter Two (2)</th>
<th>Secondary Research: Chapter Two (2)</th>
<th>Primary Research: Chapter Three (3)</th>
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</thead>
</table>
| 1. To assess the perception by Nharira Dairy farmers on the benefits of forward vertical integration in dairy operations | 2.1 Introduction  
2.2 General Overview  
2.2.1 Benefits of Dairy Operations-Brooke (2008); Jan (2012); Janis (2010)  
2.2.2 Vertical Integration in Dairy Operations  
2.2.3 Dairy Operations | Business magazines  
Farmers’ magazines—Joseph Gallo farms; Dale farm; | 3.1 Introduction  
3.2 Research Philosophies |
| 2. To determine the costs and returns from forward vertical integration by Nharira dairy farmers | 2.3 Stakeholder perception on forward vertical integration in dairy operations  
2.3.1 Definition of forward vertical integration  
2.3.2 Vertical Integration Theories  
2.3.3 Measurement metrics of benefits to farmers who are in dairy operations—Shoemaker, Eastridge, Breeze, Woodruff, Radar and Mannison (2008);  
2.3.3.1 Benefits of forward vertical integration in dairy—Myers (2010); Bencke (2007); Guan and Rehme (2012); Metin and Balagtas (2012); Boyce (2008)  
2.3.3.2 Limitations of forward vertical integration—McGuire and Staelin (2008); Gilson, Sabel, Scott (2009); Porter (1980). | Farmers’ magazines. Journals. | 3.3 Research Approaches  
3.4 Research Strategies  
3.5 Classification strategy  
3.6 Population Part explanatory  
Part descriptive  
3.7 Data collection methods  
Self administered questionnaires  
10 x Likert’s 5 point scale statements  
2 x Open Ended questions |
5. Classification strategy  
Part explanatory  
Part descriptive  
Self administered questionnaires  
10 x Likert’s 5 point scale statements  
2 x Open ended questions |
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<th>Turnaround strategy for Nharira dairy that considers forward vertical integration effects on dairy farm management</th>
<th>Schoeman (2010); Reynolds, Fischer and Hartmann (2009); King III Report (2009). Access to capital-Turvey, Bogan and Yu (2010). 2.5.3 Microfactors-Bell (2009). 2.5.4 Entrepreneurship and managerial skills-Pyysaainen, Anderson, McElwee and Vesala (2006); Timmons (1999); Chandalia (2012). 2.5.5 Leadership and administrative ability-Clarke (2012); Almas (2010)</th>
<th>Journals</th>
<th>Classification strategy</th>
<th>Part explanatory</th>
<th>Part descriptive</th>
<th>Self administered questionnaire</th>
<th>10 x Likert’s 5 point scale statements</th>
<th>2 x Open ended questions</th>
</tr>
</thead>
</table>
APPENDIX 2
SAMPLE INTRODUCTORY LETTER
Graduate School of Management
University of Zimbabwe
6 Langham Road
Mt Pleasant, Harare.
Telephone 263-4-307377

Dear Sir/Madam

RE: MASTER IN BUSINESS ADMINISTRATION QUESTIONNAIRE

The researcher is a final year student studying for a Master in Business Administration Degree at the University of Zimbabwe. The researcher is conducting a research which seeks to investigate ‘The benefits of forward vertical integration in dairy operations for Nharira Dairy Project during the period 2010-2012’. This research is an issue of great importance within Zimbabwe and yet little is currently known about the consequences.

You are one of a small number of people who are being asked to give your opinion on this issue. The researcher would greatly appreciate if you could assist by completing and returning the attached questionnaire by January 28 2013.

If you have any question you wish to ask or there is anything you wish to discuss, please do not hesitate to telephone the writer on cell-phone number 0773542992. All information you provide will be totally confidential and will not be disclosed to third parties without your permission. You will notice that your name and address will not appear on the questionnaire and that there is no identification number. This is purely an academic research and all the information received will be treated in the strictest of confidence.

Thank you in advance for your cooperation in this matter.

Yours faithfully

Saranji K. (Mr).
Master in Business Administration Candidate
APPENDIX 3  SAMPLE OF NHARIRA DAIRY PROJECT SURVEY QUESTIONNAIRE

You are kindly requested to read and answer all questions on this questionnaire. all responses will be treated in the strictest confidence and respondent anonymity is guaranteed.

SECTION A: DEMOGRAPHIC DETAILS

Tick the appropriate box

Sex
Male  Female
Marital status
Single  Married  Widow
Age
< 30  < 40  < 50  < 60  > 60
Education
Primary  Secondary  College / University

SECTION B

For your answer, make use of the five (5) point Likert’s scale which varies from “disagree strongly” (1) “ Agree strongly” (5) as illustrated below:

<table>
<thead>
<tr>
<th>Disagree strongly</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree strongly</th>
<th>Unknown</th>
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<tr>
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</tbody>
</table>

1. The following statements refer to “forward vertical integration in dairy farming operations.

<table>
<thead>
<tr>
<th>B</th>
<th>1</th>
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<tbody>
<tr>
<td>1.1. Recognized breeds of dairy cows are critical for success in forward vertical integration in dairy farming</td>
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<td>1.2. The number of your cows is adequate for supplying milk to the processing centre.</td>
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<td>1.3. You have got at least one cow producing milk at any one time of the year</td>
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<td>1.4. One or more of your cows always produce a calf every year</td>
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<td>1.5. Milking of cows is done every day without fail if the cows are lactating</td>
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<td>1.6. There is always adequate milk for feeding calves and delivering to the milk processing centre.</td>
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<td>1.7. Milk is delivered daily at the milk collection and processing centre.</td>
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<td>1.8. All the milk is delivered at the processing centre and there is no side marketing</td>
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<tr>
<td>1.9. There is constant communication between farmers and the milk processing center</td>
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</table>
1.10 You are ready to contribute money and materials for the smooth running of the milk processing centre.

C (1) How have you benefitted as a member of Nharira dairy project?

(11) In what ways if any have you been disadvantaged as a member of the dairy project?

You are kindly requested to read and answer all questions on this questionnaire. All responses will be treated in the strictest confidence and respondent anonymity is guaranteed.

SECTION B

For your answer, make use of the five (5) point Likert’s scale which varies from “disagree strongly” (1) “Agree strongly” (5) as illustrated below:

<table>
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</table>

2. The following statements refer to “Determining the costs and returns from forward vertical integration in dairy farming operations”.

B

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
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<tr>
<td>2.2</td>
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<tr>
<td>2.3</td>
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<tr>
<td>2.4</td>
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<tr>
<td>2.5</td>
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<td>2.6</td>
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<tr>
<td>2.7</td>
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<tr>
<td>2.8</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
are beyond farmer’s control.

2.10 The proceeds or income from processing milk is always favourable against total milk production costs and processing costs.

C (1) What other costs do you encounter in your operations?
(11) What is your average annual gross income and gross expenditure?

You are kindly requested to read and answer all questions on this questionnaire. All responses will be treated in the strictest confidence and respondent anonymity is guaranteed.

SECTION B

For your answer, make use of the five (5) point Likert’s scale which varies from “disagree strongly” (1) “ Agree strongly” (5) as illustrated below:

<table>
<thead>
<tr>
<th>Disagree strongly</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree strongly</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

3. The following statements refer to “Managerial competencies, entrepreneurial skills, leadership skills and administrative capabilities in dairy farming operations

<table>
<thead>
<tr>
<th>B</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1. Governance in terms of transparency, accountability, fairness responsibility and upholding ethical values ensure success of forward vertical integration in dairy projects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2. Timely, frequent, relevant and reliable communication is very common in cooperative dairy projects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3. Equal power distribution between farmers, management committee members and workers in a cooperative is very visible and strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4. The management committee and farmers are very effective in organizing sources of capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5. Succession planning is widely talked about among the dairy farmers and the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.6. Entrepreneurial spirit especially innovation, opportunity based risk taking, transforming demand into supply with innovation is characteristic among the dairy farmers.

3.7. There is managerial rational business planning among farmers.

3.8. Training and evaluation related to situational factors help farmers develop into entrepreneurs.

3.9. Leadership skills are shown through knowledge sharing among farmers.

3.10 Farmers in difficulties resort to joint farming with others.

C. (1) What can be done to promote cooperation among dairy farmers? (11) What would be the possible benefits of cooperation among dairy farmers?

(1)

(11)
You are kindly requested to read and answer all questions on this questionnaire. All responses will be treated in the strictest confidence and respondent anonymity is guaranteed.

**SECTION B**

For your answer, make use of the five (5) point Likert’s scale which varies from “disagree strongly” (1) “Agree strongly” (5) as illustrated below:

<table>
<thead>
<tr>
<th>Disagree strongly</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree strongly</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

4. The following statements refer addressing issues of production technology challenges, marketing challenges and complying with institutional rules:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1. Food nutrition technology is moving away from synthetic food towards chemical free and naturally grown food.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.2. Dairy farmers have resorted to automatic oestrus detection and artificial insemination.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.3. Disease management is now automatically monitored and has become preventative rather than treatment of animals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4. Automatic and robotic milking has become real rather than science fiction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5. Hand milking of cows is now replaced by hand milking machines in small scale dairy operations in other parts of the world.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.6. Timely processing of milk is not a challenge to farmers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.7. Social media interaction and exchanging of notes is improving dairy farming operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.8. Automatic milking is available, affordable and user friendly, only that farmers are not willing to use it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.9. Development and promotion of new dairy product brands is the best way to remain competitive in dairy farming.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.10 The dairy Act and health Act promotes consumer confidence in dairy farmers.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. How can farmers: (1) access and (11) benefit from dairy technology?

(1)

(11)
You are kindly requested to read and answer all questions on this questionnaire. All responses will be treated in the strictest confidence and respondent anonymity is guaranteed.

SECTION B

For your answer, make use of the five (5) point Likert’s scale which varies from “disagree strongly” (1) “Agree strongly” (5) as illustrated below:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Agree strongly</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

5. The following statements refer to “Awareness on Environmental sustainability”.

B

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1. Dairy farming operations have a serious impact on the environment in a negative way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2. Manure from dairy cows requires proper and speedily disposal because it is not environmentally safe.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3. Production of maize for silage using artificial fertilizers like ammonium nitrate is not encouraged because of damage to the atmosphere (greenhouse effect).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4. Environmental communication increases profits in dairy farming.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5. Anaerobic digestion of cow manure produce biogas for generating electricity on the farm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.6. Manure from dairy cows must not be exposed to the outside environment due to greenhouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.7. Applying cattle manure and urine on pasture grass is damaging to the environment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8. Methane, nitrogen and Carbon dioxide are gases generated by dairy farming operations and produce the green house effect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.9. Processing milk into commodities like yoghurt, cooled milk and cheese produce greenhouse effect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.10 Dairy farmers are now taking a proactive approach with environment groups for sustainable environmental management.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C (1) How can environmental sustainability awareness be raised among dairy farmers? (11) How can dairy farmers benefit from sustainable environmental use?

(1)

(11)
Appendix 4 Data sheets

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt;30</th>
<th>&lt;40</th>
<th>&lt;50</th>
<th>&lt;60</th>
<th>&gt;60</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
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<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
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<td>6</td>
<td>Nil</td>
<td>2</td>
<td>Nil</td>
</tr>
</tbody>
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<table>
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<th>Married</th>
<th>Widowed</th>
<th>Totals</th>
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</thead>
<tbody>
<tr>
<td>Sex</td>
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<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
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<table>
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<tr>
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<th>College / university</th>
<th>Totals</th>
</tr>
</thead>
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<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
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</table>

<table>
<thead>
<tr>
<th>1- Forward vertical integration in dairy operations</th>
<th>Sample size</th>
<th>Responses rate</th>
<th>No responses</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Disagree 1-2</td>
<td>Neutral 3</td>
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<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>1.2</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>76% 4%</td>
</tr>
<tr>
<td>1.3</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>42% Nil</td>
</tr>
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<td>1.4</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>55% Nil</td>
</tr>
<tr>
<td>1.5</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>35% 6%</td>
</tr>
<tr>
<td>1.6</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>42% 6%</td>
</tr>
<tr>
<td>1.7</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>51% 6%</td>
</tr>
<tr>
<td>1.8</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>18% 9%</td>
</tr>
<tr>
<td>1.9</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>9% 3%</td>
</tr>
<tr>
<td>1.10</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>3% Nil</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Findings</th>
<th>Comments on the nature of benefits by members of Nharira dairy project</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>Improved standard of living</td>
</tr>
<tr>
<td>6%</td>
<td>Herd improvement /low breeding and training</td>
</tr>
<tr>
<td>6%</td>
<td>Loan procurement</td>
</tr>
<tr>
<td>10%</td>
<td>Did not comment</td>
</tr>
</tbody>
</table>
23% Easy marketing of milk
26% High income and school fees for children
26% Regular payouts or income

Findings

| Comments on the nature of disadvantages from forward vertical integrations |
|---|---|
| 3% | Late payment |
| 6% | Economic disruption |
| 29% | Low payouts |
| 62% | Did not comment |

<table>
<thead>
<tr>
<th>2- Costs returns from forward vertical integration in dairy farming</th>
<th>Sample size</th>
<th>Responses rate</th>
<th>No responses</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Disagree 1-2</td>
<td>Neutral 3</td>
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<tr>
<td>2.1</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>1%</td>
</tr>
<tr>
<td>2.2</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>21%</td>
</tr>
<tr>
<td>2.3</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>33%</td>
</tr>
<tr>
<td>2.4</td>
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<td>100%</td>
<td>Nil</td>
<td>Nil</td>
</tr>
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<td>2.5</td>
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<td>Nil</td>
<td>15%</td>
</tr>
<tr>
<td>2.6</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>3%</td>
</tr>
<tr>
<td>2.7</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>36%</td>
</tr>
<tr>
<td>2.8</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>33%</td>
</tr>
<tr>
<td>2.9</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>9%</td>
</tr>
<tr>
<td>2.10</td>
<td>31</td>
<td>100%</td>
<td>Nil</td>
<td>61%</td>
</tr>
</tbody>
</table>

Findings

<table>
<thead>
<tr>
<th>Comments on the nature of costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
</tr>
<tr>
<td>6%</td>
</tr>
<tr>
<td>6%</td>
</tr>
<tr>
<td>29%</td>
</tr>
<tr>
<td>56%</td>
</tr>
</tbody>
</table>
## Annual gross income in US$

<table>
<thead>
<tr>
<th>Annual gross income in US$</th>
<th>Findings</th>
<th>Annual total expenditure in US$</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>16%</td>
<td>500</td>
<td>58%</td>
</tr>
<tr>
<td>500 – 1000</td>
<td>42%</td>
<td>500-1000</td>
<td>10%</td>
</tr>
<tr>
<td>1000 – 1500</td>
<td>3%</td>
<td>1000-1500</td>
<td>6%</td>
</tr>
<tr>
<td>1500 – 2000</td>
<td>6.5%</td>
<td>unknown</td>
<td>26%</td>
</tr>
<tr>
<td>2000-2500</td>
<td>6.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown income did not indicate income</td>
<td>26%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Year Revenue US$ Expenditure US$ Farmer

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue US$</th>
<th>Expenditure US$</th>
<th>Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>35000</td>
<td>23640</td>
<td>12640</td>
</tr>
<tr>
<td>2011</td>
<td>46000</td>
<td>32000</td>
<td>14360</td>
</tr>
<tr>
<td>2012</td>
<td>60000</td>
<td>43000</td>
<td>18360</td>
</tr>
</tbody>
</table>

## Year Cost Item US$ 2010 2011 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost Item</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Firewood</td>
<td>118.00</td>
<td>160</td>
<td>215</td>
</tr>
<tr>
<td>2011</td>
<td>Firewood</td>
<td>9456</td>
<td>12800</td>
<td>16800</td>
</tr>
<tr>
<td>2012</td>
<td>Firewood</td>
<td>118</td>
<td>160</td>
<td>215</td>
</tr>
<tr>
<td>2010</td>
<td>Electricity</td>
<td>10874.00</td>
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<td>19780</td>
</tr>
<tr>
<td>2011</td>
<td>Water</td>
<td>1658</td>
<td>2240</td>
<td>3000</td>
</tr>
<tr>
<td>2012</td>
<td>Water</td>
<td>709</td>
<td>960</td>
<td>1290</td>
</tr>
<tr>
<td>2010</td>
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<td>709</td>
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<td>1290</td>
</tr>
<tr>
<td>2011</td>
<td>Distribution</td>
<td>473</td>
<td>640</td>
<td>860</td>
</tr>
<tr>
<td>2012</td>
<td>Distribution</td>
<td>118</td>
<td>160</td>
<td>215</td>
</tr>
<tr>
<td>2010</td>
<td>Detergents</td>
<td>236</td>
<td>320</td>
<td>430</td>
</tr>
<tr>
<td>2011</td>
<td>Others (management, allowances, communication levies)</td>
<td>23640</td>
<td>32000</td>
<td>43000</td>
</tr>
<tr>
<td>2012</td>
<td>Others (management, allowances, communication levies)</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial competency and leadership skills</td>
<td>Sample size</td>
<td>Responses rate</td>
<td>No responses</td>
<td>Findings</td>
</tr>
<tr>
<td>-------------------------------------------</td>
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**Findings**

**Comments on nature of mechanisms to achieve cooperation**

- **3%** Communication on regular basis
- **6%** Transparency and good leadership
- **10%** Did not comment
- **23%** Training of members on aspects of co-operation
- **26%** Formation of clusters or small groups of farmers who are in the same area.
- **32%** Field days / meetings / workshop’s

**Findings**

**Comments on the nature of benefits**

- **19%** Did not comment
- **23%** High production /more income
- **58%** Cost saving / low costs
<table>
<thead>
<tr>
<th>4- Production technology</th>
<th>Sample size</th>
<th>Responses rate</th>
<th>No responses</th>
<th>Findings</th>
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Findings

<table>
<thead>
<tr>
<th>Comments on way’s of accessing dairy technology</th>
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</thead>
<tbody>
<tr>
<td>3% Information dissemination by government departments.</td>
</tr>
<tr>
<td>3% Sponsorship by donor organizations</td>
</tr>
<tr>
<td>16% Training by donors and government.</td>
</tr>
<tr>
<td>23% Did not comment</td>
</tr>
<tr>
<td>25% Provision of loans by government</td>
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<tr>
<td>29% Networking and group farming</td>
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Findings

<table>
<thead>
<tr>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>29% Did not comment</td>
</tr>
<tr>
<td>32% High production</td>
</tr>
<tr>
<td>32% Low costs</td>
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### Awareness on environmental sustainability

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<tr>
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</tbody>
</table>

### Comments by farmers

19% Did not comment

81% Training / education and advice from the government

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### Findings

| Comments | 42% | Did not comment |
| Projects become operational / high production and low costs. | 58% |