

Umesh Timilsina

Risk Management In
Modern Dairy

Degree Programme in International Business
And Marketing Logistics
2013

RISK MANAGEMENT IN MODERN DAIRY

Timilsina, Umesh

Satakunta University of Applied Sciences

Degree Programme in International Business And Marketing Logistics.

Month 2012

Supervisor: Tanhua Daniela

Number of pages: 70

Appendices: 5

Keywords: Risk, Risk Management, Supply chain, Supply chain management.

The purpose of this thesis was to study the supply chain process of Modern dairy. The objectives were to find out the risks that are involved in the process. After the identification of the risks, the motive was to analyse and evaluate the risks and to find the solutions to treat the risks.

The theoretical model for the thesis was based on the seven stages of Risk management Model from Paul Hopkins. This model of Risk management describes the process of risk identification and risk handling.

The research for the thesis was carried on the basis of qualitative approach. The interviews were conducted with several personnel's. Similarly field visit and telephone interview were also conducted to understand the unclear findings of the outcomes of research.

The thesis had various outcomes. Firstly, the study about the case company (Modern Dairy) was studied. Then supply chain of Modern dairy was understood and the problems associated with the supply chain were figured out. Finally all the risks were identified and analysed based on the theory and the possible suggestions and recommendation were provided to the company.

The results indicate that the company is in the early stage of the progress and needs proper guidance for handling the risks. The company has a great need of risk manager and risk management model. Also it is necessary for the company to have a risk manager and train its staffs. Furthermore, finding some alternative logistics route and modern technology will benefit the company's profitability in future.

Table of Contents

1	INTRODUCTION.....	5
1.1	Background of the Company	6
1.2	Location profile: Sindhupalchowk (Case District)	7
1.3	Research Problems and Objectives	8
1.4	Conceptual Framework	8
2	SUPPLY CHAIN MANAGEMENT.....	10
2.1	Supply Chain	10
2.2	Supply Chain Management	12
2.3	Activities involved in Supply chain	12
2.3.1	Purchasing/Manufacturing	12
2.3.2	Logistics	13
2.3.3	Material Handling.....	15
2.4	Supply Chain Performance Metrics	16
3	RISK AND RISK MANAGEMENT	18
3.1	Introduction to Risk	18
3.2	Risk VS Hazards	20
3.3	Different types of Risks in supply chain	20
3.4	Risk Management:	22
3.5	Risk Assessment	24
3.5.1	Risks Identification.....	26
3.5.2	Risks Estimation/Risks Mapping	28
3.5.3	Risks Analysis	29
3.5.4	Risks Evaluation.....	33
3.5.5	Risks Capacity.....	34
3.5.6	Risks Handling	34
4	RESEARCH METHODOLOGY.....	36
4.1	Chosen Method of Data collection	37
4.2	Implementation of the Research	39
4.3	Validity and Reliability of Research.....	40
5	RESEARCH OUTCOMES	41
5.1	Supply Chain in Modern Dairy.....	41
5.1.1	Purchasing and Selling Process in Modern Dairy	43
5.1.2	Logistics Operation in Modern Dairy	46
5.1.3	Material Handling in Modern Dairy	47
5.1.4	Supply Chain Metrics in Modern Dairy.....	47
5.2	Risk Management in Case Company	50

5.2.1 Risk Management Analysis in Modern Dairy:.....	51
5.2.2 Risk Recognition and their effects in Modern Dairy:.....	53
5.2.3 Risk Analysis.....	56
5.2.4 Risk Evaluation	60
5.2.5 Risk Handling.....	61
6 SUGGESTIONS OR RECOMMENDATION FOR MODERN DAIRY:.....	63
CONCLUSION	67
REFERENCES	68
APPENDICES	

1 INTRODUCTION

I have always been interested in the topic like Risk management and Supply chain management since the start of the courses in SAMK. As I started to think about the thesis, the first thing that popped into my mind was the supply chain management. Moreover, risk management was an interesting topic to add to the risk management.

I was actively involved in various conversations regarding the company with my father during the research process. Every day, I heard about the problems the company is facing and the losses company has to bear. As the company is newly established, lots of problems were arising each day. Since my study in SAMK has given me lots of knowledge regarding the topic of risk management and supply chain management, I decided to have a detailed research on the supply chain of modern dairy and the risks related to it.

After the planning of the thesis, I talked with my father regarding the topic and finally to the CEO of the company Mr. Ajab Lal Yadab. As Modern dairy is operating its supply chain from three districts, we had to choose one of the districts for the case study. Among the three districts, I choose to research about Sindhupalchowk district for my case study. As Sindhupalchowk is one of the backward districts among three, I choose to research about this district.

Finally, on agreement, I decided to write my bachelor thesis on Risk management in supply chain of the Modern Dairy.

1.1 Background of the Company

Modern Dairy is one of the public organizations which collects raw milk from farmers and distribute the final products to the customers. It was established in 2010 with the help of 6 partners who have early experience of milk production and distribution from Dairy Development Corporation (DDC- Government owned enterprise). Modern dairy collects 4000-5000 Liters of milk every day from the producers (farmers) and distributes to its Retailers. The main Customers (retailers) of Modern Dairy are from Kathmandu, Bhaktapur and Lalitpur.

The main objectives of Modern Dairy are providing guaranteed market and a fair price to the rural milk producers (farmers) and supplying hygienic/quality/Standard pasteurized milk and other dairy products to its consumers. This corporation was established with following objectives:

- a. Provide a quality product to the customers around Kathmandu Valley.
- b. Guarantee market for milk producers (farmers) with fair price.
- c. Develop organized milk collection system to meet the increasing demand for pasteurized milk and milk products in the Kathmandu.
- d. Supply pasteurized milk products to urban consumers.

(Interview conducted with the CEO of Modern Dairy Mr Ajab Lal Yadav)

1.2 Location profile: Sindhupalchowk (Case District)

Sindhupalchowk district is one of the nearest district to Capital of Nepal Kathmandu with the area of 2542 sq. Km. The population of this district was 336,478 in 2006, but the population of the district was decreased to 287,798 2011. This is due to the fact that Sindhupalchowk district is very backward in providing the infrastructure to the people. Though this district is the near to the facilitated city Kathmandu, it is one of the least developed districts of Nepal.

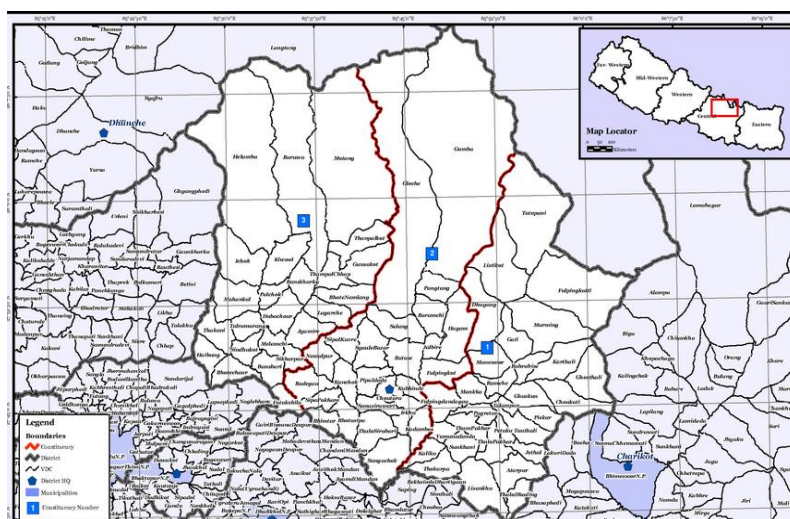


Fig 1 : Sindhupalchowk District (Source: un.org.np)

Sindhupalchowk is connected to Kathmandu by Araniko Highway. But the district is still in its infant age of development. The people are mostly engaged in the traditional method of farming and cattle rearing. The educational status of the district is not very standard. Most of the people are literate because of growing numbers of schools and colleges, but the people are still not aware of the modern technology and business ideas.

1.3 Research Problems and Objectives

The aim of my research is to understand the risks that are involved in the supply chain of the case company. The thesis deals with identifying, classifying the risks in the supply chain. The subjective part of the thesis includes the understanding of the Supply chain management and Risk management. It is also focused in the comparative study of the theory in the context of the case company. The main objective of this study is to provide the case company with a clear view of the risk in their business from purchase to distribution channel. It also includes some suggestions that the company could apply in order to eliminate or reduce the risks.

The objectives of this study are as follows:

- a. To determine the Supply chain of Milk in case company.
- b. To find out the areas of risks in Supply chain.
- c. To Analyze, differentiate and treat the risk.
- d. To provide detail view of risk areas to the case company and provide them some suggestions

1.4 Conceptual Framework

The conceptual framework illustrates risks involved in supply chain of the milk. The figure shows that the supply chain of the milk involves various parties like The Producers, Chilling centers, Company and the Consumers. During this supply chain, there are various risks involved, which have an adverse effect in the quality of the milk. These risks are identified, differentiated, analyzed and treated in the context with Modern dairy. Finally the conclusion is drawn to treat the risks and some recommendation is provided to the case company.

The framework shows the supply chain in the first part of the diagram which is opened up with the risks (illustrated by star shape). The case company is overlapped with the risk to show that all the risks that are identified and treated are based on the perspective of the case company (Modern dairy). Finally, the conclusion is shown in the rectangular shape.

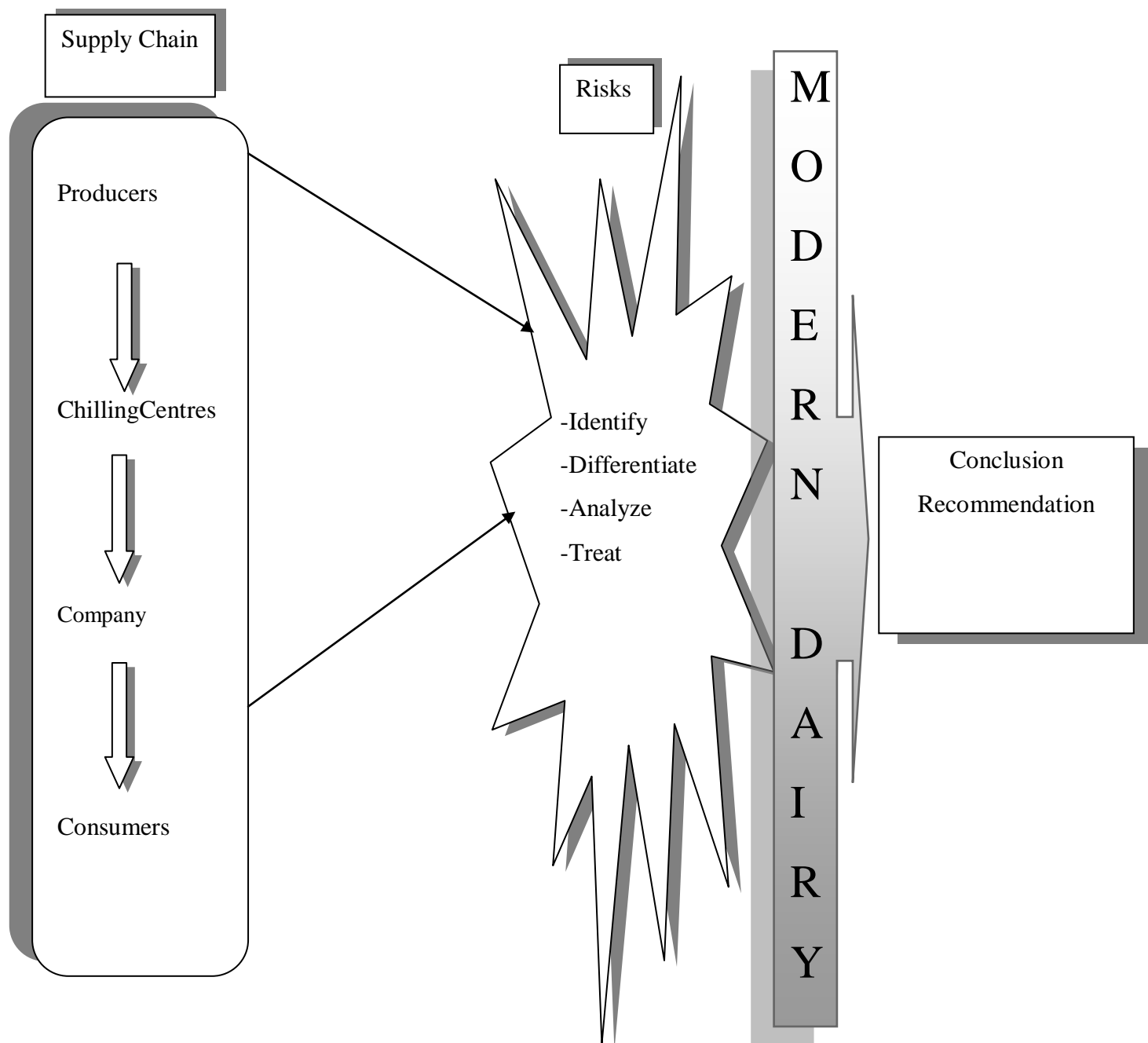


Fig 2: Conceptual Framework: Risks involved in Supply chain of Milk in Modern Dairy

2 SUPPLY CHAIN MANAGEMENT

2.1 Supply Chain

Supply chain has been defined in various forms. One of the views on supply chain defines it as a trend that affects the product from ‘dirt to dusk’. This means; the supply chain starts with the growing crops from the mother earth and ends with the disposal of the product in the soil after the use (finally returning to the mother earth). In between there are various process involved like conversion, processing, distribution etc. All of these processes from dirt to dusk are considered as Supply chain.

In practical life, Supply chain is a dynamic process which involves various parties i.e. manufacturers, suppliers, transporters, warehouse, retailers etc. These parties work together to satisfy the need of the customers. In a supply chain, the physical process may include the flow of products from suppliers to the end consumers, but the supply chain as a whole includes the supply chain decisions, as well. Product returns, payments, rebates, repair etc are the supply chain decision involved in the process.(Ayers,J.B. 2006. 4-6).

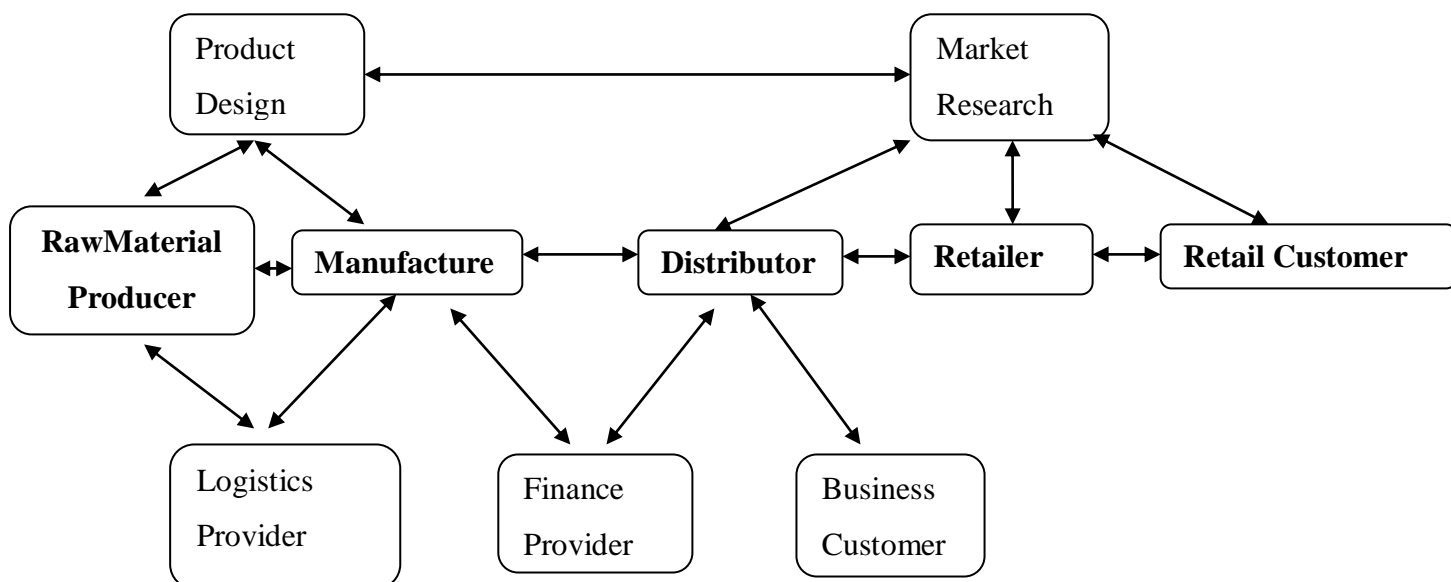


Fig 3: Supply chain Process (Extended) (Hugos,M. 2003 27)

The figure above represents the extended form of the supply chain. In this process, the raw material is produced which is further processed by the manufacturer. Finally, it reaches the Retailer and then to the retail customer. In between this main process, there involves other activities like product design, market research etc. During the whole process, the logistics, finance provider and Business customer has active participation. (Hugos,M. 2003 27). Generally, the supply chain in the products like food items ends when the consumers consume the product. But there is a new trend in the supply chain management which is recovery, recycling or reuse. The organizations are now encouraged to convert the used product into new products. The products can be reused or recycled after end of their life. i.e Plastics, steels etc. (Handfield,R.B&Nicholas,E.L. 1999. 4-5)

During the process of the supply chain, there is a continuous flow of the information, product and Money. The product flow from manufacturer to the customer while the money flows from customers to the manufacturers. But the information keeps flowing between all the parties during the supply chain. The supply chain involves various stages which include Customers, Retailers, wholesalers/distributors, Manufacturers, Component/ raw material suppliers. All of these stages are connected to each other through the flow of products, information and funds. (Chopra,S.&Meindl,P. 2007. 3-5)

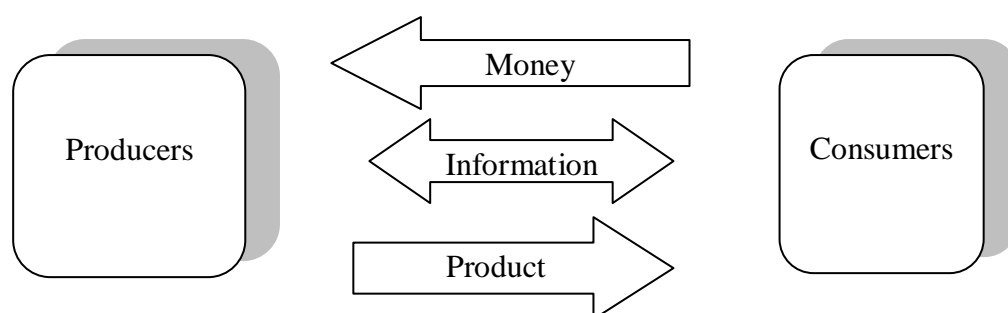


Fig 4: Flow of information, money and Product (Chopra,S.&Meindl,P. 2007. 3-5)

2.2 Supply Chain Management

Supply chain management is a broad topic which deals with whole supply chain cycle and also the management of the supply chain in order to satisfy the need of the customers. The Supply chain management can be described as: “Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements”. In detail, the supply chain management takes into consideration all the facilities that affect the cost and also to provide the customer with the products on the basis of their requirements and comforts. (Simchi,D.L.Kaminsky,P&Simchi, E.L. 2003. 1-2)

2.3 Activities involved in Supply chain

There are various activities involved in supply chain. Some of them are as follows:

2.3.1 Purchasing/Manufacturing

Purchasing is one of the most important processes of supply chain and core activity of any organizations. Every organization is involved in purchasing of goods or services. The main objective of purchasing is to avail the materials, supplies and equipment at the minimum possible costs. Moreover, it ensures the continuous flow of production and increase the asset turnover. Purchasing is classified under Mercantile and Industrial purchasing in the business world. Mercantile purchasing means the commercial activities where the goods are bought and resale with the motive of earning profit. On the other hand, Industrial purchasing deals with procurement, raw materials, component, office supplies, spares and tools, machine and equipments etc.

The principle of purchasing is to purchase the right quality of material, in right quantities, at right time, at right place and from the right source. The effective purchasing

has various advantages. It affects the quality of the final product, productivity, delivery time etc. There are various steps involved in purchasing. They are as follows:

1. Recognition of the need
2. Selection of the supplier
3. Placing the purchasing order
4. Receiving and inspection of the materials
5. Payment of the invoice
6. Maintenance of the records
7. Maintenance of the vendor relations

2.3.2 Logistics

Logistics is one of the most important activities of the supply chain. Every organization takes this role for the movement of the goods. The producers supply the raw material to the organization which manufactures the goods and the finished products are moved to the customers. Logistics needs lots of efforts, but the customer who buys the product might not know the value of the logistics. For the outsiders, the only visible activities are the trucks carrying some of the products or unloading the trucks in some shops, or the taking off the baggage in the airports. These are the visible signs of Logistics.

Every organization delivers the goods and service to the customer. The service should be provided on time to meet their satisfaction. Normally, in the modern age, the companies are much more focused in providing the service along with the goods. Many manufacturers like Toyota or Nokia provide the guarantee/ warranty in their products. Also, some food providers like Hamburgers or McDonalds provide the goods (Food) along with the service (prepare food and cleaning the place) and home delivery of the service. For every organization, the main aim is to satisfy the customer so that their sale increases in the long run. The Logistics plays a major role in all these activities. Logistics manages the flow of inputs through different operations within the organization.

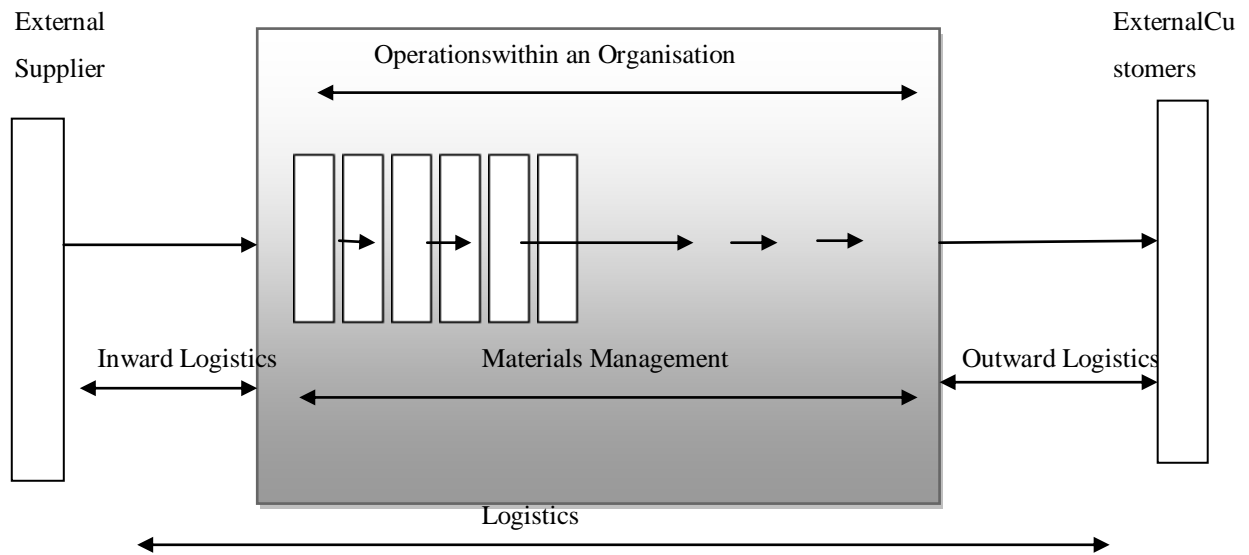


Fig 5: The flow of Materials controlled by logistics (Waters, Donald.2009)

The logistics include the movement of materials from the supplier into the organization which is called inbound while moving the goods from the organization to the customers is known as outbound or outward logistics. Similarly moving of the goods within the organization is known as materials management.

(Waters, Donald. 2009. Pg 4-6.)

2.3.3 Material Handling

Material handling is the process of Storing, Loading, Moving and Unloading of the material using various techniques and equipment's with lowest possible costs. Material Handling needs to be done in very careful manner. Some of the requirements for the material handling are; Making goods available in time when needed, Utilization of the least possible space for storing goods, Safe and efficient movement of goods to the destination etc.

Material handling is an important part of the supply chain. It helps the company to increase the profitability, and the production reduces indirect cost. An effective material handling ensures the efficiency of production by providing the right quantity at right place in the right time. Moreover, materials handling also reduce the damage and accidents and increase efficiency of equipment's.

A material handling in a company depends on the type of the materials that needs to be handled. So knowledge on different types of materials along with their characteristics is essential before handling the goods. Normally the materials are divided into four forms: Solids, Semi Liquids, liquids and Gases. Solid materials are the mostly used goods and more easy to handle than the liquids and gases. The solid materials are handled on the basis of its shape, size and weight. Similarly for gases, various requirements such as pressure, chemical properties etc need to be maintained. For Liquids, the characteristics like freezing and boiling point, temperature, inflammability, density and viscosity are important factors. Liquids are generally handled in tight or open containers with the facilities of heating, cooling, agitating, insulation etc according to the character of the liquid. (Ray,S.2007 pg 1-5)

2.4 Supply Chain Performance Metrics

It is very essential for a company to monitor and control its operations on a regular basis. The performance of the company depends on its supply chain performance. The supply chain performance metrics helps to identify the performance that a supply chain should deliver. This simple model allows dividing the market and identifying the requirements and opportunities for its supply chains.

The Supply chain Performance metrics is based on the types of market and its performance. Generally market can be defined on the basis of the two essential elements- supply and demand. This model highlights the four types of markets. They are the Developing Market, Growth Market, Steady Market and Mature Market. The Developing market is the one whose supply and demand are low. This market is uncertain; the cost of sales is high and inventories are low in this type of markets. Similarly, Growth market has higher demand than the supply. In this market the supply is uncertain, cost of sales is low and inventories can be higher due to increase in value. Furthermore, Steady market is a market where supply and demand are higher. This is an established market and is often predictable. Finally, mature market has the supply higher than the demand. Here the demand is quiet predictable and excess supply is always maintained.

In supply chain performance metrics, these four markets are divided into four quadrants. In the first quadrant, developing market is placed which has low supply and demand. In the second quadrant there lies growth market because it has low supply and high demand. Similarly, Steady market lies in the third quadrant where both supply and demand are high. And, mature market lies in a fourth quadrant which has higher supply than demand.(Hugs,M. 2003. 137-140)

All the different types of market along with their supply and demand can be plotted as below:

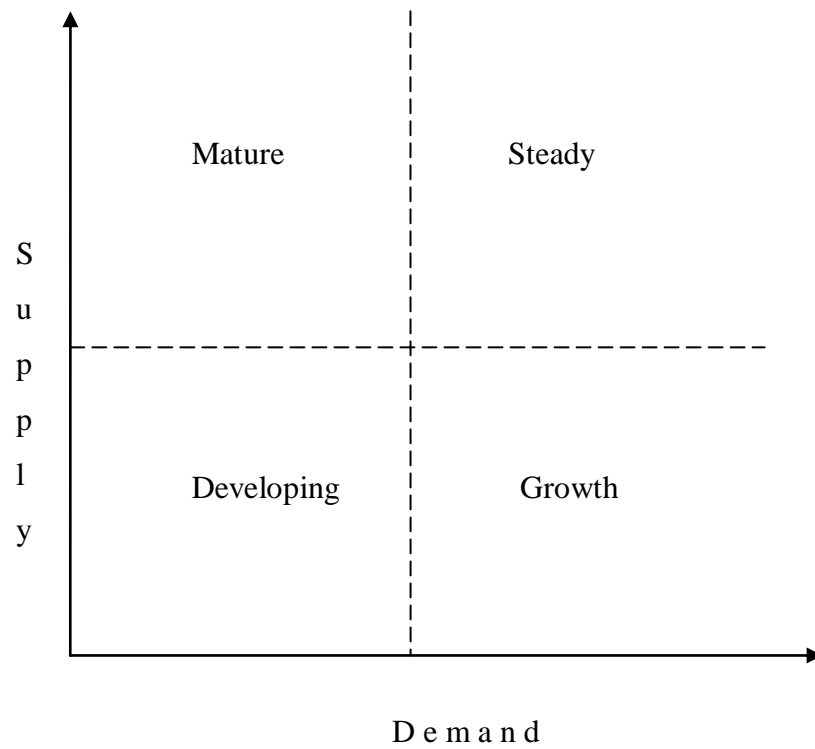


Fig 6: Showing -which market belongs to which quadrant based on supply and demand (Hugs,M. 2003)

3 RISK AND RISK MANAGEMENT

3.1 Introduction to Risk

Risk is assumed to be everywhere. When a person is travelling in a bus, there is always a risk of getting into accident. Similar with the case of a person who is crossing the road. He might get hit by a vehicle anytime, anywhere. A child playing with its toy might get hurt because of its poor design. The movie that has just released in the market gets huge loss of its investment. Similarly, the juice that we take every day may contain alar or the meat we eat may contain cholesterol which is bad for our health. The question arises, is the world a safer place to live? And the only answer to this question is 'No'. The world is inherently unsafe. We experience risk in the air we breathe, food we take, the investment we make, the things we purchase. It is impossible for us to avoid the Risk that is prevalent in every step we take. (Culp,CL. 2001 3-7)

Risk is directly proportional to the change and progress. With the invention of any technology, there is always the possibility of risk which could be physical or financial. The proportion of risk has increased with the new invention and technologies. If we look at the past and analyze the increment of risk, it is obvious for us to view that risk has increased over time. In the past, humans have short and brutal life because of the reason that they were forced to search for their food and living everywhere facing the danger of preying animals, poor weather etc. The situation changed, and new invention and the technologies were invented. Each addition of the technology created new risk. From the time we wake up in the morning till the night we sleep, we are exposed to many possible risks. (Website of nyu education)

So, what is the risk? How can it be explained? There are lots of discussions to explain what risk is. The risk has been linked in so many disciplines that it is defined in different ways by each one. Some of the definition of risk can be portrayed as below:

1. Risk versus Probability:

Risk is defined as the probability of the event occurring and the consequences of the event. For example: The probability of the earthquake taking place has less probability while the consequences of it, is very high.

2. Risk versus threat:

Risk is differentiated with the threat in some disciplines. It is considered that, threat is a probability event with very large negative consequences. The analyst may be unable to access the probability of threat. In other hand risk is a higher probability event with enough information for the assessment of both probability and consequences. It means that risk can be occurred more frequently than threat; and there is possibility of taking prevention.

3. All outcomes versus Negative outcomes:

A risk can be defined combining both the positive and negative outcomes. Some of the definition on risk only involves the negative scenario while some includes wide picture of risk. The definition from the engineering defines risk as the product of the probability of an event occurring (which is undesirable) and an assessment of the expected negative impact of the event that may occur.

i.e Risk= Probability of an accident * consequence in lost money/deaths

(Holton, Glyn A. 2004. 19–25.)

Generally, ‘‘Risk is a concept that denotes the potential negative impact to an asset or some characteristic of value that may arise from some present process or future event.’’ (Agrawal,R.C 2009 pg 6). Risk can be interpreted in many ways. We cannot run away from risk to secure our lives. If any person wants to play safely, or do nothing in order to avoid the risk, he has no possibility of getting success. We would nev-

er be able to use phones, if Graham bell wasn't interested to take risk. We could have never flown in sky if Wright Brothers wouldn't have invented Airplane thinking there is a huge risk in the invention of Airplane. The risk that arises in our everyday life is a common thing but some risks are so bad that they must be eliminated at all cost. Thus the concept of risk management is developed so that we can identify, differentiate, transfer or eliminate the risk on the basis of its seriousness.(Culp,CL. 2001 3-7)

3.2 Risk VS Hazards

The term Hazard is often used in an interchangeable manner with the risks. They are mostly used in similar context. But in terms of Risk management, the term Hazard is very simple terms compared to Risk. Hazards are generally used to describe the existence of the potential situation whereas risk is to take into account the likely scale of the consequences. Risk broadly estimates and statistically compiles all the probability of the event and the time period which threat is assessed. (King,R.D. 2000. 14).

3.3 Different types of Risks in supply chain

a. Pure Risks

In pure risk, there are two possibilities: either something bad happening or nothing happening. In pure risk, there is no measurable benefit. (Website of MyNewMarkets.com, 2013). Pure risks are generally the risk that involves nature, politics or social brawl etc. The natural risk in this category involves the climatic conditions like floods, earthquake etc. Similarly social security (Fraud, theft, corruption), Health and safety risks (Local Laws, standards, product liability, and employer's liability) and Quality risks (poor quality control standards and methods) are also considered as pure risks. (Website of FAO corporate Document Repository, 2013)

- Environmental risks:

Environmental risks are generally the risks that cause physical damages, health effects, economic damage etc. The risks occur due to uncertainty like floods, landslide, earthquake etc. These are risks that are unpredictable and can occur any time.

- Quality Risks:

Quality risk is very important aspect of any business. Risks in quality are very important to be identified, analyzed and treated. Most companies of the world have started managing their quality system standard to the popular ISO 9001 standard. (Reuvid, 2007 Pg 140). Since Underdeveloped countries like Nepal are continuously suffering from the risks of quality, quality risks need to be properly identified and treated.

b. Speculative Risks

In this type of risks, there are three possible outcomes. Either the risk is good (gain), something bad (loss) or nothing (staying even). The examples of speculative risks are gambling, investment in stock market etc. There are equal chances of earning or losing money in this kind of investments. (Website of MyNewMarkets.com, 2013)

3.4 Risk Management:

Risk management is the process of identifying, analyzing and reacting to the risks in an organization. Risk management is a reaction to the risks. The reaction to the identified risks may reduce, prevent or do whatever needed to lessen their effect. (Waters, D. 2007. pg75-76)

Risk Management consists of various disciplines.

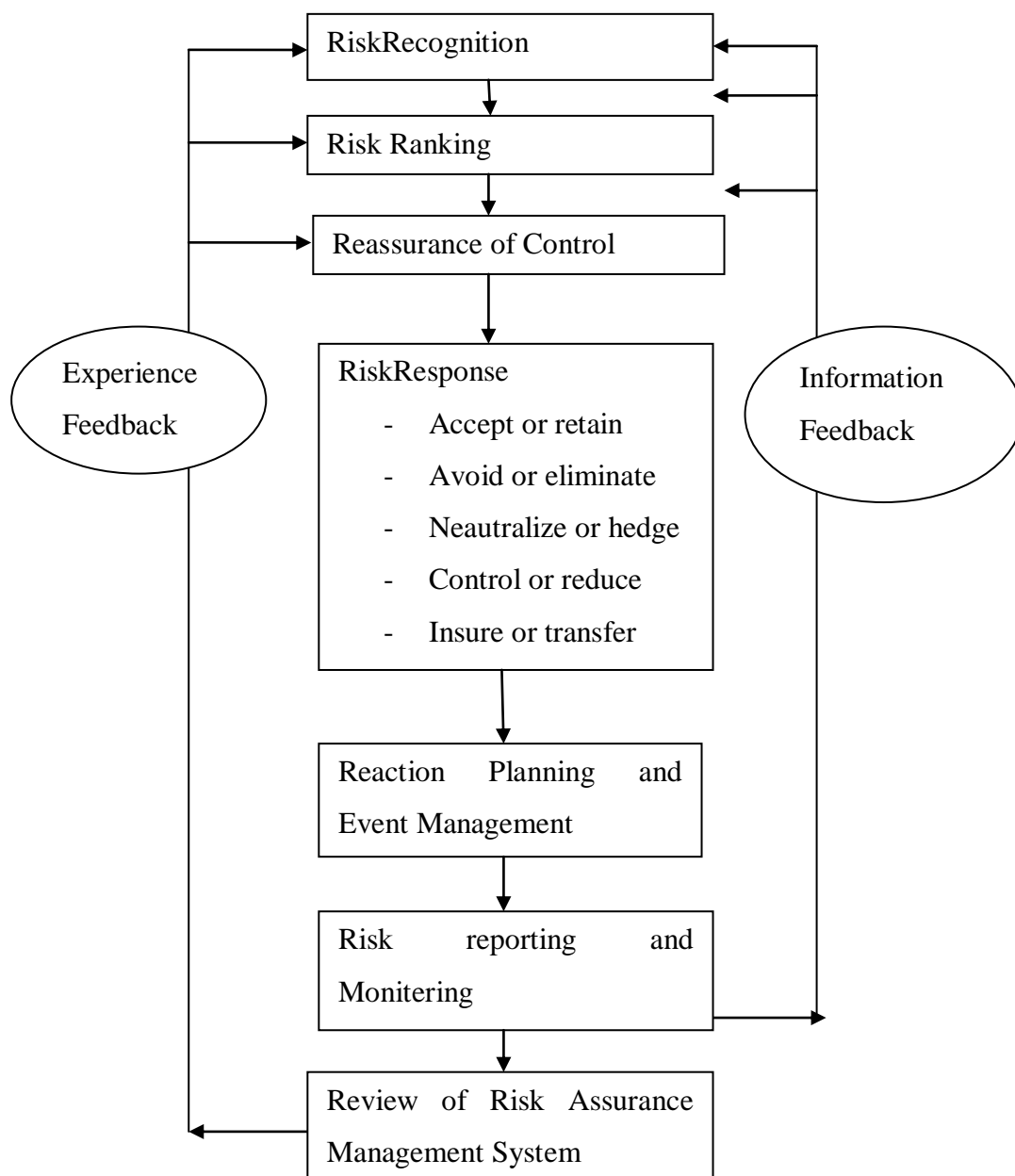


Fig 7: The established seven stages in the discipline of Risk Management (Hopkins, 2002)

Risk management has several disciplines. A risk management discipline is a system of rules for behavior in context or Risks. It is very important for an organization what risk management is seeking to deliver. In this age, risk management has various benefits. Risk management is an interdependent set of tools and techniques which consist of powerful disciplines and has several outputs and stages.

The first stage of Risk management is the recognition of the risks and deciding whether it is the hazard, control or opportunity. In this step, various factors are analyzed like what could go wrong (Hazard risks), what needs to be controlled (Control risks) and what must go right (opportunity risks). This stage of risk management should be well structured in order to achieve potential risks that could impact the key dependencies, core processes, corporate objectives, and corporate mission and stakeholder expectations.

The next step in risk management discipline is Risk Ranking. In this step, the risks are ranked on the basis of its magnitude and 'Risk profile' is produced for the organization for the further step. This step helps to separate hazard risks, control risks and opportunity risks and give answers to question like 'what could happen (what is the CASE), could it impact the benchmark level for significance, how likely is it to happen at or above the benchmark level.'

Reassurance of control is the process in which the risks are assured if they can be controlled. The risk recognition, risk rating and reassurance or control together is referred as Risk Assessment. Risk Assessment helps to apply the risk management disciplines. Furthermore, the other step of risk management is Risk Response. In this step, the actions are taken on the basis of following: Risk acceptance or retention, risk avoidance or elimination, risk neutralization or hedging, risk control or reduction, insurance or risk transfer.

After the process of risk identification, ranking and risk response, the organization needs to plan a reaction. It includes the disaster plans, recovery plans etc. Recovery

planning for Hazard risks includes the damage limitation and cost containment. And Recovery plan includes the result from loss, damage etc.

Finally, the organization needs to report and monitor the risk related issues which works as an architecture for a company in the future. Necessary guidelines need to be made to protect the company from future risks.

(Hopkins, 2002. 22-31)

3.5 Risk Assessment

Risk assessment is the process in which the risks are identified in the workplace so that the necessary precautions can be taken to prevent the harm. In this process of Risk management, all the risks are identified and classified. After classifying the risks, they are evaluated, and the precautions are decided. The findings are recorded and implemented in the workplace. The methodology mainly focuses on risks that have to manage. So the risks are separated in such a way that not so urgent risks are kept aside. (Website of HSE: Health and Safety Education, 2013)

Risk assessment is part of risk management. It is a central component of risk management and helps to identify and analyze hazards or threats.

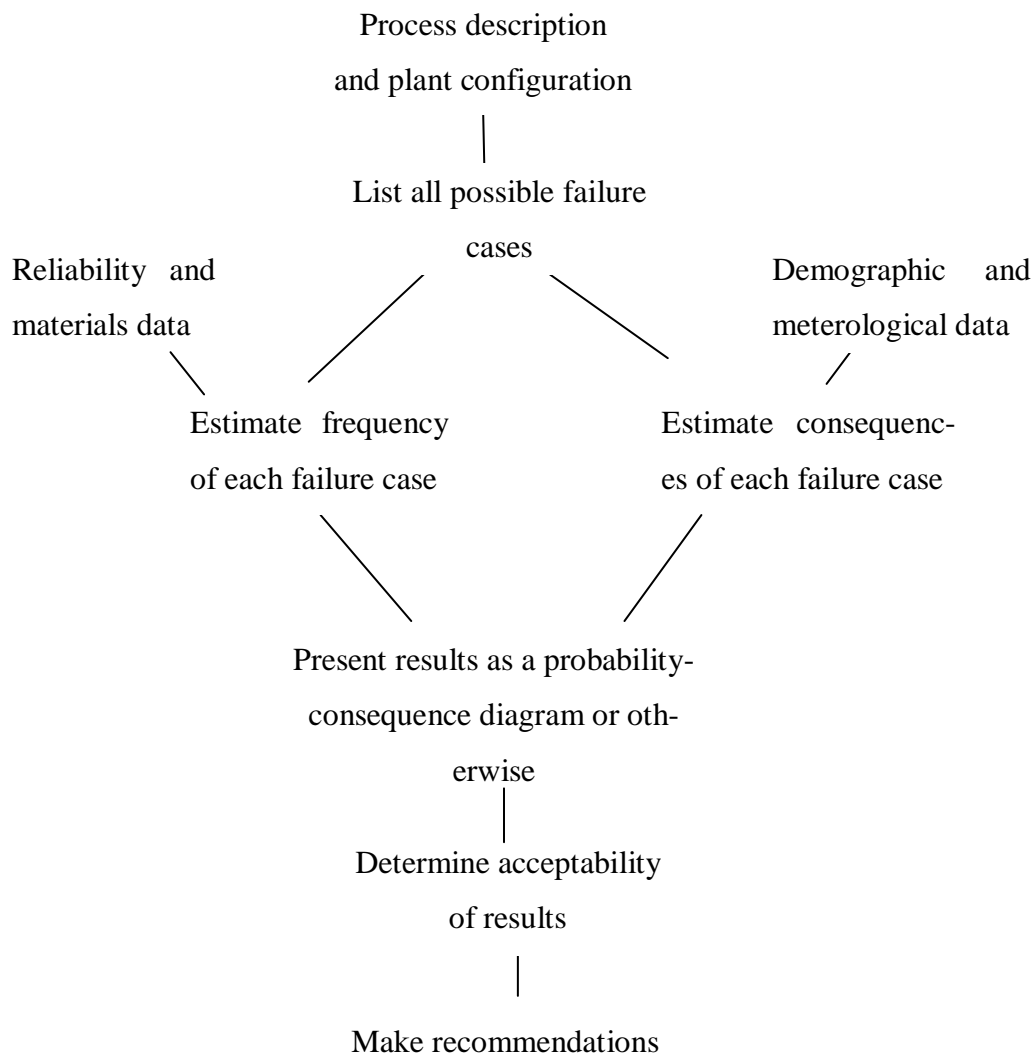


Fig 8 : Flow diagram of Risk Assessment (Waring and Glendon, 2000)

3.5.1 Risks Identification

It is the process of finding out the list of risks which are likely to affect the supply chain of an organization. ‘‘Hendricks and Singhal (2003) found that 34 per cent of supply chain disruptions originated from internal operations, meaning that the firm itself was responsible for the disruptions; suppliers were primarily responsible for 15 per cent of disruptions, customers for 13 per cent, nature and government for 4 per cent and various combinations of parties for 6 per cent.’’ Moreover, they also found that the other reasons for supply chain disruptions are shortage of parts (22% of incidents), sudden change in demand (9%), development problems (4%) and quality (3%).

Risk Identification helps to review all the uncertainties that arise during the supply chain

Summary			Description		
Identification number	Data recognized	Owner	Description of risk	Description of Impact	Probability
1					
2					
3					
4					
5					

Fig 9: Illustration of a basic Risk Register (Waters,D.2007)

The risk identification process needs to follow certain procedures to identify the risks which will eventually divide the whole supply chain into series of distinct operations. The general procedures include following steps.

- a. Defining the supply chain process in overall.
- b. Dividing and considering the details of each operation.
- c. Identifying the risks in each operation systematically.
- d. Analyzing the main features of each risk.
- e. Describing the most important risks in risk register or risk portfolio.

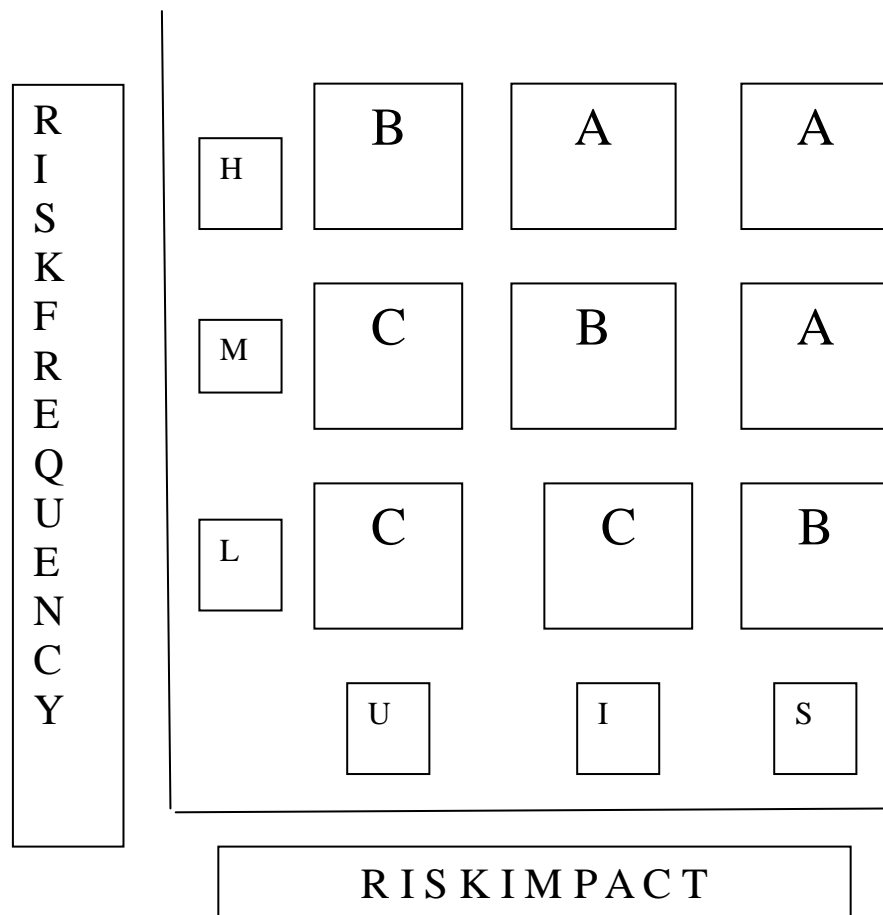
Risk register or Risk portfolio can be one of the important process which help to enter the features of risk. It helps the manager to add all the details of risk in a single register which might help the organization to identify and evaluate each risk individually (Waters,D.2007.Pg 97-106).

Risk register along with the risk treatment register practically gives the microscopic detail about the everyday occurring risks. The risk treatment register ensures if the risks are handled properly. Also these registers help to prioritize the risks according to the situation. (Website of Business Victoria).

This risk register and risk treatment register is practically used to analyze the risks in Modern dairy. The risk register and risk treatment register template is also available in Appendix 3 and 4.

3.5.2 Risks Estimation/Risks Mapping

Risk mapping is a tool to estimate the risks. This tool helps to estimate the frequency of risk and map it on the chart. The advantage of this tool is that it produces a model for further evaluation and amendment.



H: High, M: Medium, L: Low, U: Unimportant, I: Important,

Fig 10: Risk mapping Chart (Lecture Material)

In the above chart, the risks are plotted under two categories- Risk Frequency and Risk Impact. The Risk frequency shows whether the risk is medium, high or low, and the Risk impact shows whether the risk is important, unimportant or strong. On the basis of the chart, the organization decides which risk needs to be treated and which risks can be neglected.

3.5.3 Risks Analysis

3.5.3.1 Short, Medium and Long term Risks

Short term risk impacts in the continuity and monitoring of daily operation of the business. It can affect the key dependencies of the core business process. These risks can be compared to hazard risks in most situations. The unplanned business operation might lead to the situation and its impact is immediate. For example Machines dysfunction leads to immediate disruption of operation of various activities in an organization.

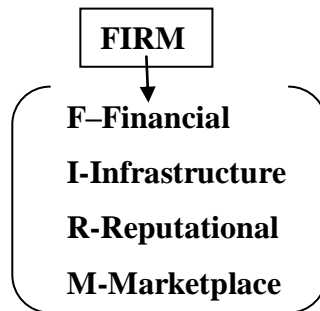
Medium term risk is not an immediate risk and impacts the company after certain time interval. The time interval could be 12 months after the Case occurrences. The medium risks are mostly associated with the projects, project launch etc. The example of medium term risks is poor management of the project. The poorly managed project takes time to be known and leads to the failure of the project in long term.

Long term risks affect the company after few years of the Case occurrences. The time interval can be 1-5 years and affect the development plans and delivery strategy of business in long term. The example of Long term risks is decision on selection of the Machinery. If the decision of purchasing machinery is wrong, the consequences will be risky for the organization.

(Hopkin,2002.Pg 77-80)

3.5.3.2 Firm Risk Scorecard

Firm Risk Scorecard is the process in which the information of the risks is recorded in a significant manner according to the impact of the risks. It acts as a template and undertakes the assessment activity. The Firm Risk Scorecard is classified into four headings. They are as follows:



a) **Financial Risks:**

The risks that have the impact in cash flow and profitability of the company are financial risks. The financial risks are linked to the all the failure related to the finance. The aim is to lessen the loss and ensure the correct allocation of the Cash in an organization. Financial risk can be measured in terms of quantity thus management and control is possible.

b) **Infrastructure Risks:**

The risks that affect the normal operation of the business are infrastructural risks. These risks affect the efficiency of the routine work. Infrastructural risks are not always straight forward but can be quantified. These are the internal risks which might take place in various situations like delay of the supplier or manufacturer to provide the infrastructure ie machinery for the operation of organization. The failure in the management of financial risks results in the poor performance of the business. This will continue affect customer satisfaction.

c) Reputational Risks:

Reputational risks include the situation in the organization is not able to fulfill the desire of its customers and partners. The failure of an organization (to meet the expectation of the customers), impact on reputation of the organization among the business partners and stakeholders.

d) Marketplace Risks:

The risks that impact on the level of customer expenditure and customer retention are Marketplace risks. This includes the failure of organization to achieve the required presence or level of revenue in marketplace. (Hopkin,P. 2002).

Risk can be categorized into different categories

1. Strategic Risk

This risk includes the risks which are related to the strategy, political risks, global risk or risks related to the economy.

2. OperationalRisk

This risk includes the risks that are related to the operation of the business such as risk in infrastructure, logistics, supply chain etc.

3. Financial Risk

The risks like credit risks, currency risks and risk related to finance belongs to this category.

4. HazardRisk

Hazard risk includes the risks like natural disasters, fire, accidents etc.

After the risks are categorized, it is necessary to prioritize the risk and analyze which risks affect the business for a longer period of time. (Waring&Glendon, 1998, 28)

3.5.3.3 Risk Matrix:

Risk matrix is the most common method of risk analysis tool. Risk matrix helps to analyze each risk according to its consequences criteria and likelihood. In the risk matrix, the risks along with their definitions of the likelihood and consequences are mentioned.

In accordance to the consequences criteria provided in the risk matrix, consequences of the event occurring should be determined. Similarly, likelihood criteria can be applied to determine the likelihood of the risk occurring. Finally, the assessment is done with reference to the effectiveness of the current control activities.

To find out the level of each risk, we can refer to the risk matrix. Risk level can be determined or identified by intersecting the consequence levels and the likelihood on the matrix. Different methodology and approach is required to determine the risk level of complex risks. For example, for the large procurement of materials in the company usually have lots of risks associated with it. To determine the level of such risks and its consequences, a different methodology and approached is required to assess it.

Significance		Consequence					
		1 Insignificant Impact	2 Minor Impact to Small Population	3 Moderate- Minor Impact to Large Population	4 Major Impact to Small Population	5 Catastrophic - Major Impact to Large Population	
Likelihood	1	Rare	Low	Low	Moderate	High	High
	2	Unlikely	Low	Low	Moderate	High	Very High
	3	Moderate / Possible	Low	Moderate	High	Very High	Very High
	4	Likely	Moderate	High	High	Very High	Extreme
	5	Almost Certain	Moderate	High	Very High	Extreme	Extreme

Fig 11 : Risk Matrix (Available on Website of gnedenko forum Organization- International Group on Reliability, 2013)

3.5.4 Risks Evaluation

After the risks are identified in a company, each risk should be taken separately and evaluated. The main aim is to evaluate the likelihood of damage and its economic consequences. Risk evaluation is carried out so that the risks can be put in order of their importance. (Luotonen, 1993. Pg 24)

3.5.5 Risks Capacity

‘A firms ability to identify their financial resources, expertise, and operating mandate to determine how much risk they are able to take.’

(Website of The Law Dictionary, 2013).

3.5.5.1 Risk Exposure

Risk exposure is the cumulative total of all of the individual values at risk associated with the risks facing the organization. Most of the organization doesn't have the proper analysis of the Risk capacity and Risk exposures. Let's take an example to understand the Risk Capacity and Risk Exposures.

In Kathmandu, Nepal: the medical service is needed throughout the year. So the Risk capacity for the medical workers is that the medical store needs to be open at nights, in public holidays. The extra working people should be hired for the extra works. The Risk exposure in this case is the health of people living in Kathmandu Valley. Also, the risk of people losing their life is high.

3.5.6 Risks Handling

After the recognition of the risks, it is very necessary to respond to them. There are various risk reduction measures that the organization can inherit. The organization can accept or retain the risk depending upon the current level of risk. An organization can also eliminate or avoid the risk. This can be done by stopping the process or activity which is the cause of risk.

Some of the risks that appear in the business need to be balanced against one another. Like: if the bears loss in one of the product, it can be recovered over the profit of other product produced by the company.

The risks can be controlled or reduce. There are certain ways to control or reduce the risks. For example: Wearing the helmet while riding motor bike is one of the ways to reduce or control the risk of accident. Moreover Insurance or transfer of risk is another measure in risk handling process. Insurance helps in transferring the financial losses arising from hazard risks to lesser extent.

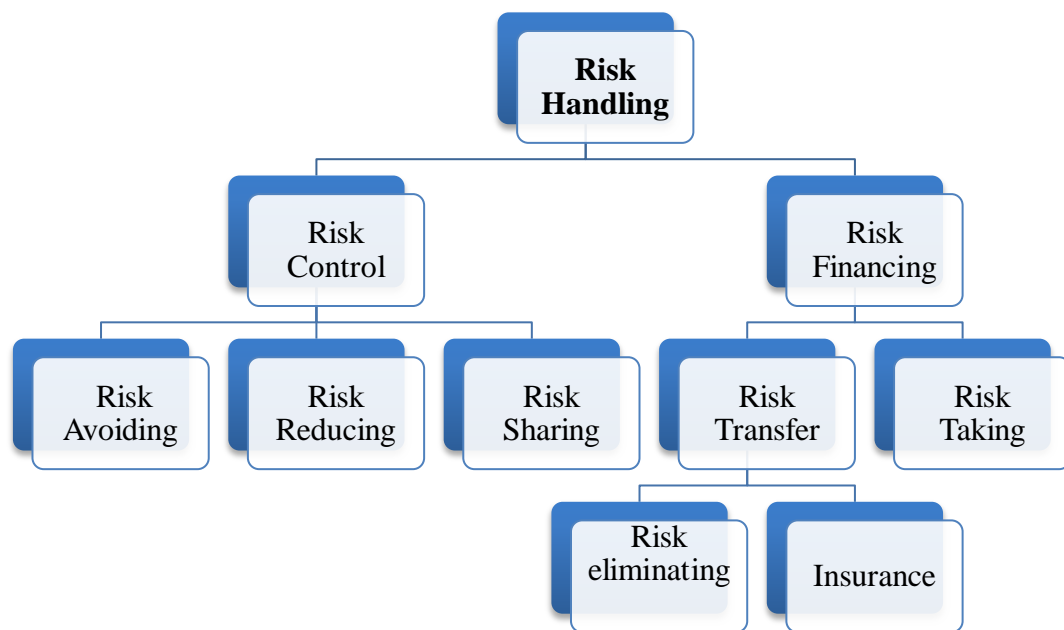


Fig 12: Risk Handling (Hopkins, 2002)

4 RESEARCH METHODOLOGY

A. Qualitative Research

According to Stern, 1980, qualitative research is much needed when the research required exploring of the new phenomena or the data is raw. Kananen (2010) explains qualitative method as a suitable methodology when the new concept needs to be understood. According to Kananen, qualitative research is conducted when there is no knowledge of the concept, and the aim is to achieve understanding of the concept deeply or to create theories and hypotheses.

Qualitative research mainly deals with the opinions, experience and feelings of individuals. In this method of research, the data is collected through direct encounters or personal interviews, by observation or by focus groups. Moreover, studying the documents like reports, mission statements, annual reports etc can also be the other method in qualitative research. (Hancock 1998, 6-13). According to Saunders, Lewis and Thornhill (2003,250-251), large number of questions (complex or open end) can be answered through interviews.

B. Quantitative Research

Quantitative research methodology is used when the phenomena can be observed or measured. It is a deductive method in which the theories are tested that has already been proposed. (Hancock 1998, 1-2) . Quantitative research is used when the aim is to find the answers to question like why, how many or how much. (Kananen 2012, 74).

After understanding the different research methodology, I used quantitative method, to do my further research. As my research required face to face interview, field visit and observation, I choose to use qualitative method of research.

4.1 Chosen Method of Data collection

1. Interview:

Interview is the most common and primary technique of data collection. The outcome of the interview depends on the number of participants, number of interviews conducted etc. An interview can be conducted either individually or in a group. Individual interview explores the topic in depth while group interview helps to explore the opinions and behavior. Individual is more about the individual experience than the issues of the public. So it can provoke individual emotions towards the subject matter. (Source: Sachdeva. 2009 pg164-168)

Individual Interviews can be conducted in three ways: Unstructured, Structured and Semi structured Interview. Unstructured interview is informal, open ended, flexible and free flowing type of interview method for research. In this type of interview, the questions are not preplanned but the interview has certain topics that need to be covered. Unstructured interview is more like a friendly chatting or like everyday conversation. (Website of History Learning, 2013) Date: 09.02.2013. Similarly Semi structured interview is taken setting up a interview and allows the interviewee to speak about their experiences and opinions on particular topic. The main motive of semi structured interview is that the researcher can understand the viewpoint of the respondent. In this type of interview both the open ended questions and general conversation is involved. (Website of Organization of Sociology,2013). Finally, structured interview involves two people: One person asking list of predetermined questions (interviewer) to another person on definite topics (Interviewee). The strength of structured interview is that it helps the researcher understand the specific topic in depth from the respondents. This interview can help to explore the personal feeling of the respondent and helps to gather the depth of the information about the topic. (Website of Organization of Sociology, 2013).

My research was mostly based on the interview. It includes all three kinds of interviews. I prepared some sets of questions to ask to the interviewee. But the interview was quiet informal. The topic was modified expressing the thoughts and ideas of the interviewee. Also, I conducted telephone research to understand the unclear matters.

2. Field Visit and Observation:

Observation method of research is generally useful when the research question needs to be answered. Observation includes, listening, reading, smelling and touching. Generally Observation is done when it is happening live and does not need any source for the confirmation. (Sachdeva, 2009. Pg 180) . Observation is one of the useful data collections and can be useful when the research is concerned with the people's behavior. It can be divided into participant Observation and structured observation.(Saunders, Lewis&Thorn-hill 2003, 221.)

My research also includes Observation as a research method. Since I had to understand and interpret the people's experiences into my thesis, it was one of the good methods of data collection.

Also I visited the company and analyzed different aspect of the business life. The observation regarding the company's business process was an important factor to come up with all the detailed results.

4.2 Implementation of the Research

I interviewed several persons regarding the topic of Risk Management. I talked with the CEO Mr Ajab lal Yadav and also the logistics head Mr Timilsina regarding the matter. Moreover I also took an interview with one of our Neighbor (Mr. Buddhiram Dhital) who is working in the Dairy Development Corporation (DDC) for long period of time.

During my visit to Nepal during the October-November 2012, I took a trip from Sindhupalchowk to Modern dairy and to the distributors and Retailers. During this trip I got to see the supply chain of Modern dairy as well as the problems that arise during the process. After my return to Finland, I was regularly in contact with the CEO of the company (Mr Ajab lal Yadav), Mr. Ramesh Pokhrel and Mr. Krishna Prasad Timilsina (My father). It was a great help for me to understand and analyzed the Supply chain and risks in the company as I could contact my father regularly. He gave me all the information about the establishment of the company, the normal process of supply chain and how the situations are handled in the company.

Also I visited the Dairy Development Corporation (DDC) in Lainchaur Kathmandu for 3 days. In this three days, I visited the laboratory, the production area and conducted a small interview with few people who were friends with my father. This interview made me able to analyze the difference between the operation of large business like DDC and small organization like Modern Dairy. Also the difference in handling the risks in two companies are totally different. As DDC deals with the customer throughout Nepal and has wide range of business, they are much more conscious towards the risks that arise in their business.

4.3 Validity and Reliability of Research

Reliability refers to the concept that will identify how accurate or stable the results are when the experiment is done several times. The main point is to get the same result in each repetitive times of the test.(Website of writing@CSU).

Validity refers to the test that gives the result of how well the research is measured. Validity checks if the research measures what is supposed to be measured. Validity always comes together with reliability. The test that needs to be reliable should also be valid. The validity can be improved if the objective or goals of the research are clearly defined. (Website of Student Outcomes Assessment)

5 RESEARCH OUTCOMES

5.1 Supply Chain in Modern Dairy

Supply chain is one of the most important processes of Modern Dairy. Modern dairy operates its supply chain from three districts. According to the research, the company faces various situations during this process. The Supply chain from Sindhupalchowk district is comparatively difficult than the other two districts (Chitwan and Kavrepalanchowk) because of its geography and landscape.

The model of supply chain in modern dairy was developed during the year of establishment. The Model includes the components like farmers, chilling centers, Company, distributors and customers. The model does not provide the wide range of information regarding the product and services. The model of supply chain in company was developed to view the supply chain in general. Nothing big and descriptive information was added to the model. The Management of the company was much more focused on the practical aspects of the supply chain and they didn't give priority to the theoretical aspects like - the model.



Fig 13: Supply chain in Modern Dairy in the past (Source: Interview)

In 2011, the model of supply chain in Modern was changed. The company realized the importance of a good model of supply chain management for the company as the demand and supply of the company in increasing in each year and they were unable to manage the supply chain. In the same year, the company re-organized the supply chain model and added few important issues like the logistics, Distributors, private

dairy's etc. In this model, the company was more focused on how their product, money and information flow in the company.

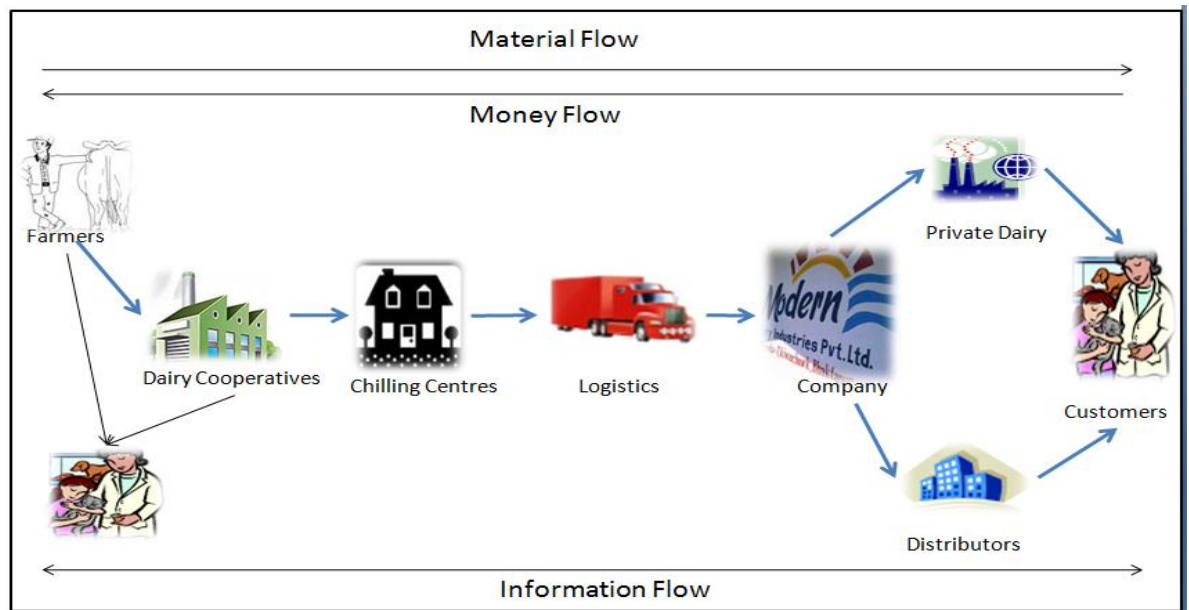


Fig 14: Modified from Harrison & Hoek, logistics management and Strategy, 2nd edition, page-8, 9.

Modern Dairy has a simple flow of supply chain. The raw material (Milk) is bought by the company from the local farmers of Sindhupalchowk district. The farmers sell the milk to the dairy Centre where the milk is collected in huge quantity. The collected milk is then maintained under certain standard temperature in the chilling centre. The chilling centre and the dairy centre are at the same place. Therefore, no transportation is needed to carry the milk to the chilling centre. After the milk is treated in the chilling centre, it is carried to the company in Kathmandu via tankers. The milk is then schemed, packed and is ready to distribute to the customers.

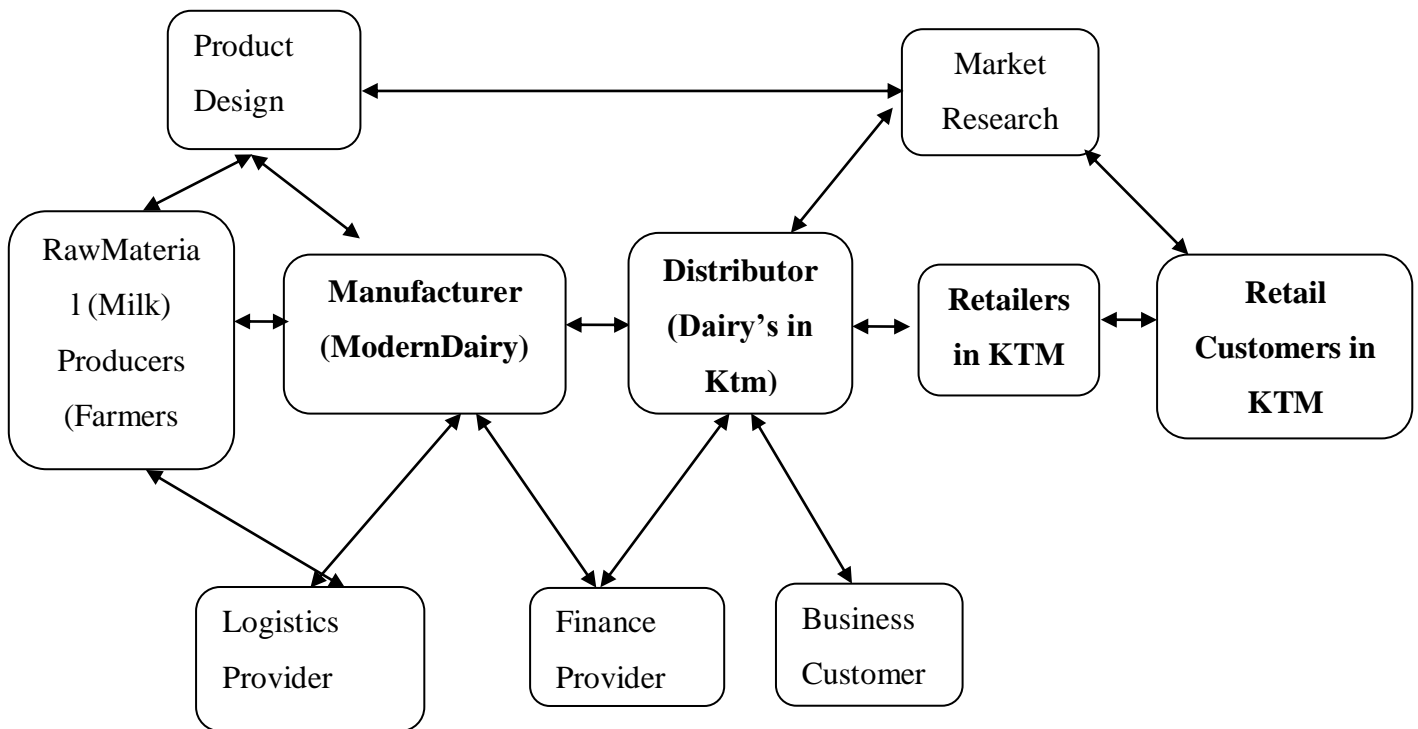


Fig 15: Supply Chain in Modern Dairy (Referred to theory)

5.1.1 Purchasing and Selling Process in Modern Dairy

The purchasing and selling process are the core activities of Modern Dairy. The Purchasing and Selling in Modern Dairy are co-related and takes place at the same time. The Purchasing in the company fully depends on how much the company is able to sell in the Market. The company places its purchasing Order from the local Dairies. The company visits the market in Kathmandu to understand the demand. The Company contacts the retailers and distributors in the Kathmandu Valley and arranges the meeting to discuss about the demand in the Market. The recognition of need in the Modern Dairy is decided on the basis of how much the retailers/distributors are willing to purchase from Modern Dairy.

After the demand in the market is analyzed, the Modern dairy is bound to select the suppliers who are willing to supply the milk to the company. In reference to the research, the suppliers are chosen on the basis of how much quantity they are ready to supply to the company and are flexible and reliable. Similarly, the selection depends on the relation of the company with the suppliers in the past. According to the CEO, the decision on choosing the supplier is highly based on the personal contact of the Company's management team. Modern dairy has a long term relation with the suppliers in all the three districts (Sindhupalchowk, Kavrepalanchowk and Chitwan) since the beginning of the establishment. But the company is also trying to increase the number of suppliers in the same districts or the other nearest districts like Dhading and Nuwakot to fulfill the increasing demand.

After selection of the reliable supplier, Modern dairy places a purchase order to the Local Dairy's in the districts based on how much the Retailers and Distributors places an order to the Company. The purchasing order of Modern Dairy from different districts is reviewed in every three months.

When the purchasing order is made, the company receives the milk (as a raw material) from the suppliers and they sell it to the retailers and distributors after the treatment of milk. Finally the payment is received by the company from the retailers and Distributors and the company pays the money to the local suppliers. In this whole purchasing process, the material flows from the Local dairies/Farmers to the Retailers and Distributors. Similarly, the money and the Purchase order flows from the Retailers/distributors to the local dairies/farmers. The purchasing process of the company can be seen as below:

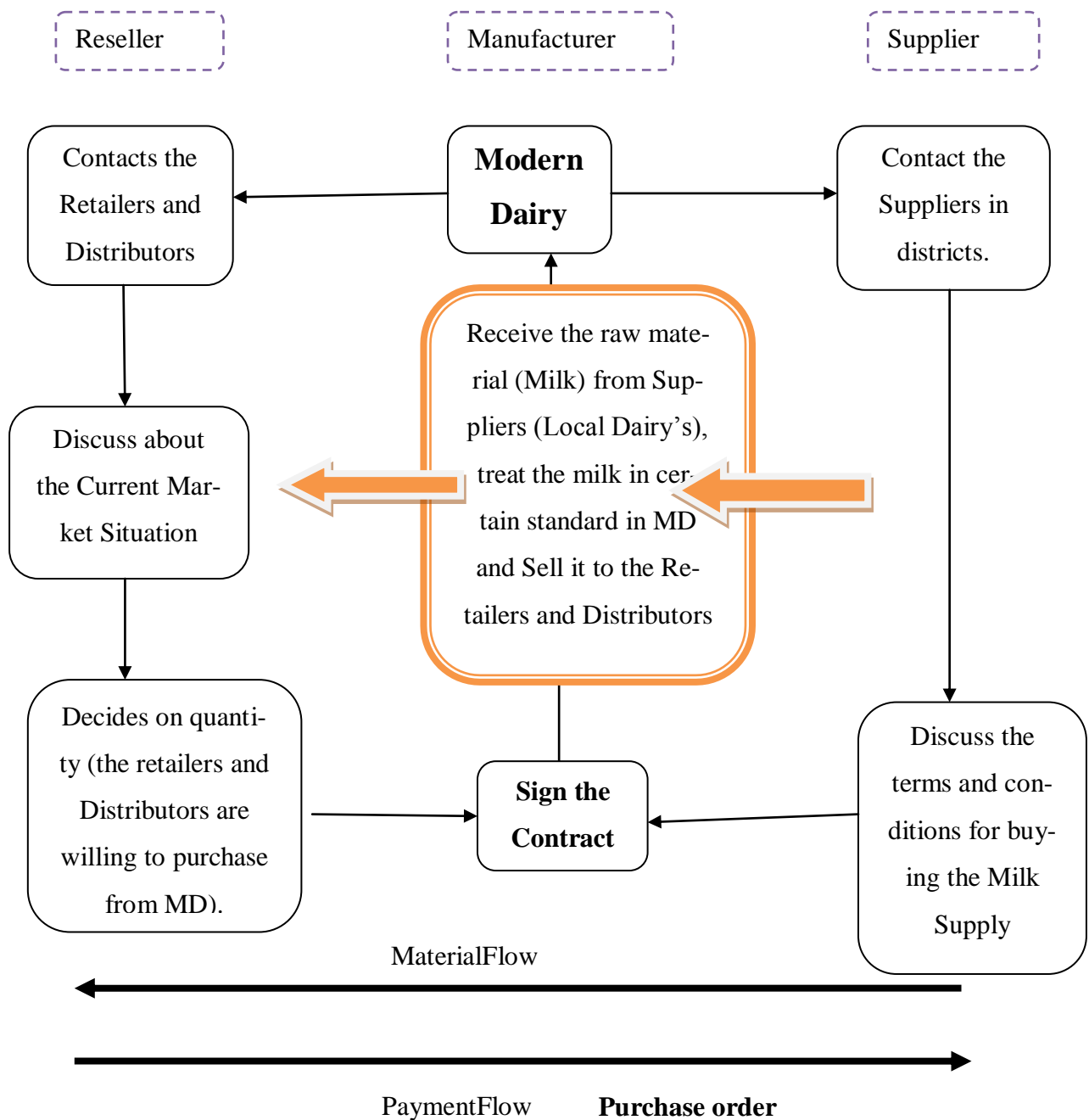


Fig 16 : Purchasing Process in Modern Dairy (Source: Created and Modified from the theory, (Chunawalla, S.A, 2008)

5.1.2 Logistics Operation in Modern Dairy

As mentioned in the description of the company, Modern dairy operates its logistics from three districts (Chitwan, Kavrepalanchowk and Sindhupalchowk). Regarding the Supply chain related information. The logistics operation in Modern Dairy is very difficult process. The Milk supplying districts for the company (Sindhupalchowk and Kavrepalanchowk) lies in the hilly areas with distinct physical feature. Moreover the chosen district for the case study (Sindhupalchowk) is among the backward district in Nepal considering the transportation facilities.

Comparing the Logistics Operation of Modern dairy with theory, the inward logistics of the company includes the farmers who bring the milk to the dairy centers. Farmers are considered as external supplier to the company. They are the ones who sell their milk to the company. After the milk is collected in the Dairy centers, they are bought to the chilling Centre where the milk is maintained under certain temperature. This process does not take any transportation as Modern dairy has the chilling Centre at the same place with the dairy Centre. The Milk is bought to the Company through takers. This internal logistic process (from dairy centre to the company) of Modern dairy (for Sindhupalchowk district) is taken care under the supervision of Mr. Krishna Prasad Timilsina. The outward logistics of the company takes place after the milk is treated in the company. The milk is then distributed to its retailers and distributors through the tankers.

5.1.3 Material Handling in Modern Dairy

Handling of the materials in Modern dairy is done by some lower level staffs. When the milk is loaded in tankers or unloaded in the company, they are responsible to do it carefully and with full cleanliness so that the milk is safe and healthy. The staffs are instructed to handle the liquid delicately. There are lots of chances of spilling the milk or touching the milk with hand. The staffs of material handling work use gloves while loading and unloading process. Also the pipes are handled carefully not to spill the milk on floor.

5.1.4 Supply Chain Metrics in Modern Dairy

Modern Dairy is newly established organization whose supply chain has been redefined according to the changing situations. The old supply chain model of the company was very traditional and unreliable to the changing business environment. According to Mr. Ramesh Pokhrel, 2009 was a difficult year for the company. As the company was new, the demand of the milk was very less. It was very difficult for the company to increase the demand of the milk in the competitive market of Kathmandu. With the existing strong competition in the market; it was not easy to create the high demand. Mr. Pokhrel explains that the milk supply of the company was limited in the first year. In 2009, Modern Dairy was only able to collect milk from Sindhupalchowk district. In September 2010, the company was able to increase its supply chain from the other district- Chitwan and Kavrepalanchowk. In the first 2 years of the company establishment, the company was in the developing phase in the supply chain performance metrics.

The demand and supply in Modern Dairy is quite unpredictable. Due to the growing market, the demand is quite unstable. The demand of milk is surprisingly high in

some seasons while in other seasons, the demand decreases. So, Modern Dairy has not been able to meet the demand of the customers in some seasons.

After four years of its establishment, the performance of the company is quiet in the Growth phase. The company is now able to make good image among the customers and the demand of the milk is increasing every year. The reason behind the growth is due to the good word of mouth and quality product (milk). The demand of the company is getting higher but the company is not been able to fulfill the demand. Mr. Pokhrel says 'The demand is increasing in Kathmandu and the nearest district of Kathmandu as well. But the company is not able to meet the demands of the customers'. According to the statistics report of Supply and demand in 2012, Modern Dairy can be plotted in the fourth Quadrant as follows:

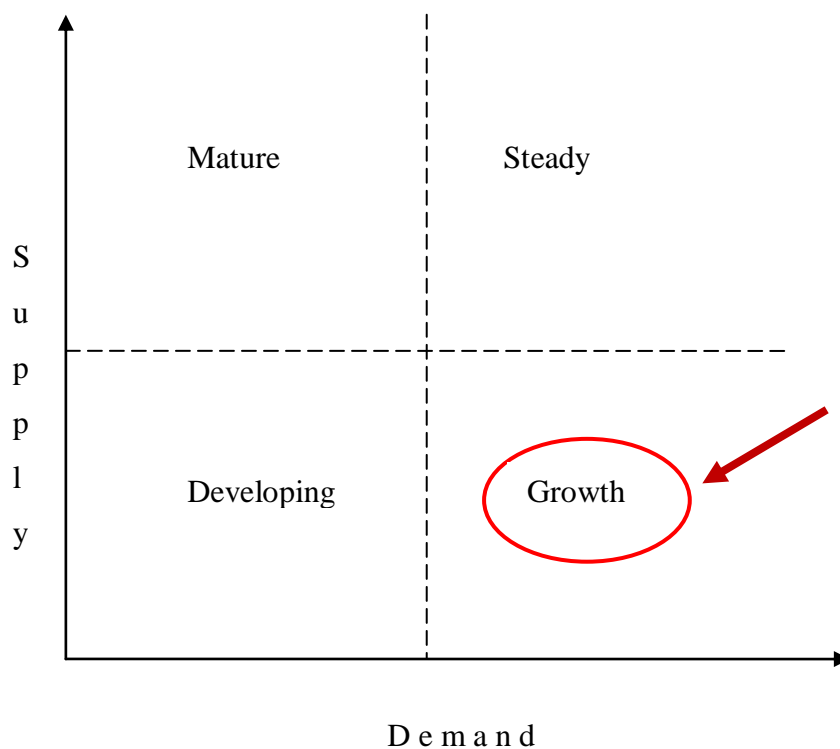


Fig 17: Supply chain Performance of Modern Dairy (Source: Modified from Essentials of Supply Chain Management. (Hugs,M. 2003.)



Fig 18: The possible extension of Modern Dairy plotted in Map of Nepal (Source: Modified from Website of ncthakur.itgo.com)

5.2 Risk Management in Case Company

Modern dairy has a simple model for Risk Analysis and treatment. The broad view for risk management has not been introduced yet. There is no Risk Managers in the company and all the risk related matters are handled by the Supply chain and logistic head and managers. The risks are superficially identified and treated accordingly.

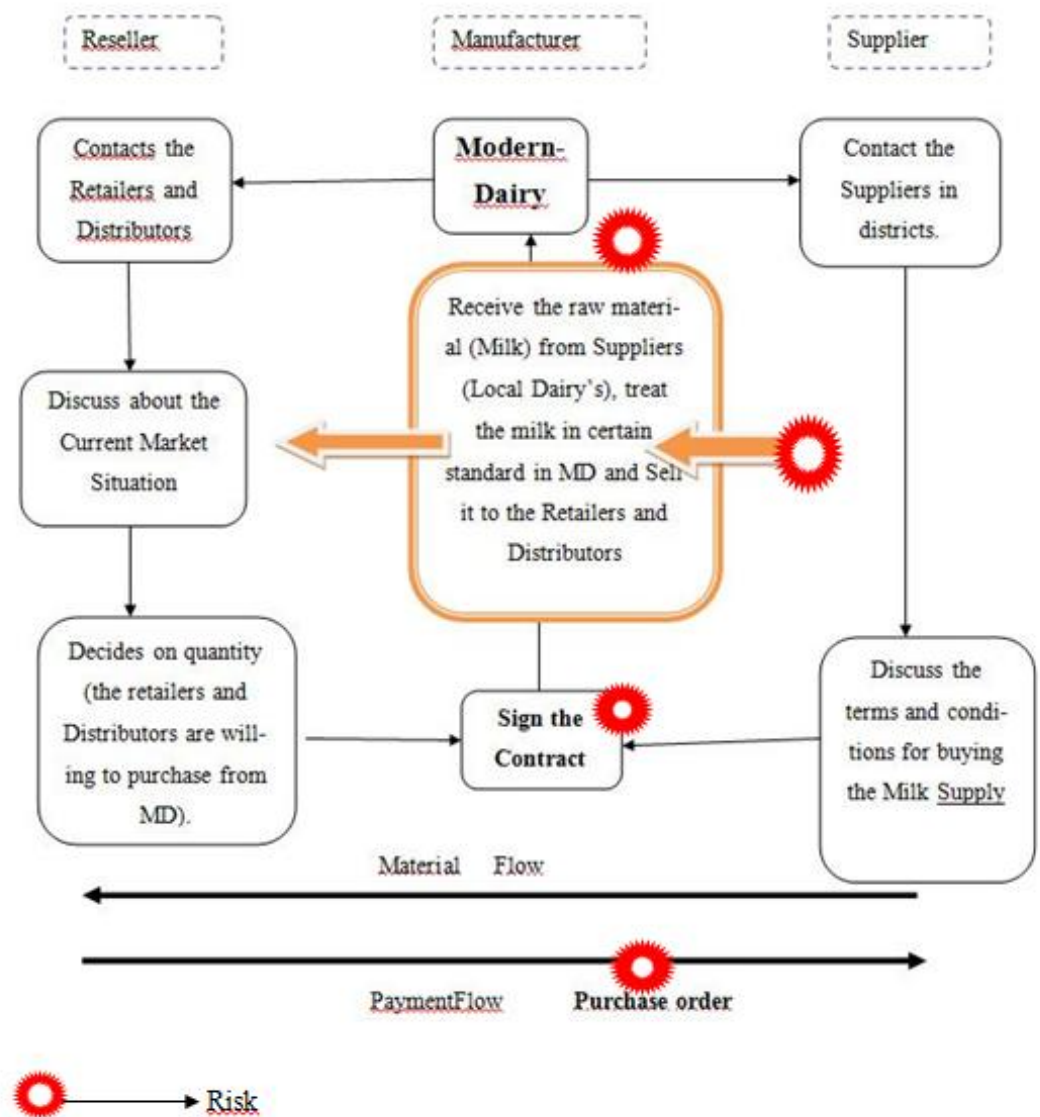


Fig 19: Risks in Modern dairy Supply Chain. (Referred to Theory)

In Modern Dairy, the risk arises mostly during the supply chain process. The risks are mostly related to the material flow. During the flow of material all the environmental risks, product risks, political risks, logistics risks come along. Some of the risks also arise in the manufacturing process and distribution process.

All these risks that arise during the process of supply chain are identified. The identified risks are analyzed whether they can be accepted or avoided and they are treated according to the nature of risks. Necessary precautions are implemented and finally reported to the upper management team.

5.2.1 Risk Management Analysis in Modern Dairy:

In Modern Dairy, the risks are handled haphazardly. Each department is responsible for the identification and reporting of the risks. For example the risks in logistics are handled by the logistic head, risks in the Lab of the company by the workers or supervisor. Similarly, the risk in the marketplace or demand and supply is handled by the upper managers. Basically, there is no any proper system of tasks responsibility in Modern dairy. All the risks that are identified in different sections of the company and are discussed in the monthly meetings and the solutions are found accordingly.

Risk management is taken as one of the simpler topic in the most of the business in Modern Dairy. The management is not aware of the facts that risks exists everywhere. This is due to lack of understanding in the field of Risk Management. During the visit to the company and taking a trip to Sindhupalchowk, I analyzed several aspects which are responsible for the ongoing risks in the company. Some of the aspects are focused below:

During my research, I observed that Modern dairy lacks the competencies. The Management team of the company is not strong enough to view the future.

The Company is not able to understand the core importance of the Risk management and Supply chain management. This is due to superficial education system of Nepal which only allows the people to understand the theoretical aspects of the subject.

Also the staffs hired in the company are not well experienced. Specially the lower level staffs are totally unaware of the ongoing process of the company. For the company like Modern dairy, each staffs should have the knowledge on the biology of the Milk so that the risks can be handled at any point of time. The driver who carries the milk from different district is illiterate and they don't have any knowledge or training in various conditions where milk has to be maintained to avoid the spoiling. I found that there are lots of those times when there are no supervisors travelling during the logistics process and when the milk is stuck in the street for some calamities or strikes, it gets spoilt. So, this is one of the problem that modern dairy has not yet highlighted.

The company has not yet decided to have a risk manager who could handle the risks that occur every day. The risks are not identified and treated as a big aspect of the company. It is just taken as an accident and treated on temporary basis. Like, if there is flood on the way to the company, they are only focused on how to get the milk to the company on particular day. They are not focused that these problems will arise in the future and there could be alternative ways to deal with it. The company does not have the well-educated personnel who could focus on the details of the occurring risk and the risk that are probable in the future.

The theoretical model of Risk management is not well defined in Modern dairy. The risk management is taken as hazards and treated at the moment. The risk analysis is not done so that the long term or short term risks are not identified. Furthermore, risk mapping and register of risks is also not done. The newly established Modern Dairy lacks the vision on Risk Management completely. The model of risk management is quite superficial and does not define each component or aspects of the supply chain process. It does not highlight the areas in which the risks are more likely to occur or does not say anything about the risks that can be avoided or ignored.

5.2.2 Risk Recognition and their effects in Modern Dairy:

During my research, I found out that there are certain risks that are creating trouble for the development of the company.

a) Product risks:

The risk of the product getting spoiled or ruined is in every step of the supply chain. The milk is a delicate component that needs to be taken care with certain techniques. If the right technique is not used during the collection, transportation or distribution process, there is risk that it can get spoiled at any point of time.

All the risks that are identified in the supply chain of the company are directly or indirectly related to the product. As the main objective of the company is to provide its customer with the best quality product so the main target of the company is to handle the risks related to the product.

During the research, I realized that this is one of the most important risks that need to be considered. To avoid the risks related to milk, one need to know what the good quality of milk contains how it should be preserved or transported? What keeps milk in good condition and what are the main responsible factors for spoiled milk? Even though I was not to be involved in biology of milk, it was good find out the short investigation on the methods how milk can be preserved.

Good quality raw milk must be:

- Free from debris and sediment.
- Free from off-flavors.
- Low in bacterial numbers.
- Normal composition and acidity.
- Free of antibiotics and chemical residues.

(Website of Food and Agriculture Organization of the United Nations)

b) Risk of Competition:

Kathmandu is a big market with large number of buyers. The demand of the market is very high and the supply is low. Also the market comprises or lots of scattered retailers and distributors who are randomly supplying milk to the consumers. Due to the emerging new players in the milk business, the market of milk has become challenging.

In the competitive market like Kathmandu, the competition and rivalry cannot be left unnoticed. Apart from the biggest milk supplier – Dairy development Corporation (DDC), there are various other private milk suppliers who are emerging rapidly. Some firms like Anmol , Sitaram are now able to increase the market share of customers. These private firms are slowly giving competition to the DDC- the oldest and biggest milk supplier operated by the government.

Modern Dairy, being a newly established firm, the company needs to discover certain unique techniques to come into the eye of the customers. As per the overview of the supply and demand of the company, it seems that Modern Dairy has been able to attract certain group of customers. The demand of the milk is increasing each year and the Company is slowly giving competition on the market. But the company can never ignore the power of the competitors and should be prepared for the risks that might arise in future.

c) Risk in Supply and demand

Modern dairy always faces the problem in fulfilling the demand of the customers. As milk is the seasonal product considering that the quantity fluctuates in each season, the company is always in the risk of not getting the enough quantity of milk. The unpredictable rise and fall in the quantity of milk supply is a trouble for the company.

d) Risk in Logistics

Logistics Risk is another risky aspect of Modern Dairy. Modern dairy has the single route for its logistics operation (for the case district – Sindhupalchowk).

During the logistics operation, there are cases of tankers being damaged. Also, the logistics operation might be affected by certain factors like environment, politics etc. These situations have major impact on the product as it needs to be maintained under certain standards to save it from getting spoiled. This risk affects the whole process of supply chain and customer relationship

e) Environmental risks

As Nepal being a mountainous country, the risks related to the environment (environmental risk) is always in considerations. The environmental risks are often experienced in the rainy seasons where there are lots of chances of floods and landslide. There are lots of cases in the past that the milk was not been able to carry to the Modern Dairy due to such problems.

f) Political Risks

The political situation of Nepal is very unstable .Politics greatly affect the workflow of Modern dairy. There is regular strike and shut downs of the street. During those times, it is very difficult to carry out the logistics operation in the company.

e) Power cut Risk

Power cut is one of the big problems of Nepal and for modern dairy it affects directly. The load shedding (power cut) occur almost whole year. According to the news of September on Himalayan times, the power cut is 49 hours per week. So the power cut is approx. 7 hours per day. The electricity cut increases and decreases on each seasons depending on the water flow in the country. (Website of Himalayan Times.2013).

As the Modern dairy needs to maintain the standard quality of milk, the electricity is an essential factor. The power cut give rise to lots of problems. The equipment cannot be used in time and the whole operation needs to be stopped or alternative method needs to be found out.

f) Technological risks

There is always a risk in Modern dairy that the equipment's are well operated. The problem in operation of certain equipment's like cooling system, and the computer etc. slow down the whole supply chain process. Also this type of risk might occur at lots of time.

g) Legal risks

- Quality risk
- Packaging/ Labeling risk
- Nutrition requirements risk.

Legal risks are always associated with any kind of business. The regular inspection from government regarding the quality, packaging, labeling, nutrition requirement etc can lead to the legal issues to the company. Various milk industry has been suspended for not fulfilling the standard legal requirements and many of them are under supervision.(Website of The Kathmandu Post) Therefore, Modern dairy needs to be careful regarding the legal issues of the milk business.

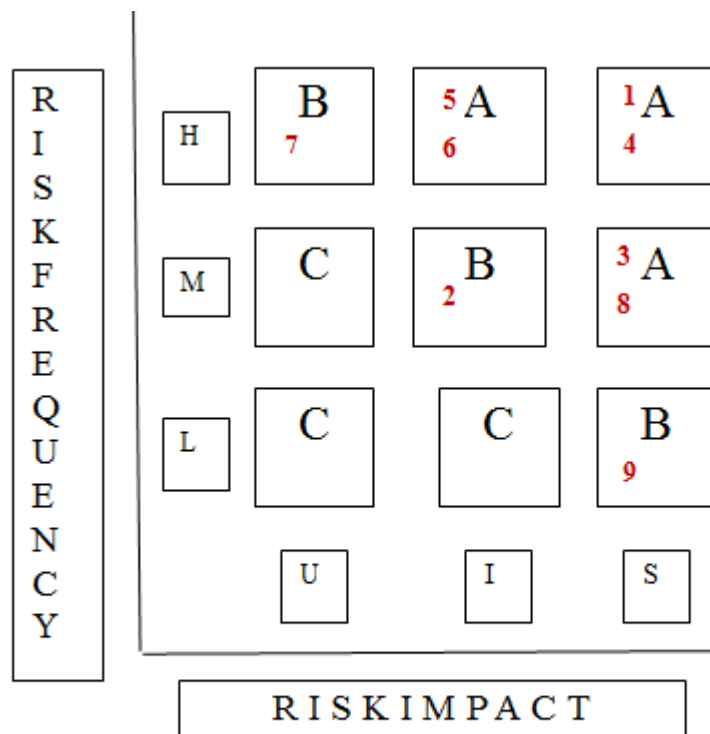
5.2.3 Risk Analysis

The identified risks are now registered in the risk register to analyze them properly. The risk register provides detail overview about each risk. The risks are analyzed based on their likelihood of occurrence, their impact, resulting level of risk, how adequate solution the company has for each risks and the priority order of each risk.

Before the risks are analyzed in risk register they are now mapped on the risk mapping chart to know how much important the risks are to be treated or avoided. Firstly all the identified risks are 'numbered' as below:

Risks	Given Number
Product Risks	1
Competition Risks	2
Supply and Demand Risks	3
Logistics Risks	4
Environmental Risks	5
Political Risks	6
Power Cut Risks	7
Technological Risks	8
Legal Risks	9

All the risks that are numbered are mapped on the risk mapping diagram according to their priority of treatment.



H: High, M: Medium, L: Low, U: Unimportant, I: Important, S: Strong

Fig 20: Mapping the risks in the Risk mapping Chart (Referring to theory)

In above Risk mapping chart, the risks that are highly occurring and has strong impact are plotted on A (Right side at the top). They are number 1(Product risks) and number 4(Logistic risks). These risks have high impact on the regular operation of the business and needs immediate treatment.

Modern dairy faces several situations of Spoiling of the milk on the way to the Modern dairy (product risks and Logistic risks). These risks are serious risk and likely to occur most frequently. So, it needs to be treated as a priority. If the chances of spoiling of milk seems high, the necessary treatment should be done, of the milk is already spoiled, the company needs to think how to meet the demand of the customers.

Similarly, Supply and demand risks and technological risks are plotted on second line right side A. These risks are important but they occur less compare to the logistics risk and product risks. These risks are important to be treated as the supply is less than the demand; there are chances of customer dissatisfaction. Therefore in order to keep the customer loyalty towards the company, Modern dairy needs to take this risk in priority. If the supply is less, the company needs to contact its supplier to increase the quantity of milk supply. There can be an instant solution within a day but this risk needs to be treated as an important risks. Also, some of the technical issues might appear in the company like problems with the machines, computers or some laboratory instruments etc. These kinds of risk are most likely to appear in everyday in the company. These technological risks needs to be prioritized and needs the treatment as soon as possible. There are chances that this might affect the whole operation of the company. This kind of risks can be handled by the mechanic who is hired for the company's emergency services (in technological part).

Legal risk is plotted in the third line right side at B. Legal risks are strongly important but they occur very less (probably once in a year).Legal issues can be said as rarely occurring risks for Modern dairy. But they should be handled very carefully. Most of the legal risks appear during the process of maintaining the standard product or meeting the legal requirements in collection and distribution process. If the company is not able to work under the law, it might be charged for violence of the law.

This might seriously affect the company's reputation and the company might have chances to never recover it in the eye of the customers. Therefore, a legal risk needs to be taken into account very precisely. The company is much conscious about the regulations but the frequent legal suggestion from the legal officer could be the best solution to this risk that might arise.

Environmental risks (5) and Political risks (6) are plotted on first line left side A. These risks are very likely to occur and are important. These risks should be prioritized as they occur mostly in context of Nepal. During the process of collection of milk and distribution, there are chances of Landslide, flood or risks of Strike and chaos on street. This might result in affecting the supply chain of the company which directly affects the distribution process. These risks are unpredictable and can happen anytime. The company should be prepared for this kind of situation and should focus on alternative way to satisfy their customers.

Power Cut risk (Number 7) is highly occurring risk or most common risk in Nepal. The power cut is experienced almost every day. As the machinery in company works only with electricity, it is required to solve this problem. Therefore the company has now some generators stored in case of sudden power cut. This risks are important risk but taken as unimportant because its regular and the optional solution is already found for this risk. This risk can easily be neglected by the company.

Competition risk (Number 2) is likely to occur less. The competition is always there in the market but the sudden change in the market structure is experienced rarely. The competition risk should be treated as important risk as it is always necessary to be able to compete with the Competitors. The competition risks can be solved by getting the regular updates of the market situation.

All these risks/hazards that occur normally in the operation of Modern dairy are registered in Risk register (Available in appendix 3). In this register all the risk are defined properly and prioritized according to their impact. Also risk register provides the information about what actions can be performed in each case or what needs to be done to manage the situation.

5.2.4 Risk Evaluation

The risks Evaluation is based on categories of risks. The risks are categorized into four main titles- strategic risks, Operational Risks, Financial Risks and Hazard risks. The risks are then analyzed if they are pure or speculative and also how much they occur in the business. Also depending on how long the risks affect in the company they are categorized if they are short, medium or long term risk.

According to the research on Modern dairy the risks that occurred in each category are listed below:

Total no of cases for each category of risks:

Strategic Risks: $5+1+1 = 7 = 11.11\%$

Operational Risks: $6+20+9+12 = 47 = 74.60\%$

Financial Risks: $1 = 1.59\%$

Hazard Risks: $2+5+1 = 8 = 12.70\%$

Total Cases= 63

The result shows that the operational risks are mostly occurring risks whereas, financial risks occur least. So the Operational risk needs treatment on the regular basis and should be prioritized. The company needs to find solutions to these risks that might occur during the operation of the business delaying the process.

According to the research on each category, the strategic risks are mostly the risk that affects the business for long period of time whereas, the operational risks has short term effect. This means that Strategic risks should be handled very carefully as it includes the decision of the business process. The management should consider these risks in the top priority so that the business is not affected for long term. (See Appendix 5 for detail information)

5.2.5 Risk Handling

1. Risk avoiding

Risk avoiding is not a good idea to deal with the risks in Modern dairy. But there are few risks that cannot be predicted. So they can be prioritized less compared to the risks that have possibility to control. The risk like environmental risks needs to be avoided in Modern dairy. The risks like landslide, flood or any natural calamities cannot be controlled. The only thing that Modern dairy can do is to take precautions of having the necessary material to prevent the milk from getting spoiled if such situations occur. The Political risks cannot be predicted in Nepal. It can happen anytime at anyplace. There is no any control over the risk and can be avoided or can be listed as less priority in the list of risks that needs to be handled.

2. Risk Transfer

The risk transfer is an important method of risk handling for Modern Dairy. The risks like hazard risks needs immediate treatment and people should always be ready to handle them at any point. Some of the precautions that can be transferred/eliminated/Insured can be analyzed using the risk treatment register. It helps to take each risk individually to find the necessary solution for them. At this point, Modern dairy can decide if they want to take risk, eliminate them or use the available insurance. Having detailed information about the risk, the company can prioritize the risk which needs to be solved on the spot and can handle the less priority ones later. The Risk treatment register with detail information of each risk can be found in appendix 4.

The risk treatment register also contains the information that is already included in the risk register. The risks that are already registered in risk register are copied to risk treatment register to find out the proper way to deal with it. Risk register helps to find out the immediate treatment while risk treatment register gives information about the further actions. Also it gives the information about either the risk should be accepted or rejected and the

responsible person for handling each risks. The risk treatment register is used in context of Modern dairy to find out the solutions to each risks which can be found in Appendix 4.

Risk treatment register analysis:

Analyzing the risk treatment register, it seems that some of the risks can only be rejected or avoided. There is very less control over the risks like environmental risks, political risks. Like, the only precautions that can be taken for the environmental risk is finding the alternative routes. Nothing else can be done to prevent the risk. In this case, the risk needs to be accepted. In case of some damage the insurance claim can somehow assist the company financially.

Also similar is the case with the Competition risks, market risks and Supply and demand risks. These strategic risks like risk of competition and supply and demand risk can only be analyzed after they occur. The only precautions for these risks are to get updates about the market situation. And the solution after they occur is to start research contacting the company's distributors and retailers. Similarly, some of the Hazard risks like simple accidents and operational risks like problems in computer or machines etc. can be solved instantly. (Detail description can be found in Appendix 3 and 4).

6 SUGGESTIONS OR RECOMMENDATION FOR MODERN DAIRY:

a. Creating the New Risk Management Model for the company:

Modern dairy needs to create a new model of risk management for the company. The old model does not define the whole process of risk management in detail. The new model needs to be developed such that it explains how the management of risk should be done in Modern dairy. Also it should include the detail analysis and treatment.

b. Hiring Risk Manager:

It is very important for Modern dairy to hire a risk manager. The availability of well-educated risk manager will take all the responsibility of analyzing each risk. He will find out the necessary solution to tackle with the risks. Also the specialized risk manager can find various new techniques to face the risks in future. This will really help the company for the smooth operation.

c. Maintaining the Product:

It is very necessary for Modern dairy to maintain its product. As milk is a delicate substance, it needs proper care. The detail information about the product preservation is necessary. During my research, I found some milk preservation techniques which reduce the risk from milk getting spoiled which are explained as below.

Milk preservation techniques

The milk needs to be reached the processor/machine in good condition. The most sensitive elements in preservation of the milk is its temperature. During hot environment, the milk can spoil within 3-4 hours.

Bulk milk transport is the better options for transporting the milk. The bulk tankers are insulated and it helps milk to remain cold for long time.

In Company and chilling centers, special attention should be paid to check if the Milk cans, vessels, milk machines and milk transport vessels etc. are cleaned before use. They should be properly rinsed before use. Sterilization with the boiling water or using dairy sanitizing solution such as hypochlorite (according to manufacturer's instruction) can help in sanitation.

Hygienic milk handling in the milk factories is very important to protect the milk. The milk factory should be kept clean and in good repair. The floors and walls of the milk factory must be washable and should be painted with the light color. The doors should be self-shutting and windows should be insect proof to keep the flies away from the factory. The equipment and utensils should be disinfected before use and whenever there is possibility of accidental contamination. Proper precautions should be taken to prevent the contamination of dairy products during the repair and maintenance.

‘The disinfection of the equipment’s in the milk factory can be done in following ways:

Steam-

- Steam - Steaming should be done for 10- 15 minutes after the condensate has attained 85° C.
- Hot water - Hot water at 80 C(use soft water only to prevent deposition of salts) for at least 20 minutes in circulation cleaning for 15 minutes at 85° C
- Detergents/disinfectants - used as part of the cleaning process at temperatures between 45-60° C in manual cleaning and for cold milk lines, storage tanks and tankers.’

The milk should be transported in clean vehicle under appropriate conditions. Also the people involved in handling the milk should wear the clean protective clothing and working gear (e.g. coats, overalls, caps etc.). And the laboratory needs to be properly inspected in regular intervals. (Website of Food and Agriculture Organization of the United Nations,2013)

Cleanliness requirements:

At Milk collection and Chilling Centers

The milk collecting Cans should be made of Aluminum or Stainless Steel (SS). The milk brought in the Cans which cannot be cleaned properly is not to be accepted.

The milk shouldn't be bought from the cows which are getting treatment or using the antibiotics. The milk shouldn't be mixed with any powders and such milk shouldn't be bought by the milk collection centers. The milk collection centers should be established in the place where there is enough space to collect the milk and have all the facilities like enough water. The collected milk should be transported to the chilling Centre as soon as possible. In cases when the milk are not able to be transported as soon as possible, it should be boiled properly and then keep cold. (Code of Practice for Dairy Industry, Nepal Dairy Development Board,2013)

d. Finding out the possibility of alternative route of transportation:

During my research, I found out that finding the alternative route of transportation is one of the most important solutions to most of the risks. The possibility of re- routing the transportation from Sindhupalchowk was discussed. The result for the alternative route couldn't be solved. But this is one of the researches that I would like to work in future if the company permits.

e. Using Risk Register to Analyze and treat the risks:

After doing research on how the risk are handled and treated in Modern dairy, I came with the conclusion that Modern dairy needs to have a register which records all the risks.

f. Training to Staffs:

Modern dairy needs to train its staff about the handling of the product and cleanliness requirement. Furthermore, they can also train them about the risks that might occur in the field they are working and teach them how to deal with it. The proper training will help them increase their understanding re-

garding the business and they can support the company from the reoccurring risks.

f. Finding out possibilities of New technologies

During my research, I found out that the company is using the traditional methods of the technology. As Nepal is a developing country, different advanced technologies have not been introduced yet. After living in Finland for almost more than 4 years, I can now differentiate the development in the technologies. Even though I brought this topic for the discussion with the CEO, and managers, they seem quiet disinterested in the topic. The main reason behind it is the financial situation of the company. As the company is still in infant stage of the development, it still needs to achieve certain level of success to introduce new modern technologies which has not been introduced in Nepal yet.

But this suggestion is also one of the finding that I would like to work for the company. I would like to research on possibilities of the modern technology that can be introduced to Modern dairy according to its current financial situation.

CONCLUSION

The objectives of this research were to explore the risks in the chain of Modern Dairy and to provide them suggestion to deal with the risks. To fulfill the objectives, I conducted some research to figure out the risks in the supply chain and came up with some suggestions and recommendation to the company.

In this thesis, I was able to utilize the knowledge that I gained during my study in SAMK. The research was quiet fruitful as I was able to understand the business operation of Modern dairy and the problems associated with the company. This research deepened my understanding in Risk Management and Supply chain management. Also I got an overall insight of the political influence in the Nepalese market and how it is adding fuel to the prevailing risks.

In conclusion, I can say that the situation of Modern dairy seems too critical. If all the risks are not handled at right time, it might greatly affect the financial situation of the company. Further, Modern Dairy needs to understand the practical aspect of Risk management and Supply chain management to use them in their practical business environment.

After all this research, I would still like to look into details about the company's weakness. Also I want to study about the market structure of the milk business in Nepal and study the consumer behaviour in Kathmandu, Bhaktapur and Lalitpur. As my father is a shareholder for the company, I am motivated to suggest the company with all the knowledge that I got during my bachelors study period.

Though, it was a long time that I took to complete my thesis due to the full time working hours and visits, I am happy that I reached my objectives. My father was a great support for all the information. Also my brother who assists my father helped me to understand various aspects of milk business and the business environment in Nepal.

REFERENCES

Chopra, S. & Meindl, P. 2007. Supply Chain Management: Strategy, Planning & Operation. Second Edition. Pearson Prentice Hall. New Jersey.

Ayers, J. 2006. Handbook of Supply Chain Management. Second Edition. New York. Auerbach Publications.

Culp, CL. 2001. The Risk Management process. John Wiley and Sons, Inc. New York.

Holton, Glyn A. (2004). Defining Risk, Financial Analysts Journal, 60 (6), 19–25.

Agrawal, R.C. 2009. Risk Management. Global Media. Jaipur, India. Available at Ebrary.

Website of Health and Safety Executive Referred on November 18 2012.

<http://www.hse.gov.uk/>

King, R.D. 2000. Risk Management. Scitech Educational. Broadstairs, Kent. GBR.

Simchi, D.L. Kaminsky, P & Simchi, E.L. 2003. Designing and Managing The Supply Chain. Second Edition. McGraw Hill. New York.

Handfield, R.B & Nichols, E.L. 1999. Introduction to supply chain Management. Prentice Hall. London.

Hugos, M. 2003. Essentials of Supply Chain Management. John Wiley & Sons, Inc. New Jersey.

Waters, Donald. 2007 Supply chain risk management: Vulnerability and resilience in logistics. Kogan Page Publishers. USA.

Waters, Donald. 2009 Supply Chain Management: An introduction to logistics. Second Edition. Palgrave Macmillan. England.

Hopkin, P. 2002. Holistic Risk Management In Practice. Witherby & Co. Ltd. London.

D, Waters. 2007. Supply Chain Risk Management- Vulnerability and Resilience in logistics. Kogan page limited. UK.

Saunders, M., Lewis, P & Thornhill, A. 2003. Research Methods for Business Students. Third Edition. Harlow. Pearson Education Limited.

Chunawalla, S.A, 2008. Materials and Purchasing Management. Himalaya Publishing Group. India. Available at ebrary. 18.01.2013

Stern, Patrick N. 1980. Grounded Theory methodology: its uses and process Image. Vol-12 . USA

Website of CAPEBRETON UNIVERSITY. Available on 24th Jan 2013.
<http://faculty.cbu.ca/>

Website of Sociology Central. Available on 10th February 2013.
<http://www.sociology.org.uk/>

Website of nyu education. Available on 25th November 2012.
<http://www.stern.nyu.edu/>

Website of History Learning. Available on 09.02.2013.
<http://www.historylearningsite.co.uk/>

Sachdeva, JK.2009. Business Research Methodology. Global Media. Mumbai, India.

Saunders, M. , Lewis, P. & Thornhill, A. 2003. Research for Business Students. England: Pearson education Limited

Luotonen, E. 1993. Risk Management and Insurances. Tekijä ja Painatuskeskus Oy. Helsinki.

Website of Law Dictionary. Available on 14th Jan 201.
<http://thelawdictionary.org/>

Reuvid, J. 2007. Managing Business Risk. Kogan Page and Contributions. UK

Website of MyNewMarkets.com. Available on 09.02.2013
<http://www.mynewmarkets.com/>

(Available on Website of gnedenko eform.
<http://gnedenko-forum.org/>

Website of ncthakur.itgo.com. Available on 13th October 2013.

<http://ncthakur.itgo.com/map04.htm>

Website of The Kathmandu Post. Available on 15th October 2013.

<http://www.ekantipur.com/tkp/>

Website of The Himalayan Times. Available on 15th October 2013.

<http://thehimalayantimes.com/>

Harrison A., Hoek R. V., (2007) "Logistics Management and Strategy", 2nd edition, Prentice Hall.

Porter, M.E. 1980. Competitive Strategy. The Free Press. New York.

Ray, S. Introduction to materials Handling. 2007 pg 1-5. New Age International. India.) Available in Ebrary 12.12.2012

Website of Business Victoria. Available on 13th August 2013.

<http://www.business.vic.gov.au/>

Website of Student Outcomes Assessment. Available on 25th October 2013.

<http://www.uni.edu/>

Website of writing@CSU. Available on 28th October 2013.

<http://writing.colostate.edu/>

APPENDIX 1

Questionnaire:

About the company

1. Can you please give me short information about the company (Modern Dairy)?
2. Can you give me detail information about the supply chain from Sindupalchok to Modern Dairy?

Supply chain

3. How is the Logistics chain operated in the Company(means of transportation)?
4. Do you have any Supply chain Manager who is responsible for the supply chain from the Producers to the Distributors?
5. What are the main responsibilities of the Supply chain Manager?

Risk and Risk Management

6. Are there any problems that you face in collecting the milk from the farmers and bringing it to the company? Can you explain?
7. What are different types of risk that normally arise in this company?
8. As our country Nepal is much affected by politics. How does it affect in the supply chain of milk?
9. How does environment affect in collection and distribution of milk? Seasonal problems?
10. Do you have the Risk Manager in the Company?
11. If Yes, What are the responsibilities of the Risk Manager?

12. If Not, How do you deal in different situation when the probability of risk is high?
13. What are the different risks that the company normally faces in the supply chain?
14. How Does Company deal with the Risks?
15. Are there any mostly re-occurring Risks which are less possible to handle?
16. Any written document for the duties and responsibilities of Supply and Risk Managers?
17. Any criteria to be maintained for the product (milk) under the law?
18. How do you handle the risk?
19. What kind of healthy habits do you normally apply inside the working place?
20. What are the responsible factors (related to hygiene) for spoiling of the milk?
21. Other factors?
22. What about the materials handling in your company and the risks associated with it?
23. After the distribution of the milk, do you get any complains or feedback about the product? How do you deal with it.

APPENDIX 2: Code of Practice of Dairy Industry.

प्रस्तावना

यो व्यवहारिक संहिता प्रशोधित दुग्ध तथा दुग्ध पदार्थहरूको गुणस्तर सुधार गर्न र उपभोक्ताहरूको स्वास्थ्यलाई ध्यानमा राखि दुग्ध तथा दुग्ध पदार्थहरूको गुणस्तर अनुगमन/निरिक्षण गर्ने र दुग्ध व्यवसायको दिगो भविष्य सुरक्षित गर्ने उद्देश्यले तर्जुमा गरिएको हो ।

क्षेत्र (Scope)

यस व्यवहारिक संहितामा प्रशोधित दुग्ध उत्पादन गर्ने दुग्ध उद्योगहरूका लागि निम्न लिखित कुराहरू बारे निर्देशन दिइएको छ ।

- (१) स्वच्छ दुग्ध उत्पादन प्रक्रिया
- (२) दुग्ध संकलन र चिस्मान केन्द्र
- (३) दुग्ध उद्योगको वातावरण/निर्माण स्थल
- (४) भवन
- (५) प्रशोधन कक्षको वनावट, भुईँ र भित्त
- (६) पानीको व्यवस्था
- (७) सरसफाईको व्यवस्था
- (८) प्रयोगशाला व्यवस्था
- (९) प्रशोधन
- (१०) प्याकेजिङ
- (११) जनशक्ति
- (१२) व्यवहारिक संहिता लागू गर्ने प्रक्रिया

(१) स्वच्छ दुग्ध उत्पादन प्रक्रिया (कृषक स्तरमा)

स्वच्छ दुग्ध उत्पादनको लागि कृषकहरूले निम्नलिखित विधिहरू अपनाउनु पर्नेछ ।

- दुग्धानु गार्ड/भैसी एवं दुग्ध दुहने व्यक्ति स्वस्थ हुनुको साथै रोगनाट मुक्त हुनु पर्दछ । दुग्ध दुहने बित्तले दुग्ध दुहनु पूर्व व्यक्तिगत सरसफाईमा विशेष ध्यान दिनु पर्दछ ।
- गार्ड/भैसी पालिएको गोठ सफासुग्ध हुनुको साथै मनमुब राख्ने ठाउँको उचित व्यवस्था हुनु पर्दछ । र गोठ हरिपरि भिँगा, जामखुट्टे एवम् किरा फट्टासाह्रु आउने वातावरण हुनु हुदैन ।
- दुग्ध दुहने स्थानको वातावरण सफासुग्ध हुनु पर्दछ ।
- दुग्ध दुहनु पूर्व गार्ड/भैसीलाई सफा गर्नुका साथै पशुको कल्नीडा र धुन पानीले सफा गरी सफा कपडाले पछुनु पर्दछ ।
- दुग्ध दुहने भाँडो स्टेनलेस स्टील वा आल्मिनियमबाट बनेको हुनु पर्दछ ।
- दुग्ध दुहनु पूर्व र दुहपछि दुग्ध दुहने भाँडो तातो पानी र डिटरजेन्टले सफा गरी धुनो नपस्ने ठाउँमा पोस्ट्वापर राख्नु पर्दछ ।
- भित्तावट गरिएको, गुणस्तर बिशेषको, स्वाद बिशेषको वा फाटेको दुग्ध प्रशोधनको लागि संकलन केन्द्र/चिस्मान केन्द्रमा लग्नु हुदैन ।

- दुध दुहेपछि दुधलाई संकलन केन्द्र/चिस्वान केन्द्र, प्रशोधन कारखानामा ब्यासक्य छिटो पुऱ्याउनु पर्दछ ।
- एण्टिबायोटिकद्वारा उपचार भईरहेको वस्तुको दुध बिक्री/उपभोगको लागि प्रयोग गर्नु हुदैन ।

(२) दुध संकलन र चिस्वान केन्द्र

- दुध संकलन गर्ने भाँडो आलुमिनियम वा स्टेनलेस (SS)को ब्वान हुनु पर्दछ । हात पसालेर सफा गर्ने नसकिने अन्य भाँडामा स्वाइएको दुध लिन हुदैन ।
- बिरामी वा एण्टिबायोटिकले उपचार भईरहेको वस्तुहरुको दुध खरिद गर्नु हुदैन ।
- दुधमा कुनै पनि पदार्थ मिसावट गर्नु हुदैन र मिसावट भएको दुध खरिद गर्नु हुदैन ।
- दुध संकलन फार्म बिहान र बेलुकी निश्चित समयमा गर्नु पर्दछ ।
- दुध संकलन केन्द्रको गर्दा अधिकशा कृषकहरुलाई पावक पर्ने स्थान, दुधको भाँडा, ब्वान, आदि साधनहरु सफा गर्ने प्रशस्त पानी ब्ववस्था भएको र सम्भव भएमा बिजुलीको ब्ववस्था भएको स्थान हुनु पर्दछ ।
- दुध संकलन भई सकेपछि सकभर छिटो साधनद्वारा दुध चिस्वान केन्द्र वा उद्योगमा पुऱ्याउने ब्ववस्था गर्नुपर्दछ सो नसकेमा दुधलाई सकभर चाँडो उमालेर चिसो पारी राख्ने ब्ववस्था गर्नु पर्दछ ।
- चिस्वान केन्द्रमा दुधलाई ५ डि. से. तापक्रममा चिस्वाउनु पर्दछ ।
- संकलन/चिस्वान केन्द्रबाट दुधलाई प्रशोधन कारखानामा ढुवानी गर्दा ss Insulated Tander वा आलुमिनियम/ss milk can को प्रयोग गर्नु पर्दछ । ढुवानी गर्दा छिटो साधनद्वारा पाम नपर्ने गरि ढाकेर गर्नु पर्दछ ।

(३) दुध उद्योगको बातावरण/निर्माण स्थल

दुध उद्योगको भवन र बरिपरिको बातावरण धुलो उडने, फोहोरमैला धुपारेको, गाई भैसीको गोठ, आदि दुषित बातावरण र नाडि पहिरो आउने जाउनाट टाडा हुनु पर्दछ । उद्योग स्थलमा माटो, बिसली, पानी र डल निकास आदिको समुचित ब्ववस्था हुनु पर्दछ । दुध उद्योग स्थापना गर्दा प्रशोधित दुध मात्रा उत्पादन गर्ने भए उपभोक्ताको नबिक र दुध पदार्थहरुको जस्तै पिउ, चीज, मखन आदि उत्पादन गरी बिक्री बितरण गर्ने भए दुध उत्पादन हुने क्षेत्रको ऋधमवन गरी त्यस स्थानमा गर्नु पर्दछ ।

(५) भवन

दुध उद्योगको भवन बनाउदा सकेसम्म छत ढलान गरी बनाईएको हुनु पर्दछ र भुईँ तातोपानी, चाक, एसिड, मल्काली, एवं गहुँगो सामान शीतार पसार

गर्दा पनि नचिउने र सरसफाई गर्ने सजिलो हुने किसिमको हुनु पर्दछ । भवन बनाउँदा किरा फट्टमाडग्रा तथा भिर्गाहरु प्रवेश गर्न नसक्ने र बृद्धि हुन नसक्ने गरी बनाउनु पर्दछ । भवन बनाउँदा प्रशोधन कोठा, प्रयोगशाला, ट्रेसिङ्ग रुम एवं अन्य कोठाहरुको साथै शौचालयहरु एवं बेसिनहरुको पनि आवश्यकता अनुसार छुट्टै व्यवस्था हुनु पर्दछ । मध्यम तथा ठुला दुग्ध उद्योगहरुले कारखानाको दुध भर्ने/वितरण गर्ने स्थानको उचाई २-३ फिटको बनाउनु पर्दछ । भवनहरुको निर्मित रूपमा मर्मत संभार गर्नु पर्दछ ।

(५) प्रशोधन कक्षको बनावट, भुई र भित्ता

- प्रशोधन कारखानाको कोठा पक्की र छाना वा GI सिटको हुनु पर्दछ ।
- प्रशोधन कक्षमा पर्माप्ता प्रकाशको व्यवस्था हुनु पर्दछ । मतीहरु जडान गर्दा कामको प्रकृति हेरी आवश्यक मात्राको प्रकाश र उचित स्थानमा व्यवस्था गर्नुपर्दछ ।
- प्रशोधन कक्षको भुईलाई सजिलो संग सफागर्न सकिने एसिड र अल्कालिने प्रभाव पार्न नसक्ने गरि निर्माण गरिएको र पानी जस्त नदिन उपयुक्त व्यवस्था गर्नु पर्दछ ।
- प्रशोधन कक्षको भित्तामा सजिलो संग सफागर्न सकिने गरि टाइल लगाउनु पर्दछ । जुन कान्तिमा १.२मिटर उचाईसम्म हुनु पर्दछ ।
- प्रशोधन कक्षमा मेशीन सरसामानहरु जडान गर्दा मर्मत संभार सरसफाई कामको प्रक्रिया हेरी निर्मित अनुगमनका साथै स्वच्छ उत्पादनका लागि सजिलो हुने गरी व्यवस्थित तरवरने राख्नु पर्दछ ।
- प्रशोधन कक्षमा पर्माप्ता माशाना भेण्टिलेसन गरिएको र किरा फट्टमाडग्रा तथा भिर्गाहरु प्रवेश गर्न नसक्ने गरी फमाल डोकामा जालफिरो व्यवस्था गर्नु पर्दछ । भेण्टिलेसनको व्यवस्था गर्दा कोठाको आद्रता तापक्रमलाई ध्यानमा राखी कोठाको सिलिडनाट नरसाउने गरी आवश्यक व्यवस्था गरेको हुनु पर्दछ ।

(६) पानीको व्यवस्था

दुध प्रशोधन तथा सरसफाईको लागि खान योग्य पानी पर्माप्ता माशाना हुनु पर्दछ । प्रशोधनसंग प्रत्यक्ष सम्पर्कमा नआउने अर्को बाफ उत्पाद बग्गी निर्माण रेडिरेसन आदिलाई आवश्यक पर्ने पानीको छुट्टै व्यवस्था गर्नु पर्दछ । साथै कारखानाको आवश्यकता पर्ने ठाउँहरुमा सफागर्ने तातो र चिसो पानी सफाई गर्ने

उचित व्यवस्था हुनु पानीको शुष्कनैविक र रासायनिक परिक्षण साधारणतया ३-३ महिनामा गरी रेकर्ड राख्नु पर्दछ ।

(७) सरसफाई व्यवस्था

कामदारहरुलाई कारखानामा प्रवेश पूर्वसरसफाई एवं एप्रोन प्रयोग गर्ने व्यवस्था गर्नु पर्दछ । प्रशोधन कक्षको सरसफाई पश्चात निस्कने फोहोर पानीलाई जथाभावी बातावरण नखोडी उपचार गरेर मात्र फाल्ने व्यवस्था गर्नु पर्दछ । प्रशोधन कक्षको भुईँ र भित्ताहरु दैनिक सफागारि निर्मात निरीक्षण गर्नु पर्दछ ।

दुग्ध उद्योगहरुमा शौचालयको उचित व्यवस्था हुनुपर्दछ । शौचालय दुपित दुग्ध र अन्य फोहोरहरुलाई प्रशोधन कक्ष प्याकिङ कोठा र प्रयोगशालाबाट टाढा राख्नु पर्दछ । शौचालयमा पर्याप्त मात्रामा पानी र साबुनको व्यवस्था हुनुका साथै सफा राख्नु पर्दछ । उद्योगका कामदारहरुलाई कपडा फोर्नको लागि छुट्टै कोठाको व्यवस्था गर्नु पर्दछ ।

व्यक्तिगत सरसफाई

- दुग्ध संकलन प्रशोधन र वित्तिक वितरणमा प्रत्यक्ष संलग्न व्यक्ति सधैँ रोगनाट ग्रसित नभएको र व्यक्तिगत सरसफाईमा ध्यान दिने हुनु पर्दछ ।
- प्रशोधनसंग प्रत्यक्ष अप्रत्यक्ष संसर्गमा आउने कर्मचारीहरुको समय समयमा स्वास्थ्य परिक्षण गराई मसको रेकर्ड व्यवस्थित गरेर राख्नु पर्दछ ।
- कारखाना र प्रयोगशालामा प्रवेश गर्ने आगत्युक कर्मचारीहरुलाई सफा कपडा एप्रोन आवश्यकता अनुसार नुट,पल्छा,क्वाप आदि प्रयोगको व्यवस्था गर्नु पर्दछ ।
- प्रशोधनसंग प्रत्यक्ष संसर्गमा आउने र प्रयोगशालामा काम गर्ने कर्मचारीहरुले हरेक पटक काम शुरु गर्नु अगाडी, शौचालय प्रयोग गरे पछि र सडे गलेका वा नियोजक कच्चा दुग्ध छोप्पछि साबुनले सक्ती हात खुटा धुनु पर्दछ ।
- प्रशोधन कक्षमा जथाभावी धुक्ने, खानेकुरा खाने, चुरोट, सुति सेवन गर्नु हुदैन ।
- प्रशोधनसंग प्रत्यक्ष संसर्गमा आउने कामदार कर्मचारीहरुले गहना, पडी, टिप्का लगाउनु हुदैन साथै हातमा नङ पाल्नु हुदैन ।

(८) प्रयोगशालाको व्यवस्था

दुग्ध संकलन निस्स्यन केन्द्र र दुग्ध प्रशोधन उद्योगमा प्रयोगशाला स्थापना भई दुग्धको नमूना निम्न बमोजिमको परिक्षण गरी खरिद तथा वित्तिक वितरण गर्नु पर्दछ । साथै परिक्षण प्रक्रियामा प्रयोग गरिने उपकरणहरु तथा सामग्रीहरु प्रयोगशालामा

परिक्षण प्रक्रियामा उपयुक्त एव. स्तरिम सवधि अपनाई प्राप्ता नतीजा प्रतिवेदन दुरुस्त राख्नु पर्दछ ।

८.१ कच्चा दूधको गुणस्तर परिक्षण

कच्चा दूध खरिद गर्दा तालिका मा उल्लेखित भए अनुसारको परिक्षण गरी सोको नियमित रेकर्ड समेत राख्नु पर्दछ ।

तालिका नं १. कच्चा दूधको गुणस्तर परिक्षण

क्र.सं	परिक्षण	कच्चा दूधको न्यूनतम मापदण्ड
१	इन्ड्रिमानुभव परिक्षण (Organoleptic Test)	कुनै अप्राकृतिक स्वाद गन्ध र रङ हुनु हुदैन ।
२	फ्लट अन ब्याइलिङ परिक्षण (COB Test)	उमाल्दा फाटन नहुने ।
३	अल्कोहल परिक्षण (Alcohol Test)	कम्तिमा अल्कोहल परिक्षणमा पास हुनु पर्दछ ।
४	फ्याट परिक्षण (Fat Test)	गाईको दूध न्यूनतम र भैसीको दूध न्यूनतम हुनु पर्दछ ।
५	एस एन एफ परिक्षण (SNF Test)	गाईको दूधमा न्यूनतम र भैसीको दूधमा न्यूनतम हुनु पर्दछ ।
६	मिसावट परिक्षण (adulteration Test)	कुनै पनि प्रकारको मिसावट हुनु हुदैन ।

८.२ प्रशोधित दूधको गुणस्तर परिक्षण

सवै दूध उपभोगकर्ताले प्रशोधित दूधको प्रत्येक पटक (लट) को नमूनाको तालिका नं २ अनुसारको गुण परिक्षण गरी रेकर्ड राख्नु पर्दछ ।

तालिका न. २ प्रशोधित दूधको गुणस्तर परिक्षण

क्र.सं.	परिक्षण	प्रशोधित दूधको न्यूनतम मापदण्ड
१	इन्ड्रियानुभव परिक्षण	कुनै अप्राकृतिक स्वाद, गन्ध र रङ हुनु हुदैन
२	पूतांश परिक्षण (न्यूनतम)	
३	एस.एन.एफ.परिक्षण (न्यूनतम)	
४	मिस्रावट परिक्षण	कुनै पनि प्रकारको मिस्रावट हुनु हुदैन ।
५	फोस्फेटेज परिक्षण	फोस्फेटेज परिक्षण पास हुनु पर्दछ ।
६	सन्तुर्ण शुष्मजीवाणु संख्या प्रति मि. लि.(अधिकतम)	
७	कोलिफर्म परिक्षण	कोलिफर्म हुनु हुदैन ।

कैफियत

दूधको गुणस्तरको हफ्ता खाध ऐन अनुसार हुनु पर्नेछ । उद्योगले भापुले गर्ने नसकिने परिक्षणहरू दूध मान्यता प्राप्त प्रयोगशालाबाट नियमित रूपमा परिक्षण गराई प्राप्त नतिजा प्रतिवेदन सुरक्षित साथ राख्नु पर्नेछ ।

न.३ प्रशोधित दूधको गुणस्तर परिक्षण गर्ने समय तालिका

उद्योगहरूले प्रशोधित दूधको प्रत्येक पटक (लट)को नमुनाको तालिका नं. अनुसार दैनिक तथा साप्ताहिक रूपमा परिक्षण गरि गराई उपरनी वा प्रमुख व्यवस्थापक समक्ष प्रमाणित गराई नतिजा प्रतिवेदन सुरक्षित साथ राख्नु पर्दछ ।

तालिका न. ३ प्रशोधित दूधको गुणस्तर परिक्षण गर्ने समय तालिका

क्र. सं.	परिक्षण मापदण्ड	दूध उद्योगको क्षमता - दैनिक (लिटर) सम्म 100 भन्दा माथि 100
१	इन्ड्रियानुभव परिक्षण	दैनिक दैनिक
२	फस्वाट परिक्षण	दैनिक दैनिक
३	एस.एन.एफ.परिक्षण	दैनिक दैनिक

४	निसावट परिक्षण	दैनिक दैनिक
५	सुक्ष्मजीवाणु परिक्षण	साप्ताहिक दैनिक
६	इन लाइन परिक्षण	साप्ताहिक साप्ता
७	फोस्फेटेज परिक्षण	दैनिक दैनिक

(९) दूध प्रशोधन

- म्याच पाश्चुराइजेशन गर्ने उद्योगहरूले दूधलाई कमिमा ६५ सेन्टीग्रेड तापक्रममा ३० मिनेट ताताइ धरेर तापक्रममा निस्वाउनु पर्दछ ।
- HTST पाश्चुराइजेशन गर्ने डेरीहरूले दूधलाई कमिमा ७२ से. तापक्रममा ५ सेकेण्ड समान ताताएर ४ से. मा निस्को पार्नु पर्दछ ।
- दूध उद्योगमा प्रयोग हुने दूध र दूध पदार्थसंग सम्पर्कमा आउने पाइप, भल्व, क्यान, स्टोरेज ट्यांक, अन्य उपकरण सामाग्रीहरू आदि स्टेनलेस स्टेन(SS ३०४)को हुनुका साथै, फा गर्न सजिलो हुने गठान गर्नु पर्दछ ।
- दूध प्रशोधन गर्नु अघि र पछि प्रशोधन कार्यको संसर्गमा आउने उपकरण, स्टोरेज ट्यांक, पाइप लाइन, फिल्ट्रिड उपकरण, सबै भल्वहरू, आदि अनिवार्यरूपमा सफाई र निर्मलीकरण गर्नु पर्दछ ।
- उद्योगहरूले प्रशोध पश्चात **Commercial Food Grade**को उचित स्तर **Proper strength** को अल्काली एसिड प्रयोग गरी रास्त्रोसग सफाई गर्नु पर्दछ ।
- प्रशोधित दूधलाई फरमा दूध र अन्य पदार्थहरूको संसर्गमा आउन दिनु हुदैन ।
- मेशीन श्रीजारहरू सधै चालु अवस्थामा राख्नुको साथै नियमित दूधरूपमा परिक्षण गरि ठिक अवस्थामा नरहेमा तुरुन्त मर्मत गरी अभिलेख राख्ने गर्नु पर्दछ ।
- म्याकिड मेशिनको सम्पर्कद्वारा दूध प्रदुषित हुने सम्भावना बढि भएको त्वा उक्त मेशिनलाई सफा राख्नु पर्दछ ।
- प्रशोधन कोठाको भण्डार डोका खुला छोड्नु हुदैन ।
- प्रशोधन कक्षलाई दूध तथा दूध पदार्थ प्रशोधन बाहेक अन्य प्रयोगनको लागि प्रयोग गर्नु हुदैन ।
- कच दूधको अभावमा प्रयोग गरिने पाउडर दूधको गुणस्तर नेपाल सरकारले तोकेको गुणस्तर मापदण्ड अनुसारको प्रयोग गर्नु पर्दछ ।
- कोट, टली तथा अन्य सामाग्रीहरू हरेक दिन सफा राख्नु पर्दछ ।
- दूध प्रशोधन परिक्षण तथा उपकरणहरूको सरसफाईमा प्रयोग हुने केमीकलहरू सुरक्षित साथ राख्नु पर्दछ ।

(१०) प्रशोधित दूधको प्याकेजिङ, सम्बन्धन तथा विकि वितरण

(१०.१) प्रशोधित दूधको लागि प्याकेजिङ सामग्री

- प्रशोधित दूधको लेबल प्रशोधित दूधको प्याकेटमा प्रचलित ऐन नियम बमोजिम निम्न अनुसारको लेबल हुनु पर्ने छ ।
- दूधको प्रकार जस्तै प्रशोधित दूध, स्टराइज्ड दूध, गार्डको दूध होल मिल्क आदि
- प्रशोधन विधि सबै दूध उद्योगहरूले दूधको प्याकेटमा निरोगन प्रक्रिया गरेको भए पारबचुराइज्ड वा जिवाणु हनन गरेको भए स्टेरिलाइज्ड र अति उच्च तापक्रममा उपचार गरेको भए UHT treated भनि उल्लेख गर्नु पर्ने
- फ्याट र एस. उन. एक.प्रतिशत
- दूधको प्याकेटको प्रयोग विधि
- संभव भएमा प्रशोधित दूधमा भएको पोषक तत्वहरू पनि उल्लेख गर्नु पर्छ
- एपभोग गरि सक्नु पर्ने मिति
- एधोगको पूरा नाम देखाउनु
- प्याकेजिङ प्लाष्टिकमा प्रयोग पाँच पुन. प्रयोगको लागि जम्मा गरी विकि गर्ने भनी उपभोक्ताहरूमा अनुरोधना जगाउने शब्दहरू उल्लेख गर्नुपर्ने

(१०.२) प्रशोधित दूध दूध पदार्थ विकि वितरण

दूध तथा दूध पदार्थहरू अतिनैसम्बेदनशिल वस्तु एवं दुषित वातावरण, पानी, धुलो आदिले च्याङो नियन्त्रण भएकोले लोडिङ, विकि वितरण गर्दा विशेष होसियार अपनाउनु पर्दछ ।

- प्रशोधित दूधको प्याकेट सफा प्लाष्टिकको ढोढा राख्नु पर्दछ ।
- दूधको प्याकेट विकि वितरण गर्न लागु अघि चुहेको छ छैन राख्ने जाच गरी त्यसको रेकर्ड राख्नु पर्दछ ।
- प्रशोधित दूध भण्डारण गर्दा र्थेप्टीसिड तापक्रम हुने गरी गर्नु पर्दछ ।
- दूधको भण्डार कोठाको तापक्रम नियमित मापनगरी ठिक छ कि छैन जाच गरी रेकर्ड राख्नु पर्दछ ।
- प्रशोधित दूधको विकि वितरणमा प्रयोग हुने डेलीभरी भ्यान सफा हुनुको साथै खुल्ना हुनु हुदैन ।
- दूध तथा दूध पदार्थ विकि वितरण गर्नु पसल सफा सुग्ध, प्रत्यक्ष धामको प्रकाश नपर्ने खालको हुनु पर्दछ । दूध तथा दूध पदार्थ फुटपाथ, फोहोर वातावरण र तथाभावी स्थानमा विकि वितरण गर्नु हुदैन ।
- दूध तथा दूध पदार्थ स्वस्थता स्थानहरू सुपर मार्केट, डिपार्टमेण्टल स्टोर, कोल्ड स्टोर आदिमा विकि वितरणको लागि प्रोत्साहन गर्नु पर्दछ ।
- विकि वितरणको लागि राखेको दूध तथा दूध पदार्थ चिसोमा राखि विकि वितरण गर्नुपर्ने छ । प्रशोधित दूधको प्याकेट म्यातम१०ले भन्दा बढि हुन नदिन कोल्ड चेन पढाति अपनाउनु पर्दछ ।
- किर्ता आएको दूधलाई प्रशोधन गरिने दूधमा मिसाउन हुदैन ।
- जामातित धुलो दूध, प्रशोधित दूध तथा दूध पदार्थहरू भण्डार कोठामा प्राप्त भएको परिमाण र विकि वितरणमा पठाउने र किर्ता हुने परिमाणको रेकर्ड राख्नु पर्दछ ।
- प्रचलित ऐननियम बमोजिम उचित तवरले गर्नु पर्दछ ।

Appendix 3

Risk register (ModernDairy)

Datefirstcompleted:	Compiledby:
Datereviewed:	Reviewedby:

Reference ID	Describe the risk	Rate the likelihood	Rate the consequence	= Resulting level of risk	Describe how adequate current controls are	Give it a risk priority
Eg. risk # 1	What can happen? How can it happen? When can it happen?	<ul style="list-style-type: none"> - Very Likely - Likely - Unlikely - Veryunlikely 	<ul style="list-style-type: none"> - Major - Serious - Minor - Insignificant 	<ul style="list-style-type: none"> - Low - Medium - High - Major 	<ul style="list-style-type: none"> - Over adequate - Adequate - Inadequate - Non-existent 	<ul style="list-style-type: none"> A - Must B - Should C - Could
1. Product	The milk was spoiled on the way to Modern dairy (Product risks).	Very likely	Serious	Major	Inadequate. No possible replacement available for the quantity of milk to be supplied to the customers.	A
2: Landslide	Landslide/Flood on the way to Modern Dairy. Tankers are stuck on the way for more than 5 hours. (Environmental risk associated to logistics)	Likely	Serious	Medium	Inadequate: No chemicals treatment available. So chances of Milk getting spoilt are high. Alternative transportation route is needed to carry the milk to the company/ Someone should carry or buy the chemicals for treatment to the place.	A
3: Strike	Strike on Kavrepalanchowk. Tankers are not allowed to pass. Possibility of damage. (Political risk associated to logistics)	Very likely	Major	High	Non-existent: It is not possible to pass the tanker unless the strike is over or unless good conversation with the protesters. The chances of positive result are very low.	B

4. Competition	The competitors have decreased the price of milk in the market. (Competition risk)	Unlikely	Minor	Medium	Adequate: The management can decide either to go with the market price of the competitors or follow their own pricing system.	C
5. Supply and Demand	The demand of the milk has risen and company is not able to fulfill the needs of customer. (Demand and supply risk).	Very Likely	Major	Major	Inadequate: There is no instant solution. The only possibility is that there should be some storage of milk for the emergency cases like this. This might greatly affect in the customers perception towards company.	A
6. Operational	The machine stopped working. So packaging is delayed. (Operational risk)	Unlikely	Major	Major	Adequate: The repairing can be done by hired company mechanic.	A
7. Power cut	The load shedding during the operation of machine.	Very Likely	Minor	Medium	Over adequate: The company has enough Generators to start the machine again for this risk. This is mostly occurring risk and the treatment is adequate.	B
8. Legal	The legal requirements (health and safety was inspected by government and the result was positive)	Unlikely	Major (if not fulfilled the requirements)	Major (if not fulfilled the requirements)	Adequate: The company is adequately conscious about the health and safety regulations.	A
9. Fire	The small fire was caught in Laboratory	Less likely	Minor	Minor	Adequate: The fire extinguisher was used.	B

Appendix 4

Risk treatment register (Modern Dairy)

Date first completed:	Compiled by:
Date reviewed:	Reviewed by:

Risk in priority order from the risk register	Possible treatment options	Choose what to do: A = accept option/s R = reject option/s	Who will implement option/s	By when?	Who will monitor this risk and its treatment?	Further action
The milk was spoiled on the way to Modern dairy (Product risks).	- Chemical treatment - More research needed to create new options?	R	Logistics Manager	Same day	Logistic head	- Using the spoiled milk (if possible) - Wastage
Landslide/Flood on the way to Modern Dairy. Tankers are stuck on the way for more than 5 hours. (Environmental risk associated to logistics)	- Find alternative transportation route - Chemical treatment	A/R	Logistics Manages	Same time	Logistics head	- Keep updated about the situation of tankers/milk. Suggest about the possible chemical treatments to the driver/assistant in the tankers.
Strike on Kavrepalanchowk. Tankers are not allowed to pass. Possibility of damage. (Political risk associated to logistics)	- Find alternative transportation route. Convince the persons involved in strike to let pass the tankers.	A/R	Logistics Manager	Same time	Logistics head	- Keep updated about the situation of tankers/milk. Suggest about the possible chemical treatments to the driver/assistant in the tankers.

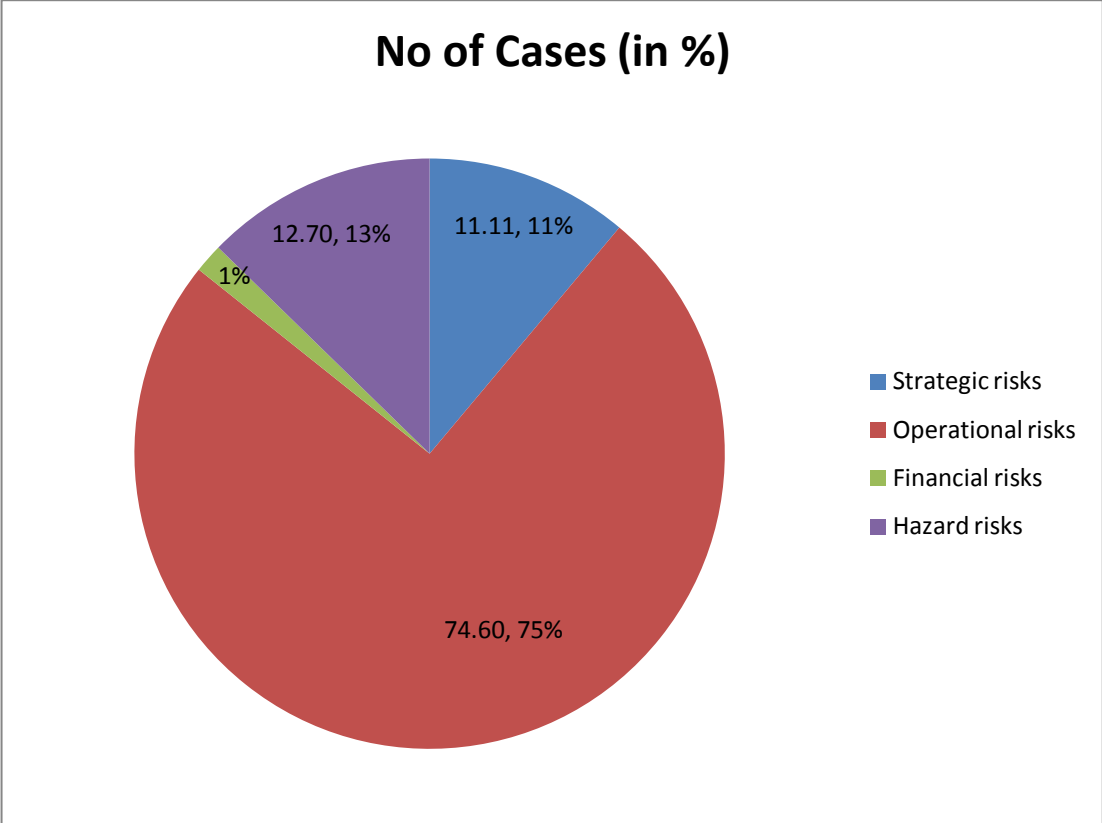
The competitors have decreased the price of milk in the market. (Competition risk)	-Arrange meeting with the management team.	A/R	Supply chain manager	Within a Week	Supply chain head	-Get all the information about the situation of the market to present to the management.
The demand of the milk has risen and company is not able to fulfill the needs of customer. (Demand and supply risk).	-Arrange meeting with the management team.	A/R	Supply chain manager	Within a Week	Supply chain head	-Prepare a report about the supply and demand in few months time.
The machine stopped working. So packaging is delayed. (Operational risk)	-Call the mechanic	A	Machine operating person.	Same day	Factory manager	-Fix the machine -Insurance for the machine can cover the expense.
The load shedding during the operation of machine.	-Use the generator	A	Machine operating person.	Same time	Factory manager	-Take generator in use.
The legal requirements (health and safety was inspected by government and the result was positive)	-Provide them the proof of business being healthy and safe	A	Factory manager	Same time	Factory manager	-Take a review from them according to their action or comment.
The small fire was caught in Laboratory	-Use fire extinguisher	A	Laboratory incharge	Same time	Factory manager	-Make sure everything is secure. Report the manager in case of damages. -Use insurance in case of damage.

Appendix 5 : Cases of Risks in Modern dairy according to each category

Risks	Risks in Supply chain	Pure /speculative	Risk category (short, Medium or long term risks)	No of cases (in six month April/May 2013- Sept/Oct 2013)
Strategic Risks	1. PoliticalRisks	Speculative	Long term risk	5
	2. CompetitionRisks	Speculative	Long term risk	0
	3. Supply and DemandRisks	Speculative	Long term risk	1
	4. Legal Risks	Speculative	Long term risk	1
	4. Market Risks	Speculative	Long term risk	0
OperationalRisks	1. Logisticsrisks	Pure	Short term	6
	2. Power Cutrisks	Pure	Short term	20
	3.Technical Risks	Pure	Short term	9
	4. Human Resource Risks	Speculative	Short term	12
Financial Risks	1. Lack of funds	Speculative	Medium term	1
HazardRisks	1. Environmental risks (Landslide, Earthquake etc.)	Pure	Short term	2
	2. Fire	Pure	Medium term	5
	3. Security	Pure	Medium term	0
	4. Health and safety risk	Pure	Long term	1

&

Pie Chart representation of cases in Modern Dairy:



List of Figures/tables used in Thesis

Fig 1 : Sindhupalchowk District	Page 7
Fig 2 : Conceptual Framework	Page 9
Fig 3 : Supply Chain Process (Extended)	Page 10
Fig 4 : Flow of information, money and Product	Page 11
Fig 5 : The flow of Materials controlled by logistics	Page 14
Fig 6 : Chart Showing which market belongs to which quadrant based on supply and demand	Page 17
Fig 7 : The established seven stages in the discipline of Risk Management	Page 22
Fig 8 : Flow diagram of Risk Assessment	Page 25
Fig 9 : Illustration of a basic Risk Register	Page 26
Fig 10 : Risk Mapping Chart (Lecture material)	Page 28
Fig 11 : Risk Matrix	Page 33
Fig 12 : Risk Handling	Page 35
Fig 13 : Supply chain in Modern Dairy in the past	Page 41
Fig 14 : Supply Chain Model in Modern	Page 42
Fig 15: Supply Chain in Modern Dairy	Page 43
Fig 16 : Purchasing Process in Modern Dairy	Page 45
Fig 17 : Supply chain Performance of Modern Dairy	Page 48
Fig 18 : The possible extension of Modern Dairy	Page 49
Fig 19: Risks identified in Modern dairy Supply Chain.	Page 50
Fig 20 : Mapping the risks in the Risk mapping Chart in context to Modern Dairy.	Page 57