

Chapter One

Introductory

1.1 Background of the Study

Working capital is the circulating blood of the business. It directly affects the profitability of the firm. Inventory is one of the vital components of working capital. It is an important part of business assets in every business. It directly affects the profitability and indirectly the managerial efficiency. That is why, inventory, inventory dynamism, its effects, and the methodology used by the poultry firm to determine it will be represented in this study.

This is the age of management science and the business competition is going to be tough day by day. To win the battle of business is not an easy task. Inventory management is one of the vital weapons to fight in this competitive world. Inventory management, or inventory control, is an attempt to balance inventory needs and requirements

with the need to minimize costs resulting from obtaining and holding inventory. There are several schools of thought that view inventory and its function differently. These will be addressed later, but first we present a foundation to facilitate the reader's understanding of inventory and its function. Inventory is a quantity or store of goods that is held for some purpose or use (the term may also be used as a verb, meaning to take inventory or to count all goods held in inventory). Inventory may be kept "in-house," meaning on the premises or nearby for immediate use; or it may be held in a

distant warehouse or distribution center for future use. With the exception of firms utilizing just-in-time methods, more often than not, the term "inventory" implies a stored quantity of goods that exceeds what is needed for the firm to function at the current time (e.g., within the next few hours). Inventory Management is the tutorial describes inventory management. Good inventory management is crucial to the success of a firm in the current competitive environment. Businesses must carry adequate inventory to meet customer demand but avoid excessive investments in inventory (.R. Anthony Inman, 2008).

“Inventory" for too many small business owners is one of the more visible and tangible aspects of doing business. Raw materials, goods in process and finished goods all represent various forms of inventories. Each type represents money tied up until the inventory leaves the company as purchased products. Likewise, merchandise stocks in a retail store contribute to profits only when their sale puts money into the cash register (*ibid*).

This is the age of competition and battle of business is going to be tough day by day. To tackle with the tough competitive environment every manager should give equal emphasis on effectively managing every department or the aspect of the business. To manage the business every manager should improve his or her management style as systematic as possible.

“Flock administration had never succeeded in gathering information form different integrators into one system. The modern administration model needed to:

-) Be user friendly and multilingual
-) Show graphs and benchmarking

) Be shared with advisors” (*Pijls, Leon, World Poultry- Elsevier Volume 18 No.5’02*)

That is why inventory management is one of the most important aspects of every business. Inventory management is possible only when we are known about the determinants of the level of inventory.

1.2 Poultry Business in Nepal

Nepal is a poor and landlocked country. It is also an agricultural country. Agriculture is the largest sector and the backbone of the Nepalese economy. It is the major source of livelihood for a majority of the population. About 76 per cent of the total populations of this country depend on the agriculture. More than 90 per cent of that population is participating for income generating activities. This implies that the competitiveness of agriculture will have decisive effect on poverty reduction. But only 39 per cent of the national GDP is contributed by this sector.

The one of the major sector of the agriculture is livestock. It has become an important component of the Nepalese agriculture. The share of Nepalese livestock to the national AGDP is around 31 per cent. The poultry farming is one of the traditional businesses of some Nepalese. It is also a remarkable component of agriculture sector. Around 50 per cent of GDP is contributed by poultry business. Chitwan is a major city for poultry business along with Parsa, Kavre, Dhading, and Nawalparasi are other major cities for this business. These cities have fulfilled more than 80 per cent of national demand.

Since, it is a major component of agriculture business it is regarded as an important economic sector. History of this business is not so long. Traditionally, this business is

going on to generate normal income or for personal use. But the business vision of this sector is not so old. Around 2030s this business was started in Nepal. Since then that it is increasing day by day. Poultry products are mainly two eggs and meat. In 2003, the poultry firms produce 20,39,000 metric ton meat and 3,65,000 metric ton eggs. Demand is increasing, supply is also increasing day by day to meet the demand.

For the development of the Nepalese economy major component of agriculture sector, poultry business should be developed very well. Inventory is one of the major business assets in every business. Likewise inventory is important for poultry business. Managing inventory is a crucial job for every manager. Managing inventory is related to retain optimum level of inventory i.e. neither insufficient nor excessive. It is directly related to the profitability of the firm. So the managers of a poultry firm should be careful for managing the inventory. This thesis is related to the determinants of the level of inventory and the inventory management system of the poultry firms of Nepal. For maintaining the level of inventory at its optimum level. They should be well known about the determinants the level of inventory that affects it directly or indirectly. Development of the poultry sector may be the root of the development of nation.

1.3 Statement of Problems

Modern concept of inventory management can be traced back to 1915-22 when several authors acting independently on carrying and holding costs of cases where the demand was known and constant. Wilson developed this work further in succeeding years and his work is still associated with fixed reorder point policy in the manufacturing companies. But these early models of inventory behaviour were little developed and had few applications until World War II. (Buchan and Ernest, 1977, 281). However, the

studies on the behaviour of demand for inventory or the determinants of level of inventory was carried out by various researchers in different industries but it is some more new for poultry firms.

Terleckyi (1961) tried to explain the effect of capital costs on target inventory levels. Robbinson (1959) studied interest rate effect on departmental store inventory. Similarly Me Gouldrick tried to assess the evidence of interest rates and other measures of credit conditions on inventory investment.

Lovell (1964) also found out the incorrect relationship between interest rate and inventory level. Joyce (1973) found negative interest rate coefficient but the coefficient was not statistically significance. However, Ando et al. (1963) and Lin (1969) reported negative statistically significance coefficient of the interest rates on determining level of inventory.

The above studies focused on the effect of interest rate on the inventory level, but there were no consistency on their results.

Liberman (1980), Irvine (1981) and Akhtar (1983) studies also indicated that fluctuations in varying costs have very significant effects on level of inventory. Other studies related to inventory demand were Burrows (1971), Grossman (1973),

Maccini and Rossanna (1981). These studies also focused on the effect of interest rates, carrying costs, sales and capital costs on the desired inventory level.

Theoretically, the level of inventories of a firm would depend on the associated cost of holding inventories. Higher interest rates reduce the attractiveness of holding inventories. However, there are no any findings with and adjustment coefficients.

In the context of Nepal, we can found several studies in the related to public enterprises and other listed organizations not in the poultry firms. Shrestha (1988), Balika (1996), Mishra, Pokhrel (1992), Rijal, Yadav (1999), Joshi (2001), tried to find out whether or not Nepalese enterprise apply the control techniques such as EOQ and ABC. But, they posed with a significant limitations as the tools were used without understanding the principles of their derivation and limitations of use.

Another aspect of this kind of studies is the determinants of level of inventory, Pradhan (1992), demonstrated that level of inventory of Nepalese public corporations is a function of sales and holding cost as represented by short term interest rate. He focused on nine public corporations and his study was based on period from 1973 to 1984. Another study conducted by Gyawali who tried to focus on the inventory demand as a function of sales, and interest cost.

In this study attempts to have been made examine the determinants of level of inventory in poultry business of Nepal. This study also demonstrates the structure and utilization of inventories in those poultry firms. The present study attempt to examine the relationship between inventory balances, sales and interest rate in the context of poultry business in Nepal by using more recent available data. This study also deals with the inventory system of those firms. Other deals of this study are as follows:

-) What is the effect of capital cost, i.e. interest rate (opportunity cost) in the determining level of inventory?

-) Do the transactions or sales of a poultry firm make change the volume or level of inventory proportionally or not?
-) Does the size of loan make change the level of inventory or not.
-) What are the other determinants of the level of inventory of a firm and how they do make change?

1.4 Objectives of the Study

Study without objective is just like journey without destination. This research has also specific objectives related to the inventory level of the poultry business in Nepal. The main objective is to examine the determinants of the inventory in poultry business. It also tried to explore the factors that determine the inventory investment in poultry sector. The following are the main objective of this study:

-) To determine whether level of sales or transaction affects the level of inventory or not.
-) To determine whether the opportunity cost (i.e. interest rates) significantly affect the level of inventory or not.
-) To determine the relationship between the level of inventory and loan size of the firms.
-) To determine the inventory system and utilization of inventory system by the poultry firms.

1.5 Significance of the Study

Every study has its own significance. This study is related to the inventory level of the poultry business in the context of Nepal. So this study is useful for the investors &

other stakeholders of poultry business and other concerned persons and institutions.

Importances of this study are:

-) This study is primarily significant to poultry business of Nepal to improve its inventory management.
-) This study is also useful for the government body, concerned for developing agriculture sector.
-) It helps for those students and other persons who want to know more about the inventory system in agribusiness and the determinants of the inventory level in poultry firms.
-) Banks and financial institutions also will be benefited from this study because it will help them to study the working capital management of those firms for providing the loans.
-) Others who interested about the poultry firms as well as inventory management.

1.6 Limitations of the Study

Study is not an easy task. The area of the study should have its own boundaries. The limitations of this study are:

-) The area of this study is taken as Chitwan and other neighbour districts to collect the data.
-) The data are collected from secondary sources too. It bears the limitations of secondary data.
-) The study mainly relates with the inventory management system and the determinants of the level of inventory but not with any other functional area.

-) This research was done in the absence of inadequate literature review because of lack of sufficient libraries and other facilities.
-) The study was done in limited budget and timeframe.

1.7 Organization of the Study

This research work will be organized in following parts:

1. Introductory
2. Review of literature.
3. Research Methodology.
4. Analysis of the problems and analyze and interpret the data.
5. Summary of findings and conclusions & recommendations.
6. References or Bibliography.

Chapter One is concerned for introducing study. This would contain an introduction which includes a statement of the problem, an overview of the study, the significance of the study [its purpose, importance and application(s)], how and why it is important. It states the rationale and the scope of the study and describes in detail what the study have set out to prove or demonstrate through the research.

Chapter Two would focus on the treatment and the research that has already been done on the topic. It would contain a review of related literature, which might include past research and writings and their impact on the study. Also, the work of renowned or unknown authors, who have written on similar subjects and has been researched with both the negative and positive perspectives.

Chapter Three represents the method and the research plans. In these chapter specific tools, statistical procedures or techniques used are described extensively.

Chapter Four presents analysis and interpretations of collected data in systematic way to come up to conclusion of the study and to give the answers of the research question. It is very important chapter for this study. It gives us the basic conclusion of this study.

Chapter Five represents for its conclusion and recommendation of this study that the final chapter of this study. It directly related to the chapter four.

Chapter Two

Literature of Review

The study on inventory determinants by indicates that the target inventory levels are functions of expected sales. Many authors have conducted empirical investigations on the topic and presented their findings in the context of different industry. The controversy arises about the cost of capital and other effects on inventory level and the adjustment speed of actual inventory level with target inventory.

This chapter is devoted to present the fact that how the inventory level is determined by the different industries has been approached by different authors. And on the basis of the review of these empirical works, some suitable models and hypothesis relating to the inventory determinants in Nepalese enterprises have been formulated.

This chapter has been divided into three sections. In first section it represents the fundamental concept of inventory and inventory management, the second section includes the different study related to this topic in worldwide context and the final section briefly reviews major empirical works on determinants of inventory level by business firms conducted in the context of Nepalese organizations.

2.1 Fundamental Concept of Inventory Management.

2.1.1 Inventory Management.

Inventory management, or inventory control, is an attempt to balance inventory needs and requirements with the need to minimize costs resulting from obtaining and holding inventory. There are several schools of thought that view inventory and its

function differently. These will be addressed later, but first let's present a foundation to facilitate the understanding of inventory and its function.

2.1.2 Why Inventory?

Inventory is a quantity or store of goods that is held for some purpose or use (the term may also be used as a verb, meaning to take inventory or to count all goods held in inventory). Inventory may be kept "in-house," meaning on the premises or nearby for immediate use; or it may be held in a distant warehouse or distribution center for future use. With the exception of firms utilizing just-in-time methods, more often than not, the term "inventory" implies a stored quantity of goods that exceeds what is needed for the firm to function at the current time (e.g., within the next few hours).

) Meet Demand: In order for a retailer to stay in business, he must have the products that the customer wants on hand when the customer wants them. If not, the retailer will have to back-order the product. If the customer can get the good from some other source, he or she may choose to do so rather than electing to allow the original retailer to meet demand later (through back-order). Hence, in many instances, if a good is not in inventory, a sale is lost forever.

) Keep Operation Running: A manufacturer must have certain purchased items (raw materials, components, or subassemblies) in order to manufacture its product. Running out of only one item can prevent a manufacturer from completing the production process of its finished goods.

Inventory between successive dependent operations also serves to decouple the dependency of the operations. A machine or work center is

often dependent upon the previous operation to provide it with parts to work on. If work ceases at a work center, then all subsequent centers will shut down for lack of work. If a supply of work-in-process inventory is kept between each work center, then each machine can maintain its operations for a limited time, hopefully until operations resume the original center.

) Lead-time: Lead-time is the time that elapses between the placing of an order (either a purchase order or a production order issued to the shop or the factory floor) and actually receiving the goods ordered. If a supplier (an external firm or an internal department or plant) cannot supply the required goods on demand, then the client firm must keep an inventory of the needed goods. The longer the lead-time, the larger the quantity of goods the firm must carry in inventory.

A just-in-time (JIT) manufacturing firm, such as Nissan in Smyrna, Tennessee, can maintain extremely low levels of inventory. Nissan takes delivery on truck seats as many as 18 times per day. However, steel mills may have a lead-time of up to three months. That means that a firm that uses steel produced at the mill must place orders at least three months in advance of their need. In order to keep their operations running in the meantime, an on-hand inventory of three months' steel requirements would be necessary.

) Hedge: Inventory can also be used as a hedge against price increases and inflation. Salesmen routinely call purchasing agents shortly before a price increase goes into effect. This gives the buyer a chance to purchase material, in excess of current need, at a price that is lower than it would be if the buyer waited until after the price increase occurs.

- J Quantity Discount: Often firms are given a price discount when purchasing large quantities of a good. This also frequently results in inventory in excess of what is currently needed to meet demand. However, if the discount is sufficient to offset the extra holding cost incurred as a result of the excess inventory, the decision to buy the large quantity is justified.
- J Smoothing Requirements: Sometimes inventory is used to smooth demand requirements in a market where demand is somewhat erratic. Notice how the use of inventory has allowed the firm to maintain a steady rate of output (thus avoiding the cost of hiring and training new personnel), while building up inventory in anticipation of an increase in demand. In fact, this is often called anticipation inventory. In essence, the use of inventory has allowed the firm to move demand requirements to earlier periods, thus smoothing the demand.

2.1.3 Controlling Inventory

ABC Analysis

Firms that carry hundreds or even thousands of different parts can be faced with the impossible task of monitoring the inventory levels of each part. In order to facilitate this, many firms use an ABC approach. ABC analysis is based on Pareto Analysis, also known as the "80/20" rule. The 80/20 comes from Pareto's finding that 20 percent of the populace possessed 80 percent of the wealth. From an inventory perspective it can restate thus by: approximately 20 percent of all inventory items represent 80 percent of inventory costs. Therefore, a firm can control 80 percent of its inventory costs by monitoring and controlling 20 percent of its inventory.

The top 20 percent of the firm's most costly items are termed "A" items (this should approximately represent 80 percent of total inventory costs). Items that are extremely

inexpensive or have low demand are termed "C" items, with "B" items falling in between A and C items. The percentages may vary with each firm, but B items usually represent about 30 percent of the total inventory items and 15 percent of the costs. C items generally constitute 50 percent of all inventory items but only around 5 percent of the costs.

By classifying each inventory item as an A, B or C the firm can determine the resources (time, effort and money) to dedicate to each item. Usually this means that the firm monitors A items very closely but can check on B and C items on a periodic basis (for example, monthly for B items and quarterly for C items).

Another control method related to the ABC concept is cycle counting. Cycle counting is used instead of the traditional "once-a-year" inventory count where firms shut down for a short period of time and physically count all inventory assets in an attempt to reconcile any possible discrepancies in their inventory records. When cycle counting is used the firm is continually taking a physical count but not of total inventory.

A firm may physically count a certain section of the plant or warehouse, moving on to other sections upon completion, until the entire facility is counted. Then the process starts all over again.

The firm may also choose to count all the A items, then the B items, and finally the C items. Certainly, the counting frequency will vary with the classification of each item. In other words, A item may be counted monthly, B items quarterly, and C items yearly. In addition the required accuracy of inventory records may vary according to classification, with A items requiring the most accurate record keeping.

Balancing Inventory Costs (EOQ Model)

As stated earlier, inventory management is an attempt to maintain an adequate supply of goods while minimizing inventory costs. It is seen a variety of reasons companies hold inventory and these reasons dictate what is deemed to be an adequate supply of inventory. Now, the question is how the balance between supply and cost can be achieved? First let's look at the types and characteristics of various costs.

There are three types of costs that together constitute total inventory costs: holding costs, set-up costs, and purchasing costs.

) **Holding Costs:** Holding Costs also called carrying costs, are the costs that result from maintaining the inventory. Inventory in excess of current demand frequently means that its holder must provide a place for its storage when not in use. This could range from a small storage area near the production line to a huge warehouse or distribution center. A storage facility requires personnel to move the inventory when needed and to keep track of what is stored and where it is stored. If the inventory is heavy or bulky, forklifts may be necessary to move it around.

Storage facilities also require heating, cooling, lighting, and water. The firm must pay insurance on the inventory, and opportunity costs occur from the lost use of the funds that were spent on the inventory. Also, obsolescence, pilferage (theft), and shrinkage are problems. All of these things add cost to holding or carrying inventory.

If the firm can determine the cost of holding one unit of inventory for one year (C) it can determine its annual holding cost by multiplying the cost of holding one unit by the average inventory held for a one-year period. Average inventory can be computed by dividing the amount of goods that are ordered every time an order is placed (Q) by two. Thus, average inventory is expressed as $Q/2$. Annual holding cost, then, can be expressed as $C (Q/2)$.

) **Set-up Costs or Ordering Costs:** Set up costs are the costs incurred from getting a machine ready to produce the desired good. In a manufacturing setting this would require the use of a skilled technician (a cost) who disassembles the tooling that is currently in use on the machine. The disassembled tooling is then taken to a tool room or tool shop for maintenance or possible repair (another cost). The technician then takes the currently needed tooling from the tool room (where it has been maintained; another cost) and brings it to the machine in question.

There the technician has to assemble the tooling on the machine in the manner required for the good to be produced (this is known as a "set-up"). Then the technician has to calibrate the machine and probably will run a number of parts, that will have to be scrapped (a cost), in order to get the machine correctly calibrated and running. All the while the machine has been idle and not producing any parts (opportunity cost). As one can see, there is considerable cost involved in set-up.

If the firm purchases the part or raw material, then an order cost, rather than a set-up cost, is incurred. Ordering costs include the purchasing agent's salary and

travel/entertainment budget, administrative and secretarial support, office space, copiers and office supplies, forms and documents, long-distance telephone bills, and computer systems and support. Also, some firms include the cost of shipping the purchased goods in the order cost.

If the firm can determine the cost of one set-up (O) or one order, it can determine its annual setup/order cost by multiplying the cost of one set-up by the number of set-ups made or orders placed annually. Suppose a firm has an annual demand (A) of 1,000 units. If the firm orders 100 units (Q) every time it places an order, the firm will obviously place 10 orders per year (A/Q). Hence, annual set-up/order cost can be expressed as $O(A/Q)$.

) **Purchasing Cost:** Purchasing cost is simply the cost of the purchased item itself. If the firm purchases a part that goes into its finished product, the firm can determine its annual purchasing cost by multiplying the cost of one purchased unit (P) by the number of finished products demanded in a year (A). Hence, purchasing cost is expressed as PA .

Now total inventory cost can be expressed as:

Total = Holding cost + Set-up/Order cost + Purchasing cost

or symbolically it is expressed as:

$$\text{Total} = C(Q/2) + O(A/Q) + PA$$

If holding costs and set-up costs were plotted as lines on a graph, the point at which they intersect (that is, the point at which they are equal) would indicate the lowest total inventory cost. Therefore, if we want to minimize total inventory cost, every time we place an order, we should order the quantity (Q)

that corresponds to the point where the two values are equal. If we set the two costs equal and solve for Q we get:

$$Q = \sqrt{2AO/C}$$

The quantity Q is known as the economic order quantity (EOQ). In order to minimize total inventory cost, the firm will order Q every time it places an order.

It must be noted that this is true only as long as no quantity discount exists. If a quantity discount is available, the firm must determine whether the savings of the quantity discount are sufficient to offset the loss of the savings resulting from the use of the EOQ.

There are a number of assumptions that must be made with the use of the EOQ. These include:

-) Only one product is involved.
-) Deterministic demand (demand is known with certainty).
-) Constant demand (demand is stable through-out the year).
-) Constant costs (no price increases or inflation).

While these assumptions would seem to make EOQ irrelevant for use in a realistic situation, it is relevant for items that have independent demand. This means that the demand for the item is not derived from the demand for something else (usually a parent item for which the unit in question is a component). For example, the demand for steering wheels would be derived from the demand for automobiles (dependent demand) but the demand for purses is not derived from anything else; purses have independent demand.

Other Lot Sizing Techniques

There are a number of other lot-sizing techniques available in addition to EOQ. These include the fixed-order quantity, fixed-order-interval model, the single-period model, and part-period balancing.

) Fixed Order-Quantity Model

EOQ is an example of the fixed-order-quantity model since the same quantity is ordered every time an order is placed. A firm might also use a fixed-order quantity when it is captive to packaging situations. If you were to walk into an office supply store and ask to buy 22 paper clips, chances are you would walk out with 100 paper clips. You were captive to the packaging requirements of paper clips, i.e., they come 100 to a box and you cannot purchase a partial box. It works the same way for other purchasing situations. A supplier may package their goods in certain quantities so that their customers must buy that quantity or a multiple of that quantity.

) Fixed-Order-Interval Model

The fixed-order-interval model is used when orders have to be placed at fixed time intervals such as weekly, biweekly, or monthly. The lot size is dependent upon how much inventory is needed from the time of order until the next order must be placed (order cycle). This system requires periodic checks of inventory levels and is used by many retail firms such as drug stores and small grocery stores.

) **Single-Period Model.**

The single-period model is used in ordering perishables, such as food and flowers, and items with a limited life, such as newspapers. Unsold or unused goods are not typically carried over from one period to another and there may even be some disposal costs involved. This model tries to balance the cost of lost customer goodwill and opportunity cost that is incurred from not having enough inventory, with the cost of having excess inventory left at the end of a period.

) **Part Period Balancing.**

Part-period balancing attempts to select the number of periods covered by the inventory order that will make total carrying costs as close as possible to the set-up/order cost.

When a proper lot size has been determined, utilizing one of the above techniques, the reorder point, or point at which an order should be placed, can be determined by the rate of demand and the lead-time. If safety stock is necessary it would be added to the reorder point quantity.

Reorder point = Expected demand during lead time + Safety stock

Thus, an inventory item with a demand of 100 per month, a two-month lead time and a desired safety stock of two weeks would have reorder point of 250. In other words, an order would be placed whenever the inventory level for that good reached 250

units.

Reorder point = $100/\text{month} \times 2 \text{ months} + 2 \text{ weeks' safety stock} = 250$

2.1.4 Recent Thoughts in Inventory Management

There are a number of techniques and philosophies that view inventory management from different perspectives.

MRP and MRP II.

MRP and MRP II are computer-based resource management systems designed for items that have dependent demand. MRP and MRP II look at order quantities period by period and, as such, allow discrete ordering (ordering only what is currently needed). In this way inventory levels can be kept at a very low level; a necessity for a complex item with dependent demand.

Just-in-time (JIT).

Just in time (JIT) is a philosophy that advocates the lowest possible levels of inventory. JIT espouses that firms need only keep inventory in the right quantity at the right time with the right quality. The ideal lot size for JIT is one, even though one hears the term "zero inventory" used.

Theory of Constraints (TOC).

Theory of constraints (TOC) is a philosophy which emphasizes that all management actions should center on the firm's constraints. While it agrees with JIT that inventory should be at the lowest level possible in most instances, it advocates that there be some buffer inventory around any capacity constraint (e.g., the slowest machine) and before finished goods.

2.2 Review of Major Studies.

It was already stated that inventory is one of the vital business assets in every business. And the successful and smooth business is possible when effective inventory management is exited. There are several determinants of level of inventory in business. We can found several research studies in this topic in the course of literature review in the context of international market.

2.2.1 The Goodwin Study (1948)

Goodwin (1948) in his study of secular and cyclical aspects of the multiplier and accelerator hypothesis observed that entrepreneurs attempt an immediate adjustment of inventories to the desired level.

2.2.2 The Michale Lovell Study (1961)

Michale Lovell (July 1961,193-314) in his study of manufacturers' inventories, sales expectations and the acceleration principle observed that the reaction coefficient of non-durable manufacturing was exceedingly small (0.0974) as compared to total

(0.4576) and total durables (0.3628). It implied the entrepreneurs were little concerned with adjusting inventories to the appropriate level.

2.2.3 The Nestor Terleckyj Study (1961)

Terleckyj (1961) in his study attempt to explain the effect of capital costs on target inventory levels. His study, however, did not show a statistically significance result.

2.2.4 The McGouldrick Study (1961)

In his study McGouldrick (1961) tried to assess the evidence of interest rates and other measures of credit conditions on inventory investment. But his findings were also disappointing in his study, the durable manufacturing inventory equation for the distribution sector showed a positive interest rate coefficient.

2.2.5 The Paul Borrows Study (1971)

In an effort to study explanatory and forecasting models of inventory investment in Britain, Poul Borrows (Paul 1971, 175-289) used sales and capital cost as explanatory variables along with other factors. He obtained as substantially higher reaction coefficient, i.e. 0.68. Besides, he observed that the coefficients of the cost and availability of funds for investment in inventories were not statistically significant. Some times they had per verse signs also.

2.2.6 The Grossman Study (1973)

Grossman study (1973,12-32) used quarterly data in an econometric model for the period of 1953-69 to depict clearly the slow response of manufacturing in adjusting their inventory levels to changes in such variables as sales and unfilled orders. He observed that manufacturers adjust their inventories to desire by 37 per cent at an annual rate.

2.2.7 The Joyce Study (1973)

Tom M. Joyce (October 1973.323-329) study was also directed towards finding out new evidence on inventory investment by individual firms in manufacturing. The study used that the model in which the capital cost role will be analyzed is the familiar flexible accelerator one used in empirical work on inventory investment. Evidence reported that the cost of capital to a firm negatively influences by inventory investment.

2.2.8 The Liberman Study (1980)

Liberman (1980) in his studies included the opportunity cost in inventory model as a key explanatory variable along with sales. He examined the size and significant of the theoretically important cost of capital effect on inventory investment by utilizing firm specific cost of capital measures in a pooled cross-section econometric analysis of inventory determinants. The major feature of his study may be stated as follows.

1. The study used a firm specific cost of capital measure instead of a market interest rate that avoided the measurement errors introduced into the analysis by the letter procedure.
2. The econometric analysis was conducted using two samples of firms. The first sample, which included heavy machinery producing companies, attempt to explain inventory investment behavior for companies that produce output in response to orders. The second sample consisted of textile companies that produce predominately to stock in anticipation of orders.

The study hypothesized that level of inventories are function of sales, the opportunity cost and the case of good produced to order, order backlogs. The equation was as follows:

$$\ln I_t = b_0 + b_1 \ln S_t + b_2 \ln CK_t + b_3 \ln Ob_t + C_t \dots \dots \dots 1$$

Where,

I_t = firm's real inventory level in period t

S_t = the level of real sales

CK_t = the real cost of capital

Ob_t = the real order backlog

Here CK_t ,

$$CK = (1-t)^{id} W_d + i^{ps} W_{ps} + i^{cs} W_{cs} \dots \dots \dots 2$$

Where,

t = corporate tax rate of the firm;

i^{ps} = cost of preferred stock

i^{cs} = cost of common stock

W_{ps} = weight of preferred stock

W_d = weight of debt

W_{cs} = weight of common stock

A part from average cost of capital, another set of costs of capital measures, employed was only the estimated cost of equity capital as a proxy for the firm's total marginal cost of capital.

The wholesale price index for machinery and equipment was used to deflate the inventory and other figures (Stated in current prices) associated with the machinery

industry, while the wholesale price index for textile product and apparel was used for the textile industry with these, Liberman obtained the following result for total inventories:

Real inventory level on equation for Heavy Machinery Firms:

$$\text{InIt} = -2.2 + 0.623\text{Ins} - 0.599\text{InCK} + 0.018\text{InPrate} + 0.155\text{In OB} \dots\dots\dots 3$$

$$(16.52)(12.56) (10.36) \quad (0.76) \quad (4.23)$$

$$R^2 = 0.977 \quad \text{S.E.} = 0.12 \quad \text{Observations} = 40$$

Real inventory level on equation for heavy machinery firms.

$$\text{InIt} = -2.50 + 0.62\text{Ins} - 0.623\text{InCK} - 0.016\text{InPrate} + 0.165\text{In OB} \dots\dots\dots 4$$

$$(19.91)(16.31) (13.13) \quad (0.72) \quad (5.47)$$

$$R^2 = 0.984 \quad \text{S.E.} = 0.10 \quad \text{Observations} = 40$$

Real inventory level on equation for textile firms:

$$\text{InIt} = -2.85 + 1.00\text{Ins} - 0.409\text{InCK} - 0.148\text{InPrate} \dots\dots\dots 5$$

$$(10.37)(15.77) (3.75) \quad (3.12)$$

$$R^2 = 0.994 \quad \text{S.E.} = 0.12 \quad \text{Observations} = 19$$

Real inventory level on equation for textile firms:

$$\ln I_t = -2.58 + 1.00 \ln S_t - 0.409 \ln CK_t - 0.148 \ln Prate_t \dots\dots\dots 6$$

$$(3.51)(8.97) (1.20) \quad (2.26)$$

$$R^2 = 0.989 \quad S.E. = 0.16 \quad \text{Observations} = 19$$

It is noted that the variables I_t , S , CK , $Prate$ and OB are the log of total inventories, sales, cost of capital, the inflation rate and real order backlogs respectively. The values in parentheses are t values and S.E. is the standard error of the equation. The regression results for raw materials, work in process and finished goods separately are not presented here.

The above result supported the theoretical propositions of Liberman. The equation 3 and 4 are quite strong and show that cost of capital coefficients were statistically significant with the theoretically correct signs. Similarly, sales coefficient demonstrated support for economics of scale. However, the inflation rate and order backlogs coefficient were nevertheless sizeable and significant though they have theoretically expected signs.

The equation (4) indicate that there is not much different in the findings of average cost of capital and marginal cost of capital equation as much of the variation in the average measures is produced by the marginal equity cost of capital.

The equation 5 and 6 showed that unlike firms producing to order, firms producing to stock also have sales and cost of capital coefficient of the theoretically expected signs. Surprisingly, the sales coefficients were on the high side. The sales coefficient is unity in the sixth equation, whereas theory suggested economics of scale. So, the estimate inventory equation for textile firms confirmed the behaviour expected for firms that produce output to stock. However, the role performed by the inflation rate was uncertain as its coefficients to theory. According to Liberman, it may reflect a speculative behaviour of firms that speculate to profit by increasing inventories in anticipation of an increased inflation rate.

The above equations were also re-estimated employing 4-6 month commercial paper rate in place of the firm specific cost of capital. However, none of the equations yielded a statistically significant result. This result therefore suggested that the significant cost of capital effects obtained by the study might be attributed to the use of theoretically more appropriate cost of capital measure.

A modest attempt was also made to test for capacity constraints that might affect inventory level. When capacity utilization was included in the above equation to test for inventory changes due to capacity constraints, it turned out to be statistically insignificant in all these cases.

2.2.9 The Maccini and Rossana Study (1981)

The study (Louis & Robertt, May, 1981) also analyzed the determinants of investment in finished goods inventories while studying adjustment speeds. Their findings showed that the speed with which actual inventories was indeed very fast. At the same

time, they also did not find any evidence that real interest rates have an important effect on inventory investment.

2.2.10 The Irvine Study (1981)

The Irvine study (1981) was also directed towards findings out whether or not retail inventory levels depend significantly on the costs associated with inventory holdings. He attempt to analyze business demand for inventory utilizing the time series equations for the sample 1958-74. Time series equations explaining the monthly inventory levels held by the total retail sectors, and the non- durable sectors were estimated. The estimated equations were based on the hypothesis that the unobservable optimum inventory level $Y(t)$ is postulated to depend on the level of expected future sales and inventory carrying cost as described below:

$$Y_t^d = a_0 + a_1 S_t + a_2 CAPC_t + E_t \dots \dots \dots 7$$

Where,

S_t = Expected sales over the appropriate future period where the expectations are held at time t .

$CAPC_t$ = Expected per unit inventory carrying cost over the future period over which the inventory will be held.

E_t = Random disturbance term.

Most of the previous studies set expected sales equal to last years sales ie $S(t) = S(t-1)$.

But Irvine utilized the following formula based on retailer proxy forecast.

$$ESDCM = D_{Sales}(t-12)$$

$$[(1/3)\{D_{Sales}(t-1)/D_{Sales}(t-13) + D_{Sales}(t-2)/D_{Sales}(t-14) + D_{Sales}(t-3)/D_{Sales}(t-15)\}] \dots \dots \dots 8$$

Where,

ESDM(t)= Expected deflated sales in the upcoming month ti

D_{Sales} = Actual deflated sales in month.

The above formula was used because a sales forecast commonly utilized by retail firms is last years sales in the same month adjusted by the stores recent sales experience. In addition to ESD1M(t) a forecast of sales expected one month ahead, ESD2M(t) were included in the specification. These measures were calculated with the help of formula similar to expression (8) except that the first term after the equal sign was replaced D_{Sales}(t-11) to calculate ESDLM(t) and was replaced by D_{Sales}(t-10) to calculate ESD2M(t) Besides, as an alternative to retailer proxy forecast, the seasonal ARIMA model were also fitted to the deflated actual monthly sales series over a 1965-74 range.

Irvine measured CAPC(i) as follows:

$$CAPC(i) = P_{i(t)}/P_{c(t)} [r_{(t)} - P_i^e P_{(t)}] \dots\dots\dots 9$$

Where,

i= T,D,ND (for total Retail, Durables and Non- Durables)

P_{i(t)} = retail price of the ith sectors goods

R_(t) = short-term interest rate.

P_i^e(t) = Expected rate of inflation of ith sectors goods over inventory holding period.

P_c(t) consumer price index (all items)

He substituted $CAPC_i(t-1)$ for expected per unit inventory carrying costs and the current month, one month ahead and two months ahead sales forecasts substituted for expected sales in expression in equation (7) and obtained the following.

$$Y^d_{(t)} = a_0 + b_1ESDCM_i(t) + b_2ESDC1M_{i(t)} + b_3ESD2M_{i(t)} + a_2CAPC_{i(t-1)} + E_{(t)} \dots 10$$

Where, $a_1 = b_1 + b_2 + b_3$

The dependent variable of the above equation was deflated by using appropriate measures.

The study indicated that expected future sales were the major determinants of retail inventory levels. The estimated coefficients of both the ARIMA forecasts and retailer forecasts, which were utilized, alternatively to measure expected future sales, were positively signed in the total retail and non-durables inventory equations. The estimated coefficients on these measure test to be statistically different from zero at 5 per cent level using a one tailed t-test. The result demonstrated by Irvine was contrary to previous studies which failed to find the capital costs significant effect. This may be attributed to the difference in the econometric techniques employed in the study. His major findings were:

- a. Retail inventories were on an average adjusted rapidly to their target levels.
- b. Target inventory levels were depending significantly on fluctuations in financial inventory carrying cost, i.e. capital cost with negative sign.
- c. Target durable inventories were much more sensitive to fluctuations in capital costs than were non-durable target inventories.
- d. The adjustment speeds of non durable inventories were quicker than that of the target level of durable inventories.

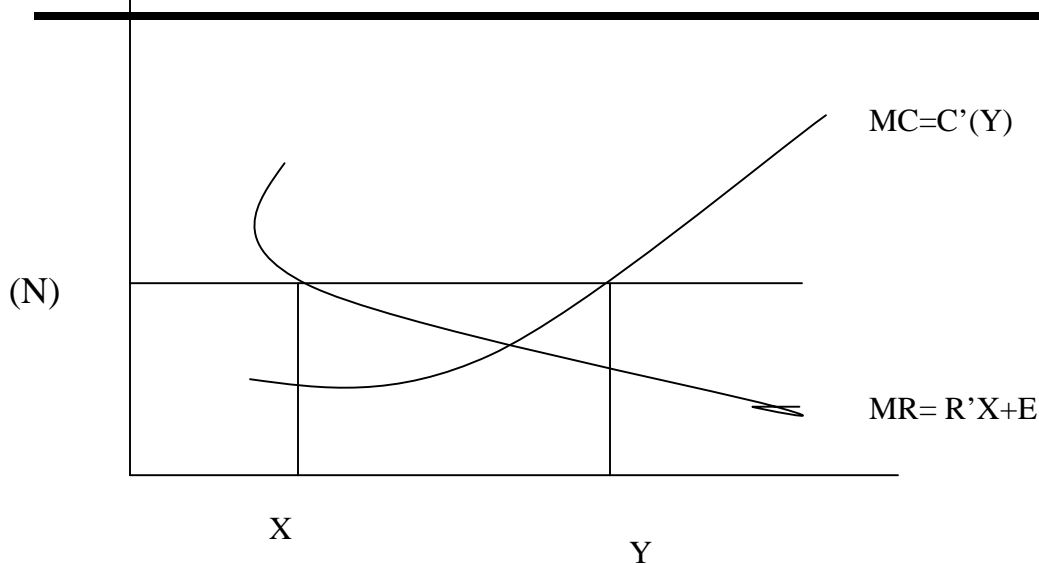
In addition to that Irvine also showed that merchant wholesales inventories also depend on the level of financial inventory carrying cost. Irvine observed that the negative coefficient on the prime interest rate was statistically very significant. He however suggested that the statistical relationship between manufacturing inventory investment and capital costs need further investigation.

2.2.11 The Alan and Blinder Study (1982)

Alan S. Blinder (June 1982, 334-347) in his study indicated that how much output to produce for inventory and it must decide how much inventory to sell. While profit maximization continues to require marginal cost (MC) = Marginal Revenue (MR) each period. It is no longer necessary that this be done with output (Y_t) equal to sales (X_t). Indeed, It will quite often be the case that optimal Y_t and X_t differ with changes in the stock of inventories (N_t) taking up the slack. He illustrated the basic idea, from figure.

MC, MR and

Figure 2.1



From the figure MC curve is $C'(Y)$ and optimal output is determined by MC to the shadow value of inventories denoted (N) at point B. The MR curve is $R'(X) + E$ and optimal sales are determined by equity MR to (N) at point A. From figure no. 2.1 it is obvious that X and Y need not be equal.

The major features and findings of Blinder's study may be stated as follows:

- a. The study hypothesized that higher initial level of inventories lead the firm produce less, charge a lower price, expected to sell more and reduce its planned inventory investment.
- b. Once again his proposition is intuitively appealing. Firms stuck with high inventories would normally be expected to cut production and "run a sale"
- c. Firm whose marginal cost of inventory holding are relatively constant and whose demand shocks are transitory will rely heavily on inventory change price and output little. Conversely, firms with sharply rising marginal inventory firms with sharply rising marginal inventory cost or permanent demand shocks will rely less on inventories as butter stocks will exhibit large price and output fluctuations.

- d. The reactions of output, price and sales to inventory stocks are strongest when the firm's inventory carrying cost function is most convex, weakest when it is close to linear.
- e. Inventory investment is characterized by the "partial investment" specification that is so popular in empirical work: inventory change is proportional to the gap between desired and actual inventory holdings. Desired inventories in the model are a decreasing function of the current demand shock.
- f. The Blinder also added in his model if negative inventories are impossible and stock outs occur instead, price will be more sensitive to positive demand shock than to negative demand shocks.
- g. Investment in inventory carrying capacity can be viewed as one of several ways for a firm to acquire greater flexibility in reacting to unanticipated events.

2.2.12 The Akhtar Study (1983)

Akhtar (June 1983, 319-238) conducted the empirical test of inventory carrying cost effects by focusing on aggregate inventory behaviour. He estimated equations with quarterly data for the sample period of 1965-81 and for the sub period 1972-81. His study was based on the "Stock adjustment" or "flexible accelerator" model and the expected price inflation. The capacity utilization as additional explanatory variable was also included in the model. He hypothesized the unobservable desired level of inventories are determined by expected demand, i.e. sales. He developed the following model:

$$\text{Invt} = a_0 + a_1 D_x t_e + a_2 R S t + a_3 P t_e + a_4 \text{Cut} \dots \dots \dots 11$$

Where,

Inv_t = Aggregate level of inventories on held at the end of period t .

Dx_t = Expected aggregate sales of goods in period t .

RS_t = Short-term interest rate of period t .

Cut = Capacity utilization in period t .

And $a_1, a_3 > 0$, $a_2, a_4 < 0$

He also expected that the unplanned and unit ended inventory investment will be depleted.

In response to movements in capacity utilization. It was specified as:

$$INV_t = b_0 + b_1 CU_t + b_2 DX_t/Q_t \dots \dots \dots 12$$

Where,

INV_t = Change in aggregate inventories over period t , which is divided into planned (or intended) component, INV_t^p and unplanned (or unit ended) component, INV_t^u .

DX_t = Aggregate sales of goods in period t .

Q_t = Industrial output in period t and $b_1 > 0$, $b_0 < 0$.

Combining equations (11) and (12) and adding a dummy variable yielded the following:

$$INV_{t+1} = C_0 + C_1 DX_t^e + C_2 RS_t + C_3 P_{3t} + C_4 Cut + C_5 (DX_t/Q_t) + C_6 LDUM + a Inv_{t-1} + U_i \dots \dots \dots 13$$

Where LDUM is a dummy variable, responding the 1980 general credit controls, equal to 1 during quarter 2 and 3, 1980 and 0 elsewhere,

U= A random disturbance term.

The sign of C_4 was expected to be ambiguous, as it would depend on whether the planned or unplanned inventory behaviour dominates capacity utilization.

Other studies of inventory level determinants, the expected demand i.e. sales were defined in following two ways:

KH The expected sales are equal to sales of the last period, i.e. $Dxe_t = Dxe_{t-1}$

ΛH It was specified as an unconstrained second degree polynomial on the preceding four quarters, or as a distributed lag estimated freely with the length of lag set at two or three quarters.]

Since DXe is based entirely on past sales, it may not be a good proxy for capturing, expectations of future sales. Therefore, in addition to DXe new orders for manufacturing goods as a proxy for expected sales was tried.

The four to six month commercial paper rate in the current period was used as a proxy for the opportunity cost of funds invested in inventories. Similarly, three different schemes were used and among them producer price index yielded considerably a better result. His major findings were:

- a. All explanatory variable, expect capacity utilization, were statistically very significant for both the entire period and the sub period.
- b. Nominal interest rates and inflation had statistical sign effects on the behaviour of inventories. The signs of the two coefficients were in accordance with a priori expectations and these coefficients were also significant at 1 per cent level. According to these results, 1 per cent to 2.2

billion declines in real aggregate in expected inflation leads to 0.7 to 0.9 billion increases in inventory investment.

- c. The estimated adjustment coefficient between the desired inventory level and the lagged inventory stock indicated a reasonable e-prompt speed of adjustment. According to the result. Around three-fifths of the discrepancy between desired inventories and the lagged inventory stock was corrected with in one quarter.

Akhtar's findings on inventory carrying cost effects were in sharp contrast to most of the earlier evidence on his subject. One obvious explanation was his choice of a more recent period. The generally high inflation and interest rates over the late 1960's and 1970's seem to have affected the result.

2.2.13 The Heifer International Study (2002)

Study by Anne Fanatico, National Center for Appropriate Technology and David Redhage, Kerr Center for Sustainable Agriculture. With contributions by Nancy Grudens Schuck, WayneKnoblauch, Judy Joanna Green, and Mary Saylor (October 2002) for Heifer International concluded that the inventory level of the poultry firms were also determined by the reliability of the supply.

“If you have own processing plant, consider how you will get a sufficient supply of live birds to support the plant year-round. What will the travel time be from the farm to the plant? Will you raise all the birds yourself? If not, survey produces in your area to determine whether they can provide an adequate supply of birds. However, local producers may prefer to process on-farm and market their own birds instead of working with you. What kind of future-supply assurance do you need? A reliable

supply is crucial when you are committed to fill an order. When working with multiple growers, you will need to require standardized production practices, including stock selection. You may need to develop a inventory level in the relation with reliability of the supply.” The Heifer International Study (October 2002).

2.2.14 The Christopher L. Delgado, Clare A. Narrod, and Marites M. Tiongco Study (2007)

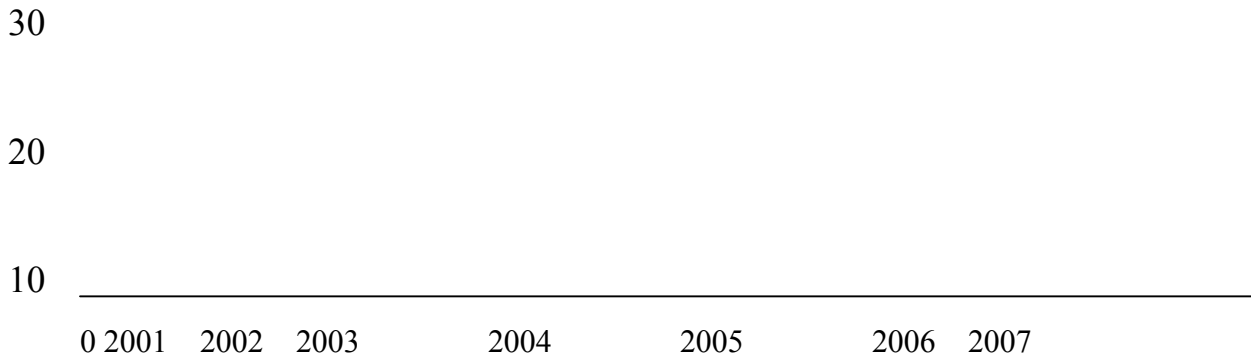
In the title “*Determinants and Implications of the Growing Scale of Livestock Farms in Four Fast-Growing Developing Countries*” Study by Christipher L et al concluded that the level of inventory in poultry firms determined by the death rate of birds. In this study authors they present the result as follows:

Figure 2.2 Broiler Chicken Inventories, Philippines, 2001–2007

Sources: Costales et al. (2003); Philippines, Bureau of Agricultural Statistics (BAS) (2007a).

Number of birds (millions)





In this way the figure presents that the inventory level of poultry firms are determined by the death rate of the birds.

2.3 Review of Related Studies in Nepal.

In this chapter it is reviewed the major studies in related to Nepalese environment. The empirical investigation on determinants of level of inventory is limited. We can find different studies in the area of other listed companies but the study on the area of poultry business is hardly found. The major studies about the determinants of level of inventory in the Nepalese context is presented as follows:

2.3.1 The Pradhan Study (1992).

With the help of cross sectional data of nine selected manufacturing public corporation for twelve years (1973-1984), Pradhan done his studies in 1992. In the absence of sufficient literature Mr. Pradhan had selected following public corporations:

- a. Agricultural Tool Factory
- b. Brick and Tile Factory

- c. Balaju Textile Limited
- d. Birgunj Sugar Factory
- e. Diary Development Corporation
- f. Janakpur Cigarette Factory
- g. Royal Drugs Limited
- h. Nepal Tea Development Corporation
- i. Bansbari Leather and Shoe Factory

According to his study, the level of inventory in the Nepalese public corporations is determined as below:

$$Y^* = F(s,i) \dots \dots \dots (14)$$

Where,

Y^* = Level of Inventories

s = Level of Sales

i = The holding cost, i.e., short term interest rate in an empirical investigation, expression (14) takes the following form:

$$Y^* = Ks^{b1} i^{b2} e^u \dots \dots \dots (15)$$

Where, the error term e^u was assumed to be independently and normally distributed and the desired level of sales (Y^*) is equal to the actual level of sales (Y), the final equation in its log form to be estimated was given as following:

$$\ln Y = b_0 + b_1 \ln S + b_2 \ln I_i + U_i \dots \dots \dots (16)$$

Where,

b_0 = Intercept/ constant of the regression line.

b_1 = Elasticity of inventory with respect to sales.

b_3 = Elasticity of inventory with respect to holding costs, i.e. interest rates.

The study also introduces another explanatory variable, capacity utilization rate in the model and also took into account a partial adjustment or flexible accelerator model of inventory behaviour. This study did not report the unanimous findings, which were follows:

- a. The elasticity of sales with respect to inventories is less than unity that showed the evidence of economics of scale with respect to the demand for inventories by manufacturing public corporations of Nepal.
- b. The interest rate coefficient was statistically significant with a theoretically correct sign. It indicated that fluctuations in inventory level depend in statistically significant manner on fluctuation in financial carrying cost of inventories and support the conclusion of Liu, Liberman Kuzents, Irvien and Akhtar.
- c. The speed of adjustment between desired and actual level inventories had been observed to be much slower, i.e. 0.15 it indicate that only 15 per cent of the adjustment of actual to desired inventory level is completed within a year.

The study was the first one that tested the demand function for inventories by using Nepalese data. However this study was conducted a long before in the context of public corporations that is completely differ form the poultry business. This findings may or may not be reliable for poultry business.

2.3.2 The Joshi Study (2003).

Mr. Joshi had done his study in the title “Inventory Demand Behavior of Listed Manufacturing Companies: A case study of ten manufacturing companies.” Mr. Joshi study was differ from Pradhan study because of the time frame and selected companies. In November 2003, he done his studies developing mainly two research hypothesis

- Demand of inventory proportionally changes according to level of sales.
- Interest rate significantly affects the level of inventory.

He had estimated following regression equations for statistical testing.

$$\ln Y_t = b_0 + b_1 \ln S_{(t-1)} \dots \dots \dots 17$$

$$\ln Y_t = b_0 + b_1 S_{(t-1)} + b_2 \ln i_t \dots \dots \dots 18$$

$$\ln Y_t = b_0 + b_1 S_t \dots \dots \dots 19$$

$$\ln Y_t = b_0 + b_1 \ln S_t + b_2 \ln i_t \dots \dots \dots 20$$

$$\ln Y_t = b_0 + b_1 \ln S_{(t-1)} + b_2 \ln i_t + b_3 \ln Y_{t-1} \dots \dots \dots 21$$

Where,

Y_t = The deflated annual actual inventory balance.

S_t = The deflated current year sales

$S_{(t-1)}$ = The one year lagged deflated annual sales.

i_t = The short-term interest rate.

$Y_{(t-1)}$ = The one year lagged deflated annual actual inventory balances.

The major findings of his study were follows:

- a. It is concluded that sales is a significant variable in inventory demand function, i.e. the effect of sales on inventory demand is significant. The result of the study showed economics of scale on inventory, holdings thereby supporting thereby supporting the finding of Akhtar and Irvie.
- b. The study showed statistically insignificant effect of capital cost on demand for inventory in Nepalese companies.

2.3.3 The Other Related Study.

In the case of literature review, only limited studies on inventory might be found in Nepalese context. The determinants of level of inventory related studies were presented above topic. Here other related studies have been undertaken on “Inventory Management” in the Nepalese context.

2.3.3.1 The Dongol Study.

Dangol study was undertaken in the title of Inventory management that explained about the inventory system in Nepalese organizations. He suggested that the top management should introduce the best policy regarding the inventory control which helps to reduce lead time, regulate usage and maintain safety stock; ultimately the firm achieves its goal to reduce inventory investment and increases the firms future prospects by making more profit.

2.3.3.2 The Shrestha Study.

Manohar Shrestha, observed that agriculture input corporation often finds difficulties in supplying fertilizers and seeds to farmer due to lack of any inventory policy to be followed by it.

2.3.3.3 The Gaire Study (1979).

Amrit Kumar Sharma Gaire; has made a study regarding proposed “Inventory Management of Royal Drug Limited”. He comes into applied scientific tools and techniques and EOQ due to lack of planning and unsystematic method of recording cost, 1979.

2.3.3.4 The Pokherel Study (1992).

A study on inventory management in Janakpur Cigarette factory regarding the study Mr Pokhrel concluded that there is not realistic raw materials purchase planning this is because the procurement of different raw materials each year fluctuates significantly and also he wants to recommend the JCF must follow the EOQ model in its purchasing decision, 1992.

2.3.3.5 The Baral Study (1994).

Puspa Raj Baral has also made study regarding “A case study of Gandaki Noodles Private Ltd.” He came into know that the factory is following neither economic order quantity model in it’s purchasing decision nor ABC analysis in managing inventory,1994.

2.3.3.6 The Rijal Study.

Saroj Rijal finds in his study of inventory management of agriculture input corporation that these were not regulate supply and proper procurement system of AIC.

2.3.3.7 The Ojha Study.

Mr. Ojha had done the study on the comparative study of RDL and Herbs production and processing company. One of the major findings of his study was that, they had not adopted optimum inventory policy and had not paid attention while preparing raw material purchase and raw materials requirement budget. The use of EOQ technique was completely ignored by RDL.

2.3.3.8 The Buddhi Study.

Mr. Buddhi had done his study in the title “Inventory Management in Public Enterprises; A comparative study between Salt Trading and National Trading Ltd.”. During his study he concluded that most of the enterprises in Nepal is facing problems of inventory. Due to lack of proper inventory planning policies, there are many enterprises where large amount of capital have been blocked up and very little measures have been taken to manage the inventories on the basis of inventory decisions models and techniques that have so far been developed. So, the study focused on the need for a good inventory system and control.

There have been developing lots of tools, formula and models for managing and controlling the inventory. However, they failed to apply it due to lack of study and research about inventory management. No techniques for inventory management are possible to apply to calculate one of the major decisions when to buy because of lack of proper planning and un-systematic methods of recording cost. If no concrete step is taken with regards to recording and maintaining proper data on stock out cost, carrying cost, ordering cost, price of inventory etc.

From the above studies we find that interest rate has been controversial effect on level of inventory. Some studies show that statistically it has significant effect of capital cost on inventories while other did not. Similarly some reported that there are economies of scale in inventory holding, while others reported approximately unit elasticity of inventory with respect to sales.

The other in the Nepalese context no study has so far been conducted in the inventory management in Poultry business besides other manufacturing companies interest rate, and the level of sales has statically significant effect on the level on inventory. Mr Pradhan's study was the perhaps first tested determinants of level of inventory by using Nepalese data. However, this study was conducted a long before. Gywali's study failed to recognize the diversified characteristics of the Nepalese enterprises. Many charges have occurred in Nepal since 1997 including policy level of changes. Privatization and globalization were taking place in Nepal and as the member of WTO since 2004, it is felt necessary to test the relation between the different variables which directly or indirectly affect the level of inventory in Nepalese organizations.

In the conclusion, the past studies shows that the level of inventories of a firm would depend on the opportunity cost of holding inventory but the earlier studies on the demand for inventories did not present unanimous findings. Liu, Kuznets, Liberman, Irvan and Akhtar reported statistically significant effect of capital cost of the inventories, while Robibnson, Lovell and Grossman did not report the same. But they observed faster adjustment between actual inventories and target inventories in other hand Lovell and Grossman observed slow speed of adjustment.

In Nepalese context no enough studies were done. Mr. Pradhan only one who done in this topics. In his study he concluded that the level of inventories was increase or decrease on the respect of level of transaction and the interest rate coefficient was statistically significant with theoretically sign it means the level of inventory also affected by the interest rate.

During literature review it can not be found the study done for inventory management on poultry business. That is why this study is done for this title to find the different variables, which determine the level of inventory in Nepalese poultry business with explaining the inventory management in those firms.

This study is different from above studies from following reasons.

- The earlier studies were done for manufacturing public companies but this study is done for poultry business.
- The earlier studies were done by mostly using secondary data and this study is attempts to done taking in comparative primary data rather than secondary data.
- This study is done taking major three independent variables interest rate of short term loan, level of sales and size of revolving fund or short term loan.
- The above studies were not done taking size of revolving fund as a independent fund but this study also considered size of revolving fund as a major variable.

This study is trying to fulfill the limitations of above studies and finding the major determinants of level of inventory in Nepalese poultry business.

Chapter Three

Research Methodology

In this chapter it will be described the methods used when conducting the thesis. Research purpose, research approach, research method and strategy are first presented. Data collection process, analysis approach and the research plans are explained in this chapter. Whereas specific tools, statistical procedures or techniques used are described extensively. For the history of methodologies and case study, a detail of current events associated with the review of related literature information as discussed in Chapter three is provided. This chapter also presents the statistical tools and techniques that use in this study.

3.1 Specification of Variables

3.1.1 Variables of the studies

Without any variables no research has been done. This research work has its own objectives and to fulfill its objectives some variables were considered. A brief explanation of the variables explanatory and explained, have been explained as follows:

Level of Inventory:

We have already discussed that every business houses should stocked inventory for different purposes. This thesis is mainly related to the level of inventory. In this study level of inventory is regarded as the dependent variable. This variable is depended on

the other independent variables such as level of sales, interest rate, size of revolving fund etc.

Level of Sales:

Nearly almost all the studies on inventories by the firms have used sales as the main exploratory variable. This study also regarded level of sales as the main independent variable which may lead or play vital role to determine the level of inventory in Nepalese poultry firms.

Interest Rate of Short term Loan:

Interest cost is some sort of opportunity cost of funds invested in inventory. Short term interest rate among others seems to be a popular measure of opportunity cost of funds invested in inventory, which is indicated by some earlier studies on the determinants of level of inventory. There is no clear cut way for using a particular measure of interest rate. Some empirical studies included long-term rate as proxy for interest rate variable in the model while other used short term rate. Hence, this study also uses the short term lending rate of Nepalese Banks specially Agriculture Development Bank, Nepal.

Size of Revolving Fund or Short Term Loan:

This is another independent variable used in this study. The size of short term loan or revolving fund also determine the level of inventory in Nepalese poultry firms. We find in previous studies the short term loan is regarded as long term in some cases. This study presents the relation between the short term loan size and inventory level.

3.1.2 Inventories in Poultry Business

Working capital is the blood of every business and the inventory is the most remarkable part of the working capital. In most of the cases the determinants of level of working capital and the level of inventory is same. Without inventory no business is done. Like wise as a business poultry firms also make provision of inventory. As the nature of business every business has different inventory and different level of inventory.

In Poultry business we found two kinds of inventories. One is a raw material and others are finished goods. The possible inventories are presented as follows according to information getting form the different poultry firms.

Raw Materials

In poultry business the raw materials means the items that are use for keeping birds alive. They are:

1. Dana
2. Poultry Drugs
3. Electric tools
4. Fuel and water
5. Bags and Crates

Finished Goods

The finished goods in poultry are major two products namely eggs and no of birds or chickens. Since no of birds are selling products it is regarded as the finished products it is perishable product.

3.2 Research Purpose

This research purpose of this study can be classified as: exploratory, conclusive and performance monitoring research. It is the stage of decision-making process the actual research area is currently in which determines what type of research is required (Kinnear & Taylor, 1996).

3.2.1 Exploratory Study

An exploratory research is of use when then project is in its early stages. It is a preliminary investigation of a situation to recognize and defining a problem. Giving an overview and being sensitive in order to detect information to completely describe the problem characterize the design. This includes secondary data, observations, and interviews with experts, group interviews with knowledgeable persons and case histories (ibid).

3.2.2 Conclusion Study

The information obtained form a conclusive research is used to evaluate and select a course of action. Compared to the exploratory approach which focus on how to define a problem and how identifying the courses of action. To conduct a conclusive study you must have a clearly defined problem to start with. Appropriate research methods include: surveys, experiments, observation and simulation (ibid).

3.2.3 Performance-Monitoring Study

The performance-monitoring research is concentrated around implementation and control. When a specific action had been taken a performance-monitoring research us used to make sure that the program work accordingly to the plans. Traditional measure

of performance parameters such as: sales share of market; profit and return in investment are of common use (ibid).

3.2.4 Chosen Study

In order to answer the research purpose, it is evaluated the present determining factors of inventory levels in poultry business. It was observed and analyzed the data to draw conclusions. The study can therefore be described as a conclusive study. The authors also choose this approach because of the aim to identify and select courses of action.

3.3 Research Approach

The two research approaches, the qualitative and the quantitative, have several differences (Saunders et al., 2000).

3.3.1 Qualitative Approach

A qualitative approach means that you use words to describe and explain the reality. It is an approach that claims that you should examine a world by examining how the inhabitants look at this world. In this type of research theory should be result form the study and not a condition for it. Criticism that is directed towards the qualitative approach is that the researchers view and opinion will affect the result form the collected data and you will not get an objective view but a subjective. It is almost impossible for a researcher not to affect the people that he is interviewing, which mean that two different researchers might get two different results form interviewing the same person (Bryman & Bell, 2003).

3.3.2 Quantitative Approach

In a quantitative approach the researcher plays the role of an objective analyst that is not influenced by the object of the research (Saunders et al., 2000). The quantitative approach represents the structured way of approaching the research subject. This leads to standardized interviews from where it is easy to generalize the results (Holme & Solvang, 1991). A weakness with this method is that the author must be able to concertise his or her presentation of problem and transform them into the right questions (ibid)

3.3.3 Chosen Approach

The conclusion and the result of the thesis are preferably made on hard data i.e. determinants of level of inventory (Sales, interest rates and size of revolving fund). This represents that the study is quantitative in nature. In another part the study is a based on qualitative techniques. Thus the study adopted both qualitative and quantitative approach.

3.4 Research Principle

There are two main contradicting research strategies in scientific work: these are reflected to the use of theory. These two methods are called deductive and inductive. Backman (1998) defines the inductive method as approaches that strongly interact with empirical studies from which research questions and hypothesizes are formulated. The deductive is based on theory and the test the theory in reality. The quantitative research approach is predominately inductive and hypothesis generating. This study has used inductive approach to answer to the research questions.

3.5 Research Strategy or Design

A research has to do with its fundamental technical design. The direction is decided by what types of conclusions are to be made by the study. There are mainly four different strategies: experiment, survey, action and case study research (Lekvall & Wahlbin, 2001)

The experiment research is advantageous to control over parameters that might affect the study is gained and the possibility to re run your test is an opinion (ibid).

The surveys are typical for examinations aimed to an exploratory level.

People who usually recognize problem or limitation in their workplace situation and develop a plan to counteract the problem **action research**.

Case studies are preferred when the researcher want detailed and through information and analyses in individual cases. The case study is also considered to give you the possibility to discover conditions that at first didn't come to mind – the possibility to be surprised.

This research work is some more in new topic and it is also related to the whole poultry business in Nepal. The research design used in this research work is combined of survey and case study. It is basically descriptive type of research.

3.6 Nature and Sources of Data

The reliability of the study depends on the nature of the data. So, every research work should have reliable data for its study. This study is done for the agro business. So, it had collected data for primary as well as secondary sources but he gave his careful attention for collecting data for both sources.

The nature of data for this research work is primarily secondary type. The data on inventory balance and sales figures relating to poultry firms have been collected from the managers and accountants of the selected firms and other required data from following sources.

1. Sources of Secondary Data

-) Nepal Rastra Bank
-) District Agriculture Office
-) District Hatuary Organization, Chitwan
-) Organization of District Poultry Firms, Chitwan
-) The listed firms.
-) Statistic Bureau of Nepal
-) The concerned Poultry Firms

2. Sources of Primary Data

-) The listed firms.
-) The managers or employees of the firms.
-) Other eyewitness who directly related to keep or manage inventory.
-) Financial institutions that provide loans to the firms.

3.7 Reasons for Selecting Poultry Business.

As a beautiful and agricultural country, the economic development of the nation directly depends on the development of agricultural development. For developing the agricultural sector the first thing is to develop the agriculture sector as business vision. The one of the major components of the agriculture sector is livestock. It has become an important economical component of the Nepalese agriculture. The share of Nepalese livestock to the national AGDP is around 31 per cent. The poultry farming is

one of the traditional businesses of some Nepalese. It is also a remarkable business sector in agriculture sector. Around 50 per cent of the livestock poultry farming covers AGDP. Chitwan is a major city for poultry farming. Along to that Parsa, Kavre, Dhading, and Nawalparasi are the other major cities for poultry farming. These cities have fulfilled more the 80 per cent of the total national demand.

This is a crucial job for every manager to manage the working capital. Inventory is one of the most important parts of the current assets. So to manage the working capital the importance aspect is to manage inventory management. Inventory management is directly related to the profitability of the firms.

For developing the agricultural business (i.e. the poultry firms) form managing the inventory is the core objective of this study. That is why the author selects the poultry business for his study.

3.8 Populations and Sample Size

We have already mentioned that Nepal is one of the most developing agricultural country and the economic development of Nepal is depend on the development of agricultural sector. Economic development of Nepal is directly depends on the development of business vision on agricultural sector. Livestock is one of the major sectors of agribusiness in Nepal. Poultry business is one of them as Livestock business. For instance support of economic development of Nepal poultry business is a major sector. Chitwan, Nawalpasi and Dhading are the districts where more then eighty per cent of the total poultry houses are established. So the all the poultry houses that have more then 1 corer transaction per year are the total population of this study.

The sample is chosen using judgments method it means the sample is chosen as the interest of researcher. The collected data of this study is presented as:

S.No.	Name of the Poultry	n	60/61	61/62	62/63	63/64	64/65
1.	Anna Purna Poultry	5					
2.	Dallakoti Poultry	5					
3.	Abhinas Haturay	5					
4.	Trishul Poultry	5					
5.	Khanal Poultry House	5					
	Total	25					

Thus these five poultry business houses are selected for the study and seem to have represented the poultry sector as a whole.

Addition to that the researcher has also collect primary data from different persons related to the poultry business directly or indirectly.

3.9 Econometric Model Specification

This study basically related to find out the determinants of the level of inventory in the poultry business in Nepal. Theoretical explanation of the model is that inventory level is the function of sales, short term interest rate, size of revolving fund i.e.

$$INV_t = F(DX_t, RS_t, SRF_t) \dots \dots \dots 3.1$$

Where,

INV_t = level of inventory for the year t

DX_t = Expected level of sales for the year t

RS_t = Rate of Interest for short term loan for the year t

SRF_t = Size of revolving fund for the year t

$$INV_t = a + b_1(DX_t) + b_2(RS_t) + b_3(SRF_t) + U_t \dots \dots \dots 3.2$$

Where, U_t = error term

And $b_1, b_3, b_4 > 0$ and $b_2 < 0$ which means that the relationship of inventory on aggregate sales, size of revolving fund and price inflation is assumed to be positive and the interest rate is assumed to be negative.

The main econometrical model is but generally the theoretical statement of the model in this study is that the inventory balance held by firms is influenced by the turnover of the firms and interest rate of short term loan in other words how much inventory is to held would depend on sales and interest rate.

As the first approximation to the theory the function may be written as

$$Y = F(S,I) \dots \dots \dots (3.3)$$

Where,

Y is the real desired level of inventories, S is the real desired level of sales and I is the interest rate on short term loan.

In an empirical investigation, equation 3.3 takes the following from:

$$Y = b_0 + Sb_1 + Ib_2 + U_t \dots \dots \dots (3.4)$$

Where, U_t is the error term, surrogate for all the omitted variables that affect explained variable, here Y, but are not included in the regression model, which is assumed to be independently and normally distributed. Taking natural logarithm of this expression and assuming desired level of inventory (Y) is equal to its actual average level (Y) ($Y_t = [a_{t-1} + a_t]/2$)

$$Y^* = K_s^{b_1} SRF^{b_2} e^u$$

Taking natural log both sides

$$\ln Y = b_0 + b_1 \ln s + b_2 \ln SRF + U_t \dots \dots \dots 3.5$$

Where, b_0 is constant, b_1 and b_2 are elasticities of Y with respects to sales S and size of revolving fund of the models.

In this study following equations have been estimated.

$$Y_t = b_0 + b_1 S_{t+1} \dots \dots \dots 3.6$$

$$Y_t = b_0 + b_1 I_t \dots \dots \dots 3.7$$

$$Y_t = b_0 + b_1 \text{SRF}_t \dots \dots \dots 3.8$$

$$Y_t = b_0 + b_1 S_{t+1} + b_2 I_t \dots \dots \dots 3.9$$

$$Y_t = b_0 + b_1 S_{t+1} + b_2 \text{SRF}_t \dots \dots \dots 3.10$$

$$Y_t = b_0 + b_1 I_t + b_2 \text{SRF}_t \dots \dots \dots 3.11$$

$$Y_t = b_0 + b_1 S_{t+1} + b_2 I_t + b_3 \text{SRF}_t \dots \dots \dots 3.12$$

Where,

Y_t = Level of Inventory

S_t = Expected Level of Sales for the year t

S_{t+1} = Estimated annual sales for the next year

I_t = Interest Rate of Short Term Loan

SRF_t = Size of Revolving Fund

3.10 Statistical Test Used

T-test

To test the validity of the assumption about regression coefficient t-test is used. The calculate t values have been compared with tabulated t values at a certain level of significance, say 1 per cent, for given degree of freedom. If the calculated values t exceeds the table value, it is inferred that the difference is significant at 1 per cent level of significant t is less then the concerned table value of t, the difference in treated as significant.

F-test

The difference between two sample means can be studied from t- test. F-test is the technique of analysis of variance enables as to test for the significance of the difference between more than two sample means. This technique is used for whether the regression equation, as a whole provides statistically significant result or not. F-value has been calculated with the help of computer. The computed f ratio is higher than that of the tabulated, null hypothesis is rejected i.e. regression results provide statistically significant results. If computed t ratio is lower; the result is treated as insignificant.

Coefficient of (Multiple) Determination (R^2)

Coefficient of determination is a measure of the degree of linear association or correlation between two variables one of which happens to be independent and other(s) being dependent variable(s) in other words R^2 measures the percentage of total variation in dependent variable explained by independent variable(s). The higher the value of R^2 , the better the fit.

Chapter Four

Analysis and Presentation of Data

This chapter is the main body of the research. This topics describe the analysis and diagnosis of the collected data and to provide the suggestion and recommendation for the improvement of inventory management of the Nepalese poultry business on the basis of collected data.

In this chapter present and analyze of data as collected mostly form the Nepalese Poultry Houses. At first descriptive statistics are presented and consequently model will be specified.

4.1 Descriptive Statistics

This research study is based of the combined strategy of descriptive and case study research design.. The descriptive statistics of selected model sample regarding seleted variable has been presented in this chapter table number 4.1 to 4.5.

Table No. 4.1

Descriptive Statistics of Anna Purna Poultry

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sales	5	46818500.00	2851500.00	49670000.00	33128300.0000	18580856.77384
Inventory	5	2916750.00	8100250.00	11017000.00	9349250.0000	1197684.66739
Size of Revolving fund	5	25850000.00	37466000.00	63316000.00	49946200.0000	11980187.19386
Interest	5	2.00	11.00	13.00	11.8000	.83666

Table No. 4.2
Descriptive Statistics of Khanal Poultry

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sales	5	20988300.00	2011700.00	23000000.00	16958340.0000	8468070.31017
Inventory	5	363500.00	1200500.00	1564000.00	1401900.0000	150667.84660
Size of Revolving Fund	5	3600000.00	6000000.00	9600000.00	8032800.0000	1391466.56446
Interest	5	2.00	11.00	13.00	11.8000	.83666

Table No. 4.3
Descriptive Statistics of Trishul Poultry

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sales	5	6200000.00	11800000.00	18000000.00	14285600.0000	2747405.46
Inventory	5	1302500.00	2200000.00	3502500.00	2888900.0000	573217.716
Size of Revolving Fund	5	4000000.00	8000000.00	12000000.00	10218000.0000	1520730.08782
Interest	5	2.00	11.00	13.00	11.8000	.83666

Table No. 4.4
Descriptive Statistics of Dallakoti Poultry

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sales	5	6595000.00	23722000.00	30317000.00	26966000.0000	2509689.82147
Inventory	5	3108595.00	1500000.00	4608595.00	2886419.0000	1264402.22103
Size of Revolving Fund	5	700000.00	1100000.00	1800000.00	1447600.0000	332609.07985
Interest	5	2.00	11.00	13.00	11.8000	.83666

Table No. 4.5
Descriptive Statistics of Abhinas Poultry

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sales	5	3528000.00	48072000.00	51600000.00	50159750.0000	1315879.24503
Inventory	5	3708000.00	7200000.00	10908000.00	8821600.0000	1360269.38509
Size of Revolving Fund	5	6920000.00	5080000.00	12000000.00	8234000.0000	2571027.03214
Interest	5	2.00	11.00	13.00	11.8000	.83666

4.1 Correlation Analysis

Correlation analysis of the collected variables is presented as follows:

Table No. 4.6
Correlations between the Variables Sales, Inventory, Size of Revolving Fund and Its Interest Rate

		sales	inv	srf	I
*	sales Pearson Correlation	1	.823	.145	-.035
	inv Pearson Correlation	.823	1	.446	-.058
	srf Pearson Correlation	.145	.446	1	.052
	I Pearson Correlation	-.035	-.058	.052	1
	N	25	25	25	25

Here,

Sales = Sales

Inv = inventory of the firm

Srf = size of revolving fund

I = interest rate on revolving fund or short term loan

From the above table we concluded that the relation of Sales is positive with inventory, size of revolving fund and interest rate. According to this correlation analysis the third hypothesis reject in 0.01 degree of significance.

4.3 Model Presentation

The regression results of the variables inventories, sales, size of revolving fund and the interest rate of the short term loan is presented as follows.

Regression of Annual End Inventory Level and Sales for the Next Year i.e. the regression model $Y_t = b_0 + b_1s_{t+1}$4.1

$$Y_t = -1063251 + 0.204s_{t+1}$$

(0.249) (0.000)

$$F = 57.032 \quad R^2 = 0.713 \quad D/W = 1.864 \\ (0.000)$$

Notes: the result is significant at 10% level of significance.

This regression model is fit in the 100 percent confidence level because the F value of the equation is 57.032 in 0.000 significance.

The regression equation 4.1 based on 25 pooled observations for the poultry houses of Nepal. The coefficient b_1 is 0.204 in 100 percent significance level which indicates that the one rupee increase in sales leads to increase 0.204 paisa inventories.

The value of R^2 indicates that the inventory is determined 71.3 percent by the sales and other determined by other variables. This thesis is new for the poultry business whether it is supported by the finding of Akhtar and Irvine and contradicts unitary or more than unitary sales elasticities noticed in some of the equation of Liberman.

The D|W test is shown 1.864 so it is assumed as the non auto regression and no need of further improvement for modified regression analysis.

Regression of Annual End Inventory Level and Interest i.e. the regression model

$$Y_t = b_0 + b_1i \dots \dots \dots 4.2$$

$$Y_t = -1565125 + 562266i \\ (.0891) \quad (0.562)$$

$$F = 34.7 \quad R^2 = 0.713 \quad D/W = 2.08 \\ (0.562)$$

Notes: the result is significant at 10% level of significance.

In 92.9 percent confidence level the model is significant in F value of the equation is 34.7 in 0.0891 significance.

In the observations of 25 pooled data form different poultry houses. The coefficient b_1 is 562266 in 43.8 percent significance level which indicates that one percent increase in interest leads to increase Rs. 562266.00 inventories.

The value of R^2 indicates that the inventory determined 1.5 percent by the interest and other determined by other variables.

The value of D|W test is shown 2.08 so it is that the non auto regression and no need of further improvement.

This result reject hypothesis. We conclude that it is insignificance or there is no any relation between interest rate and inventory level.

Regression of Annual End Inventory Level and Size of Revolving Fund i.e. the regression model $Y_t = b_0 + b_1SRF_t$4.3

$$Y_t = -3385043.3 + 0.108SRF_t$$

(.0.000) (0.003)

$$F = 10.969 \quad R^2 = 0.323 \quad D/W = 2.41$$

(0.003)

Notes: the result is significant at 10% level of significance.

The model is fit in the 99.7 percent confidence level where the value F equation is 10.969 in 0.003 significance level.

On the based on 25 pooled observations for the different poultry houses. The coefficient b_1 is 0.108 in 99.7 percent significance level which indicates that the one rupee increase in SRF leads to increase 0.108 paisa inventories.

The value of R^2 indicates that the inventory determined 32.3 percent by the size of revolving fund and other determined by other variables.

The value of D|W test is shown 2.41 so it is assumed that non auto regression and no need of further improvement.

The result of this model accepted the hypothesis. Our developed hypothesis is Revolving fund positively affects the inventory, this result also shows that positive relationship in 99.7 percent confidence level or significance. So, we conclude that it is significance or there is positive relation between size of revolving fund and inventory level in poultry business.

Regression of Annual End Inventory Level, Expected Sales For the next year and Interest rate i.e. the regression model $Y_t = b_0 + b_1 S_{t+1} + b_2 I_t$4.4

$$Y_t = -5515990 + .0235 S_{t+1} + 379738.50 I_t$$

(.0.382) (0.000) (0.474)

$$F = 28.199 \quad R^2 = 0.694 \quad D/W = 1.94$$

(0.000)

Notes: the result is significant at 10% level of significance.

The model is fit in the 100 percent confidence level where the F value of the equation is 28.199 in 0.000 significance.

The value of D|W test is 1.94 so it concludes that the model is non auto regression.

The regression equation 4.4 based on 25 pooled observations for the different poultry houses of Nepal. The coefficient b_1 is 0.0235 in 100 percent significance level which indicates that the one rupee increase in sales leads to increase 0.0235 paisa inventories and one percent change in interest rate increase Rs. 379738.50 inventory value in 63.6 percent confidence level. It concludes that interest rate and inventory level has no perfect relation.

The value of R^2 indicates that the inventory of the poultry houses of Nepal determined 69.4 percent by the variables sales and interest rate of revolving fund and other remaining 30.6 percent determined by other variables.

The result of this model partially accepts the hypothesis. Our developed hypothesis was the sales positively affect the inventory, this result also proves the positive relationship between sales and inventory in 100 percent confidence level and the research hypothesis rejected in the case of variable interest. It is not significance or there is no relation between interest rate of short term loan rate and inventory level in poultry business.

Regression of Annual End Inventory Level, Expected Sales For the next year and size of revolving fund i.e. the regression model $Y_t = b_0 + b_1S_{t+1} + b_2 SRF_t$4.5

$$Y_t = -1284338 + 0.178S_{t+1} + 0.064 SRF_t$$

(0.098) (0.000) (0.002)

F = 47.856 Adjusted $R^2 = 0.796$ D/W = 1.685
(0.000)

Notes: the result is significant at 10% level of significance.

The value of D|W test is shown 1.685 so, the model is non auto regression.

It indicates that the inventory determined 79.6 percent by the variables sales and size of revolving fund and other remaining 20.4 percent determined by other variables so that the value of R^2 is 79.6 percent.

The model is fit in the 100 percent confidence level where value of F of the equation is 47.856 in 0.000 significance.

On the based on 25 pooled observations for the different poultry business it shows that the coefficient b_1 is 0.178 in 100 percent significance level which indicates that the one rupee increase in sales leads to increase 0.178 paisa inventories and one rupee increase in revolving fund increase Rs. 0.064 inventory value in 99.8 percent confidence level.

The result of this model accepts our research hypothesis. We develop that the sales and size of short term loan or revolving fund positively affect the inventory level. This result shows the positive relationship between sales and inventory in 100 percent confidence level and inventory level and size of revolving fund also has positive relation at low confidence level.

Regression of Annual End Inventory Level, Interest Rate and Size of Revolving Fund i.e. the regression model $Y_t = b_0 + b_1 I_t + b_2 SRF_t$4.6

$$Y_t = -7609724 + 925094.3 I_t + 0.113 SRF_t$$

(0.429) (0.255) (0.002)

F = 6.253 Adjusted $R^2 = 0.304$ D/W = 1.87
(0.000)

Notes: the result is significant at 10% level of significance.

The F value of the model is 6.253 in 0.000 significance level. Thus the regression model is fit in the 100 percent confidence level.

The regression equation of 4.6 based on 25 pooled observations for the different poultry houses of Nepal. The coefficient b_1 is 0.925094.3 in 74.5 percent significance level which indicates that one percent increase in interest rate leads to increase Rs. 925094.3 inventories and one rupee increase in revolving fund increase Rs. 0.113 inventory value in 99.8 percent confidence level. The research hypothesis accepted in the case of size of revolving fund and rejected in the case of interest rate.

The value of R^2 indicates that the inventory determined 30.4percent by the variables sales and size of revolving fund and other remaining 69.6 percent determined by other variables.

The value of D|W test is shown 1.187. It is non auto regression. It doesn't need of further improvement.

The result of this model partially accepts the hypothesis. We developed that the interest has negative affect to the inventory level and size of short term loan or revolving fund positively affect the inventory level. This result shows the positive relationship between interest rate and inventory in 74.5 percent confidence level so it rejects the hypothesis. Inventory level and size of revolving fund has positive relation at 99.8 percent confidence level.

Regression of Annual End Inventory Level, Expected Sales For the Next Year, Interest Rate and Size of Revolving Fund i.e. the regression model

$$Y_t = b_0 + b_1 S_{t+1} + b_2 I_t + SRF_t \dots \dots \dots 4.7$$

$$Y_t = -8594365 + .175 S_{t+1} + 622168.36 I_t + 0.068 SRF_t$$

(0.0.099) (0.000) (0.153) (0.001)

$$F = 34.377 \text{ Adjusted } R^2 = 0.807 \text{ D/W} = 1.727$$

(0.000)

Notes: the result is significant at 10% level of significance.

The F value of the equation is 6.253 in 0.000 significance level. So the model is fit in the 100 percent confidence level

On the based on 25 pooled observations for the different poultry business the result shows the coefficient b_1 is 0.175 in 100 percent significance level which indicates that the one rupee increase sales increase 0.175 paisa in inventory. It is statistically significant result which accept the hypothesis. The coefficient b_2 is 622168.36 which is theoretically incorrect sign and also insignificant result. The coefficient b_3 is 0.068 which is theoretically correct sign and significant at 99.99 percent level. It concludes one rupee increase in revolving fund increase Re. 0.068 inventory value.

The value of R^2 indicates that the inventory level determined 80.7 percent by the variables sales, interest rate and size of revolving fund and other remaining 19.3 percent determined by other variables.

The value of D|W test is shown 1.727 it is assumed that non auto regression and no need of further improvement.

The result of this model partially accepts the hypothesis. We developed that the sales has positive liner relationship with inventory level, interest has negative affect to the inventory level and size of short term loan or revolving fund positively affect the inventory level. This result shows the positive relationship between sales and inventory level, positive relationship with interest rate and inventory and also positive relation between size of revolving fund and inventory level. The coefficient b_2 represents the inventory level and interest rate has insignificant result.

4.4 Logarithmic Model

The partial adjustment models have been widely used in studies on the demand for inventories. Goodwin, Borrows, Maccine, and Rossana and Irvine observed rapid adjustment while Lovell and Grossman observed slow speed of adjustment of actual inventory levels to the desired level of inventory levels. These models assume that each company, finding its actual inventory not equal to its desired level of inventory within any period attempts only desired level and actual level of inventories in Nepalese companies. The pooled estimated of the partial adjustment model as follows:

Regression of Annual End Inventory Level, Expected Sales for the Next Year and Size of Revolving Fund i.e. the regression model

$$\text{Ln}Y_t = b_0 + b_1\text{Ln}S_{t+1} + b_2\text{Ln} \text{SRF}_t \dots \dots \dots 4.8$$

$$Y_t = -1.049 + .629\text{Ln}S_{t+1} + 0.277\text{Ln} \text{SRF}_t$$

(0.707) (0.000) (.005)

$$F = 17.735 \text{ Adjusted } R^2 = 0.582 \text{ D/W} = 1.920$$

(0.000)

Notes: the result is significant at 10% level of significance.

The regression model results the coefficient b_1 is 0.629 which is significant. The coefficient b_2 is 0.277 which is theoretically correct sign and statistically significant. This regression model is fit in the 100 percent confidence level that F value of the equation is 17.735 in 0.000 significance level.

The regression equation 4.14 based on 25 pooled observations for the different poultry houses of Nepal. The coefficient b_1 is 0.629 in 100 percent significance level which indicates that the one rupee increase in sales results increase 0.629 paisa in inventory. It is statistically significant result which accept the hypothesis. The coefficient b_2 is 0.277 it concludes one rupee increase in revolving fund increase Re. 0.277 inventory value.

The value of R^2 indicates that the inventory level determined 58.2 percent by the variables sales and size of revolving fund and other remaining determined by other variables.

The value of D|W test is shown 1.920. The model is non auto regression and no need of further improvement.

The result of this model accepts the hypothesis. Our developed hypothesis the sales has positive liner relationship with inventory level, and size of short term loan or revolving fund positively affect the inventory level. This result concludes the positive relationship between sales and inventory level and positive relation between size of revolving fund and inventory level. So, it is theoretically and statistically significant in result.

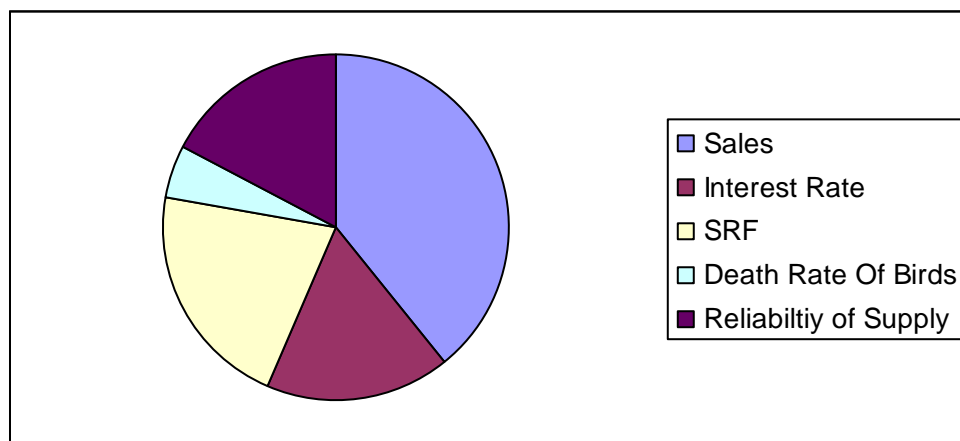
4.5 Presentation of Primary Response

It had been collected primary data from different professionals for research purpose. We are used respondents from different field i.e. academics, students, veterinary doctors, business mans and other participants.

Presentation of Data of Giving Emphasis for Determinants of Level of Inventory by respondents.

Respondents Giving Emphasis for Determinants of Level of Inventory

Pie Chart No.4.1



The respondents believe that of level of inventory is determined by sales (40%), Size of Revolving Fund (21%), Interest Rate (17%), Reliability of Supply (17%) and Death Rate of Birds (5%) respectively.

Cent percent respondents believe that there are consequences on the inventory level when sales increase and decrease. Inventory level and expected sales has positive relation. When sales increase inventory level also increase and when sales decrease inventory level also decrease.

Cent percent respondents believe that there are consequences on the inventory level and interest rate on short term loan. They believe when interest rate increase, inventory level decrease and when interest rate decrease inventory level increase. But statistical explanation doesn't prove this. It shows there is no relation between inventory level and interest rate.

Cent percent respondents believe that there are positive relations between size of short term loan and inventory level. When size increase inventory level also increase and when decrease inventory level also decrease or it both goes in same direction.

Cent percent respondents suggest using the EOQ model on purchasing inventory but in the reality we found no poultry houses use EOQ model in purchasing inventory.

During the interpretation of the data it was found that there were mainly three ordering costs namely transportation cost, administrative cost and normal or abnormal wastage on the way or transit and the carrying costs are opportunity cost or interest cost, rent of ware houses, insurance cost and normal or abnormal cost on the warehouses.

And it also concludes that the all the poultry houses used to using average method in issuing the inventory rather than LIFO and FIFO method.

Chapter Five

Conclusion and Recommendations

The main objectives of this study is to examine the existing position of the determinants of level of inventories in the Nepalese poultry business on the basis of the analysis and diagnosis of the collected data and to provide the suggestion and recommendation for the improvement of inventory management of the Nepalese poultry business. After interpretation and analysis of the data the researcher comes to following conclusions.

5.1 Summary and Conclusion

The objectives of the study were:

-) To determine whether the level of sales or transaction affects the level of inventory or not.
-) To determine whether the opportunity cost (i.e. interest rates) significantly affect the level of inventory or not.
-) To determine the relationship between the level of inventory and size of revolving fund or short term loan of the firms.
-) To determine the structure, inventory system and utilization of inventory of the poultry firms.

For the purpose of the study, the necessary data on inventory and other related variables were collected form different five poultry houses for different five years. The data were collected are profit and loss account and balance sheet available by the

concerned poultry houses and Agricultural Development Bank's web site for interest rate.

Previous study for other manufacturing companies indicated the statistically significant effects of sales on inventories similar that this study also concludes that the level of inventory strongly determined by the level of expected sales. But it is concluded that the interest rate doesn't have any affect to determine the level of inventory because there is not significant result in the relation of the interest rate and inventory level.

The major findings are presented as follows:

- It is concluded that sales is a significant variable in determining level of inventory, i.e. the effect of sales on inventory is significant. Using the single linear equation 0.204 paisa increase in inventory level with one rupee increase in expected sales. So it concluded that sales are the major determinants of the level of inventory in poultry business in Nepal.
- The study showed the statistically insignificant effect of interest in determining inventory level of Nepalese poultry business. The result is found insignificant in all equations. So it is concluded that there is no relationship between the interest rate and inventory level.
- The study showed the statistically significant effect of size of revolving fund in inventory i.e. the effect of size of revolving fund on inventory is significant. In all equations the results are significant. So we concluded that there is positive relationship between inventory level and size of revolving fund i.e. increase or decrease in short term loan results changes is inventory level in same direction.
- It is concluded that no poultry houses have scientific inventory management. No poultry houses use EOQ model for purchasing materials. And no one has its

own inventory software for managing inventory. It is concluded that the inventory management in poultry houses are very poor. It is resulting less productivity.

5.2 Recommendations

The recommendations of the study are presented as follows:

- It is recommended that these types of studies should be conducted form time to time. This study may be the first study related to inventory in poultry business in Nepal. For improving and getting productivity managing inventory is more essential and this kind of study helps them to improve their inventory system which results increase productivity as well as profitability of the firm.
- Inventory is the part of working capital and working capital is the life blood of every business. To reach the goal every business houses keep optimum level of inventory. This study found that no Nepalese poultry houses use appropriate inventory managing system. To cope with this business world they should be familiar with effective inventory management.
- Determining inventory is not an easy task but it has vital role in success of the business. So every manger should be familiar with the major determinants of the level of inventory for their poultry houses.
- This is the age of scientific fiction. No business house achieves their goal without proper management of information technology. So it is recommended that the poultry houses should be familiar with the different computer model for managing inventory.

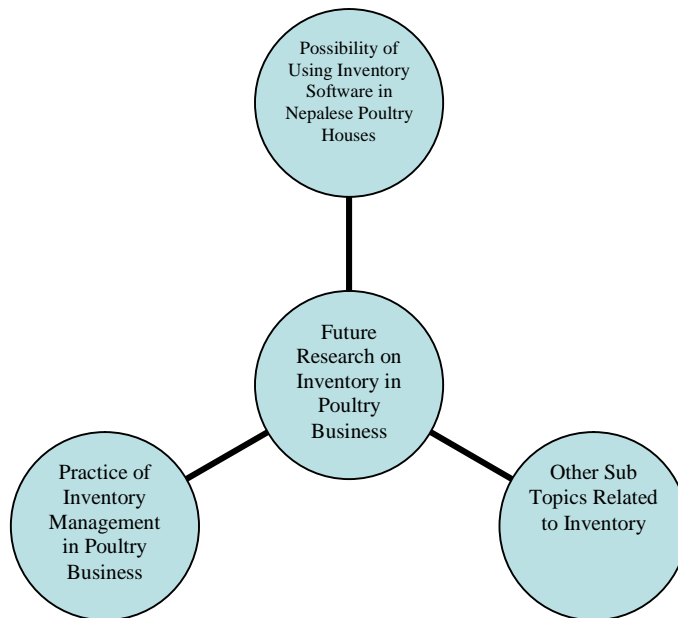
- It is showed that the inventory and sales has the direct relationship, the firms should analyze the future sales and to determine the level of inventory to be kept in the business.

5.3 Further Research

Every research has its own limitations. So this research has also many limitations. Time demands changes and improvements day by day. This research is not enough for these topics so for knowing more about the inventory of the poultry other research should be conducted. Possible areas of research related inventory has been presented in the following diagram.

Figure 5.1

Future Research on Inventory in Poultry Business



Bibliography

Books and Review Papers

Adam, Evertte E. and Ronald, Ebert J. (1993). *Production and Operation Management*. New Delhi: Prentice Hall of India Pvt. Ltd.

Agrawal, Dr Govind Ram (1981). *Inventory Cost Control. Management Day souvenir Production Management: Gandhi Bhawan, Ktm.*

Anthony R. I. “Inventory Management”, IVM Publication, 2008

Akhtar, M.A. “*Effects of Interest Rates and Inflation on Aggregate Inventory Investment In The United States*”. The American Economic Review, June, 1983

Ando, Albert et al, “*Lags In Fiscal and Monetary Policy*” In Stabilization Policies : Commission on Money and Credit, Englewood Cliffs, 1986

B. Martin and B Niklas (2006). *Diminishing of Inventory levels in VMI Relationship at Atlos Copco Tools Ab*, Lulea University of Technology

Blinder, Alan S., “*Inventories and Sticki Prices*” The American Economic Review, June. 1982

Buchan, Toesp and Evnest, Koenigrberg, “*Scientific Inventory Management*”, New Delhi: Prentice Hall of India Pvt. Ltd. 1997

Burrows, Poul, “*Explanatory and Fare Casting Models of Inventory Investment in Britain*”. Applied Econometrics, 1971

Chase, B. Richard and Aquvio, Nicholas J. (1973). *Production and Operation Management*. Georgetown Ontario: Irwin Dowsay Ltd.

Chaudhary, Dr. S.R. Roy (1999). *Accounting Theory and Management Accounting*. New Delhi: S. Chand and Sons Company.

Dangol, Ratna Man (2059). *Accounting For Financial Analysis and Planning*. Kathmandu: Taleju Prakashan.

Delmar, Donald (1989). *Operations and Industrial Management*. New Delhi Prentice Hall of India Pvt. Ltd.

Garrison, Ray H and Noreen Eric W (1991). *Managerial Accounting*. New Delhi: Mc Grew Hill.

Goel, B.S. (1992). *Production and Operation Management*. India: Vikas Publishing House.

Goyal, M.M. and S.N. (1993). *Principals of Management Accounting*. Agra: Shahity Bhawan

Grossman, Steven D. “ *A Test of Speed of Adjustment in Manufacturing Inventory Investment*”. The Quarterly Review of Economic and Business Autumn. 1973

Hampton, J.J. (1930). *Financial Decision Making*. New Delhi: Prentice Hall India Pvt. Ltd.

Henderson, G.V. and Tranne Pohl J.E. (1984). *An Introduction of Financial Management*. London: Wesley Publishing Company Mentoparic.

Heifer International Study on the Poultry Business in Philippines, 2006

Horngreen, Charles T. et. al. (2002). *Introduction to Financial Accounting*. Singapore: Pearson Education Inc.

Irvine, Owen F. Jr. “*Retail Inventory Investment and the Cost of Capital*” The American Economic Review, Sep. 1981

Jain, S.P. and Narang, K.L. (1994). *Advanced Accountancy*. New Delhi: Kalyani Publisher.

James, C. Van Home (1979). *Financial Management and Policy*. New Delhi: Prentice Hall of India Pvt. Ltd.

Joyce, Jon M “ *Cost of Capital and Inventory Investment: further Evidence.*” The Southern Economic Journal, Oct. 1973

Killeen, Lousis M. (1969). *Techniques of Inventory Management*. USA: American Management Association.

Kinnear and Taylor “Base of Research”

Kuchal, S.C. (1992). *Financial Management*, Ellhabad: Chitanya Publishing House.

Larson, K.D. etal (1997). *Financial Accounting Principles*. New Delhi: Mc Grew Hill Publishing Co.

Leon, Pijals “ World Poultry” Elsevier Volume 18 No. 5 2002

Liberman, Charles “ *Inventory Demand and Cost of Capital Effects.*” The Review of Economic and Statistics, Aug. 1980

Liu, T.C. “ *An Exploratory Quarterly Model of Effective Demand In the Post War US Economy.*” The Econometrical , July 1963

Liu, T.C. “ *An Recursive Econometric Model of US : A Test of Feasibility.*” *The Review of Econometrics and Statistics*, Feb 1969
Effective Demand In the Post War US Economy.” *The Econometrical* , July 1969

Lovell, M.C. “*Determinants of Inventory Behavior In Models of Income Behavior*” , Edward F. Dension and Lawrence R. Kelin, eds New York, 1964

Maccini, Lous J. and Rossana, Robert J. “*Investment in Finished Goods Inventries: An Analysis of Adjustment Speeds*”, *The American Economic Review Papers and Proceedings*, May 1981.

Magee, F. John (1985). *Production Planning and Inventory Control*. Tolyo: Mc Grew Hill.

McGouldrick,P. P. “*The Impact of Credit Cost and Availability on Inventory Investment.*”, In *Inventory Fluctuations and Economic Stabilization Part II* , Washington : Joint Economic Committee 87th Congress, First Session 1961

Morgan, James I “*Questions for Solving the Inventory Problem*” *Harvard Business Review: Inventory Policy*, 1972

Nair, N.K. (1994). *Publishing Material Management*. New Delhi: Publishing House Pvt. Ltd.

Puskar M. Bajracharya and Durgesh Kumar Shrestha (1988). *Production Management*. Nutan Printing Press.

Robinson , Newton Y “*The Acceleration Principle, Departmental Store Inventories*” *The American Economic Review* , June 1959

Sahajanha, S.K. and Datta, Subir (1997). *Theory and Practice of Cost Accounting*. New Delhi: S. Chand and Company.

Shafer, Scott M. and Meredith Jack R (1997). *Operations Management*. New Delhi: Mc Grow Hill.

Sharma, Narendra (1988). *A Textbook of Accountancy and Auditing*. Kathmandu: R.C. Timothy for Ekta Books.

Sharman, R.K. and Gupta, Shashi K. (1995). *Management Accounting Principles and Practice*. India: Kalyani Publisher.

Shrestha, Manohar Kumar (2037). *Financial Management: Theory and Practice*. Kathmandu: CDM. T.U.

Sttar, Martin K. and Devid, W. Miller (1977). *Inventory Control: Theory and Practics*. New Delhi: Prentice Hall of India Pvt. Ltd.

Terlckyj, Nestor E. “ *Measure of Inventory Conditions.*” In *Inventory Fluctuations and Economic Stabilizations Part II* Washington : Joint Economic Committee 87th Congress First Session 1961

Van Horn, James C. “ *Financial Management and Policy.*” Prentice Hall of India, New Delhi, 2000

Western, J. Fred and Eugene, F. Bringham (1981). *Managerial Finance*. Tokyo: The Dryden Press.

Dissertation, Thesis, Reports and Newspapers

- Agrawal, G.R. (1980). *Management in Nepal*. CEDA, T.U. Kathmandu.
- Bajracharya, Puskar (1983). *Management Problems in Manufacturing in Nepal*. CEDA, T.U., Kathmandu.
- Balika, R.K. (1996). *Inventory Management: A Case Study of Hetauda Cement Factory Limited*.
- Baral, Puspa Raj (1996). *Inventory Management: A Case Study of Gandaki Noodles Pvt. Ltd.* Dissertation, Faculty of Management, T.U.
- Bhattarai, K.K. (2002). *Inventory Management: A Case Study of Gorkhapatra Corporation*. An Unpublished Dissertation, Faculty of Management, T.U.
- CCC (2033). *Study Report of Bansbari Lather and Shoes Factory*. HMG/Nepal.
- CEDA (1974). *A Study on Agriculture Tools Factory Ltd.* T.U. Kirtipur.
- Khanal Pitamber (2005). *Inventory Management A Case Study of Gorkhapatra Corporation* , Unpublished dissertation TU
- Megee John (1990). *F-Gvides to Inventory policy-II*. Harward Business Reviews, USA.
- Pradhan M.L. (1981). *Management and Economics*, A Journal Published By Shankerdev Campus.
- Pokhrel Durba Raj, “*Inventory Management A Case Study of JCF*”, Unpublished dissertation TU

Rawal, Ram Bahadur Chhetri (1999). *Inventory Management: A Case Study of Agriculture Input Corporation with Special Reference to Chemical Fertilizer in Kathmandu Valley*. Dissertation, Faculty of Management, T.U.

Rijal, Saroj “ *Inventory Management: A Case Study of AIC.*” An Unpublished Dissertation , TU

Shreshta, K.N. (2000). *Inventory Management: A Case Study of Royal Drugs Limited*”. An Unpublished Master Degree Dissertation, Faculty of Management, T.U.

Yadav, Baidya Nath Prasad “ *Inventory Management: A Case Study of Bansbari Leather and Shoes Factory Ltd.*” An Unpublished Dissertation , TU, 2046 BS.

Yadav, Surendra Prasad “ *Inventory Management of Public Enterprises*” An Unpublished Dissertation , TU, 2046 BS.

Web Links

www.quickmba.com

www.adbnepal.com

www.tutor2.com

www.stochastic-inventroy.com

www.effectivemanagement.com/inventroy

www.spss.com

Appendix I
Questionnaires for the research work on the title
“Determinants of Level of Inventory in Nepalese Poultry Business”
For Business Houses

Name of the Poultry Firm (Optional):.....

Address (Optional):.....

1. What is your name (Optional)?

.....

2. What is your position of the firm?

- a) Manager b) Accountant c) Administrator d) Other

3. What are the inventories in your poultry?

A) Birds

B) Eggs

C) Electric Tools

D) Bags

E) Crates

F) Dana

G) Drugs

H)

I)

J)

K)

- c) Rastriya Banijya Bank
- d) Standered Chartered Bank
- e) Narayani Audhogik Bank Ltd.
- f) Sidhartha Bank Ltd.
- g) Lumbini Bank Ltd.
- h)
- i).....
- j).....

10. Do your firm use different inventory management techniques?

- a) Yes
- b) No

11. Do your firm use the EOQ in purchasing inventory?

- a) Yes
- b) No

12. What are the components of ordering costs of inventory order?

- a) Transportation Expenses
- b) Administrative Expenses
- c)

13. What are the components of holding costs of inventory holding?

- a) Interest
- b) Rent of Warehouse
- c) Insurance
- d)

14. Which method is use in your poultry firms?

- a) LIFO
- b) FIFO
- c) Average in inventory

15. Do you feel any uncomfortable in your poultry while managing inventory?

- a) No
- b) Yes, the uncomfortable is

16. Assign number form 1 to 10 accordingly to important of factor affecting inventory level.

- a) Level of Sales []
- b) Interest Rate []
- c) Size of Revolving fund (Short-term loan) []

Appendix II
Questionnaires for the research work on the title
“Determinants of Level of Inventory in Nepalese Poultry Business”
For Professionals

Name (Optional):

Institution (Optional):

Address (Optional):

1. What are the inventories in poultry business?

- A) Birds B) Eggs C) Electric Tools D) Bags E) Crates
 F) Dana G) Drugs H) I) J)

2. Assign number form 1 to 5 according to important of factor affecting inventory level in poultry business.

- a) Level of Sales []
 b) Interest Rate []
 c) Size of Revolving fund (Short-term loan) []
 d) Death Rate of Birds []
 e) Reliability of Supply []

3. Have you seen the consequences on the inventory level when sales increase (good times) and decrease (bad times) in poultry business?

- a) Yes b) No

4. Do you feel any effect to level of inventory by interest rate of short term loan or revolving fund? If yes what kind of affect it has?

- a) No b) Yes I) Positives ii) Negative

5. Do you feel any effect to level of inventory by size of short-term loan? If yes what kind of affect it has?

- a) Yes b) No I) Positives ii) Negative

6. Should the poultry firms use the EOQ in purchasing inventory?

- a) No b) Yes

7. What are the components of ordering costs of inventory order?

- a) Transportation Expenses b) Administrative Expenses c)

8. What are the components of holding costs of inventory holding?

- a) Interest b) Rent of Warehouse c) Insurance d).....

9. Which inventory method should be used in poultry firms?

- a) LIFO b) FIFO c) Average in inventory