CHAPTER I

INTRODUCTION

1.1 General Background of the Study

1.1.1 Introduction of Automobile Industries

The history of automobile industry began in the early 1769, with the inventor Nicolas J Cugnot who was French engineer who found out the first vehicle that run on roads. This automobile was steam powered, three-wheeled military tractor. This vehicle had a small range of distance covering capacity, which could run only for a maximum of 15 minutes. They also require a sufficient starting time, however they were not fit to run on roads due to bulk load of steam engines. Oliver Evans in the U.S. first designed the steam engine driven automobile.

Internal combustion engine based car powered by fuel gas came into existence in the year 1806. In 1838, Scotsman Robert Davidson invented the first electric locomotive that runs on an average speeded of 4 miles per hours. Lack of fuels discouraged the manufacture of combustion engine based automobiles. Then the internal based combustion engine, which used oxygen and hydrogen mixture, came into existence with the Swiss Engineer Francois Isaac De Rivaz. Later, automobile, which runs on hydrogen, came into existence in 1826. The first man to produce automobile was Karl Benz in Germany in the year 1888 under the license from Benz. However brothers Charles and Frank Duryea invented the Duryea Motor Wagon Company. By 1919 various national automobile industries emerged in countries like Belgium, German and Nagant exported to other countries like Tunisia, Egypt and Iran. Later after 1960, automobile industry seemed more integrated with high technologies, were Japan was a serious car production country. The major change after that was design of automobiles with safety means. More safety and security features came into existence after 1960. By

1964 the most famous Pony car was manufactured, which is known as Ford Mastang of the present era. More other cars were manufactured after that.

The automotive industry designs, develops, manufactures, markets, and sells the world's motors vehicles. In 2008, more than 70 million motor vehicles, including cars and commercial vehicles were produced worldwide.

In 2007, a total of 79.9 million of new automobiles were sold worldwide: 22.9 million in Europe, 21.4 million in Asia-Pacific, 19.4 million in USA and Canada, 4.4 million in Latin America, 2.4 million in the Middle East and 1.4 million in Africa. The markets in North America and Japan were stagnant, while those in South America and other parts of Asia grew strongly. Of the major markets, China, Russia, Brazil and India saw the most rapid growth.

About 250 million vehicles are in use in the United States. Around the world, there were about 806 million cars and light trucks on the road in 2007, they burn over 260 billion gallons of gasoline and diesel fuel yearly. The numbers are increasing rapidly, especially in China. In the opinion of some, urban transport systems based around the car have proved unsustainable, consuming excessive energy, affecting the health of populations, and delivering a declining level of service despite increasing investments. Many of these negative impacts fall disproportionately on those social groups who are also least likely to own and drive cars. The sustainable transport movement focuses on solutions to these problems.

In 2008, with rapidly rising oil prices, industries such as the automotive industry are experiencing a combination of pricing pressures from raw material costs and changes in consumer buying habis. The industry is also facing increasing external competition from the public transport sector, as consumers re-evaluate their private vehicle usage. Roughly half of the US's fifty-one light vehicle plants are projected to permanently close in the coming years, with the loss of another 200,000 jobs in the sector, on top of the 560,000 jobs lost this decade. China

became both the largest automobile producer and market in the world after experiencing massive growth in 2009.

Hulas Motors P. Ltd was established in the year 1996 it is a sister concern of Golcha Organization, one of the biggest organization in Nepal. The design of Sherpa, Mustang and Mini V is indigenous. The complete R&D is done by using national resources and local manpower. The organization have strategic alliance with their sister concern. Hulas Steel Industries who provides engineering and mechanical support while producing Nepal's first own vehicle they also support in with technical information for the laboratories and engineering software such as RISA 3 D & Auto CAD. At present more than 700 Sherpa and Mustnag vehicles are running on Nepalese road.

1.1.2   History of Automobile Industries

In the year 1769, a French engineer by the name of Nicolas J. Cugnot invented the first automobile to run on roads. This automobile, in fact, was a self-powered, three-wheeled, military tractor that made the use of a steam engine. The range of the automobile, however, was very brief and at the most, it could only run at a stretch for fifteen minutes. In addition, these automobiles were not fit for the roads as the steam engines made them very heavy and large, and required ample starting time. Oliver Evans was the first to design a steam engine driven automobile in the U.S.

A Scotsman, Robert Anderson, was the first to invent an electric carriage between 1832 and 1839. However, Thomas Davenport of the U.S.A. and Scotsman Robert Davidson were amongst the first to invent more applicable automobiles, making use of non-rechargeable electric batteries in 1842. Development of roads made travelling comfortable and as a result, the short ranged, electric battery driven automobiles were no more the best option for travelling over longer distances.

The Automobile Industry finally came of age with Henry Ford in 1914 for the bulk production of cars. This lead to the development of the industry and it first begun in the assembly lines of his car factory. The several methods adopted by Ford, made the new invention (that is, the car) popular amongst the rich as well as the masses.

According the History of Automobile Industry US, dominated the automobile markets around the globe with no notable competitors. However, after the end of the Second World War in 1945, the Automobile Industry of other technologically advanced nations such as Japan and certain European nations gained momentum and within a very short period, beginning in the early 1980s, the U.S Automobile Industry was flooded with foreign automobile companies, especially those of Japan and Germany.

The current trends of the Global Automobile Industry reveal that in the developed countries the Automobile Industries are stagnating as a result of the drooping car markets, whereas the Automobile Industry in the developing nations, such as, India and Brazil, have been consistently registering higher growth rates every passing year for their flourishing domestic automobile markets.
(Source: economywatch.com/world-industries/automobile/)

1.1.3 Current Automobile Scenario in Nepal

Presently, automobile market in Nepal is characterized by intense competition among Japanese, Korean, Indian, Malaysian and Chinese brands. Indian manufactured brand vehicles are more popular in Nepalese market because they are relatively cheaper than foreign manufactured brands. Moreover, cars imported from India come under Duty Refund Procedure (DRP), thus bringing down the prices. Beside Indians, Other brands include Chevrolets, KIA, Ford, Opel, Toyota, Honda, Hyundai, Mercedes, Lifan, Gelly, Nissan, Perodua, Daihastu,Chery, Jyote, Mitsubishi etc. are also popular brands in Nepal.

The car market in Nepal is in growing phase. Statistics published by Department of Transport Management shows that an average of 4000 units Car/Jeep/Van have been registered in Nepal over the past 5 years, with 5152 units and 4374 units registered in last 2 years.

The automobile industry contributes about 14 percent of direct revenue, including two-wheelers, spares and lubricants. Indirectly, it employs over 200,000 in the formal and informal sectors, drivers, mechanics, their helpers, people working for spares stores, etc.

Table No. – 1.1

Major Automobile Distributors in Nepal

S.N	Vehicle Company	Models Type	Distributors
1	Mahindra (India)	Pick-Up, PC, MUV, Tractor	Agni Incorporated Pvt. Ltd.
2	Tata	CV, PC, MUV	Sipradi Trading Pvt. Ltd.
3	Hyundai	PC, MUV	Avco International Pvt. Ltd. & Laxmi Intercontinental Pvt. Ltd.
4	Maruti Suzuki	PC	Arun Intercontinental Pvt. Ltd.
5	Daihastsu	Sirion, Terios	Hansa Raj Hulas Chand & Company Pvt. Ltd.
6	Mahindra Nissan	PC,	Dugar Brother & Sons Pvt. Ltd.
7	Kia Motors	Rio, PC	Karmacharya Intercontinental Pvt. Ltd.
8	Kia Motors	Picanto	Mally Brothers Pvt. Ltd.
9	Toyota Motors	PC, MUV	United Syndicates Pvt. Ltd.
10	Swaraj Mazda	Buses	Kedia International Pvt. Ltd.
11	Geely (China)	CK, MK (PC)	Sakha & Universal Automobile Pvt. Ltd.
12	Chery (China)	QQ (PC), Tiggo (MUV)	Bama Motors Pvt. Ltd.
13	Ashok Leyland	CV	Bhajuratna Trading Pvt. Ltd. Saurya Shree Trading Pvt. Ltd. & Infratech Pvt. Ltd.
14	Mitsubishi (Japan)	PC,MUV	Nakasu Motors Pvt. Ltd.
15	Mazda (Japan)	PC	Padma Shree Pvt. Ltd.
16	Eicher	Buses	Eastern Motors Pvt. Ltd.
17	Honda	PC	Syakar Company Ltd.
18	Eicher	Truck, Tipper	Cube International Pvt. Ltd.
19	Mahindra (India)	CV	Dugar Brother & Sons Pvt. Ltd.
20	Perodua	PC	Nemlink International Traders Pvt. Ltd. (Nepal)

(Source:-Self Collection)

1.2 Inventory Management

Inventory management is one of the most important tasks of any business enterprise. Almost all business companies have inventory in the form of raw material, work in progress and finished goods. Most of the trading companies invest 80% of their fund in inventory. Therefore proper management of inventory plays a vital role within the company for its better performance. Moreover industrial based manufacturing companies have to make mutual balance between the requirement and the resources to lead itself towards prosperity.

"The term inventory refers to the stockpile t the product a firm is offering for sale and the component that makes of the product"- (**Bosten,** 1975: 426)

"Inventory is composed of the assets that will be sold in future in the normal course of business operations."- (**Khan and Jain,** 1992: 325)

"Either excessive or inadequate inventories lead business organization towards loss because of large size of inventories maintained by firms, a considerable amounts of funds is required to be committed in them. It is therefore, absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary investment in them. An undertaking neglecting the management of inventories will be jeopardizing its long run profitability and may fall ultimately."- (**Pandey,** 1992: 755)

1.3 A Brief Profile of Agni Incorporated Pvt. Ltd.

Agni Incorporated Pvt. Ltd. started its business in 1991 with an Authorized distributorship of Mahindra & Mahindra brand of Multi Utility Vehicles & Tractors. Agni Incorporated Pvt. Ltd. is also an Authorized Distributor of Mahindra Renault Automobiles & Shell Maximile Lubricants. Agni has been successfully carrying the legacy of Mahindra and Mahindra in Nepal ever since its inception. The first year sale of 14 vehicles has now boomed into a full- fledged sales success story. It scores more than 10000 vehicles including both tractors and Multi-Utility vehicles till date with wide range of customer from Government Offices and Institutional Sales (INGO's, NGO's, Industries, Business Houses, Projects, Hospitals) to indispensable individuals. Today Agni is the leading Multi Utility Vehicles distributor in the country.

Mahindra Multi Utility Vehicles & Tractors has managed to carve a niche for itself in the automobile industry. Mahindra MUV vehicles which are known for their smooth performance and durability are the No. 1 utility vehicles seller in the country.

Agni has always focused on delivering its product at the right price with correct marketing strategy to our valued customer. Customer satisfaction is Agni Incorporated primary goal. Agni Incorporated has around 15 dealers and branches spread all over the country; to meet our customers needs for servicing and genuine spare parts. Agni commitments towards quality of its vehicles and services have helped it to establish as one of the well-known business house in the country.

Table No. - 1.2

Ranges of Product Offered by AIPL

Segment	Product
Pick-Up	Bolero Camper DC, Bolero Camper SC Bolero Maxi Pick-UP, Bolero Maxi Pick-Up FB Bolero Pick-UP (NEF), Scorpio Pick-Up
Cars	Logan
Jeeps	Bolero, Maxx, Maxx Ambulance Savari, Scorpio M2DI, Scorpio SLX, Xylo
Tractor	235 DI Airflow, 265 DI & 275 DI Bhoomiputra, 295 DI Turbo, 445 DI & 605 DI Ultra Arjun, 575 DI, 585 DI, 6030 DI 4DW

1.4   Statement of the Problem

Nepal is a small country with small market. Economic condition of the country is degrading due to conflict since 2052 B.S. Overall economic sectors either manufacturing or commercial sectors have undergone heavy losses. But in recent past the economic condition of the country has revived by some margin. Despite conflict situation, trading houses are increasing regularly.

In many firms, the management of inventory of physical goods is based on the intuitive determinations of the purchasing manager, who decides which item to buy when to buy them and what quantities to buy. When a company is small and the numbers of items to be stocked are few such informal procedures may work

well. However as a company grows and begins to required a wide variety of inventory items having different rates, system tend to create problems that can result higher costs and interruptions in production and supply of end items

Many enterprises can not achieve their pre established objective and goals because of mismanagement of the organization system within an organization and without will management of inventory an organization cannot get it goal. Almost all companies in Nepal seem to fail to practice the inventory management. Nepalese companies are unable to manage and control the inventories impact, the management does not forecast how much fund company should invest in the inventory. How much inventory to be stock, How to minimize the ordering quantity, how many times should be ordered. This study is concentrate to analysis of inventory management of AIPL.

In fact various news papers articles, journals and their annual performance report etc show lack of efficient inventory management. All these has raised the question whether those organization are able to manage inventory or not.

This research paper intends t explore the following research questions:

- ❖ What is effect of Inventory Management on organizational goal?
- ❖ What are the Major Turnover ratios
- ❖ What type of up to date steps is essential for applications and improvement of inventory management in Nepalese Trading Companies?
- ❖ Do AIPL Plan Inventory?
- ❖ Do AIPL Practice Inventory Management as an integral part of management process?

1.5 Objectives of the Study

This study attempts to draw a vital conclusion about Nepalese manufacturing companies regarding their management capability respect to inventory management. The main objective of this study is to study and examine the practice of inventory management in AIPL. However following are the specific objectives.

- ❖ To find out gap between theory and practice of inventory management in AIPL.
- ❖ To analyze the inventory management of AIPL using various tools and techniques
- ❖ To study and examine the present procurement procedure and stocking system of AIPL
- ❖ To find out the difficulties in application of inventory management in AIPL.
- ❖ To make recommendations to overcome the difficulties in inventory management in Nepalese trading companies.

1.6 Significance of the Study

Management is the backbone of any organization. Effective management minimizes weakness, maximizes strengths and leads the organization towards its goal. Many Nepalese business organizations today are running under traditional management system and they even fail to implement modern management strategies and plans. A company should maintain adequate stock of inventories to fulfil the production and supply because company's large amount of fund is being invested in inventories.

This study examines the inventory management practice in AIPL. It concern with AIPL'S effort towards inventory management. It explores problems and potentialities of trading house regarding management of inventory. Moreover, it

suggests for reasonable implementation of inventory management which helps top level management to make better and effective decisions. Furthermore, it will be more beneficial for various departments, business organizations, lenders, investors and policy makers. The study shows the roadmaps and guidelines for implementation of effective inventory management. It encourages the organization to apply these tools. It also provides literatures to the interested people in this field.

1.7   Limitation of the Study

This study is basically concerned with inventory management in AIPL. Thus following are the limitation of the study:

- ❖ This study focuses on automobile sector inventory management so it may not applicable for other companies as well as service companies.
- ❖ This study is concern with the practice of inventory management. It does not consider other aspects of the companies.
- ❖ The research is based on secondary data. Finding of the study basically rely upon the accuracy of such data.
- ❖ It's covered only 5 years data.

1.8   Organization of the Study

This thesis has been divided into five chapters, they are:-

Chapter 1- Introduction

This chapter covers background of the study, introducing of inventory management, statement of the problem, research objectives, significance of the study and limitations of the study etc.

Chapter 2- Review of Literature

This chapter focuses a review of related literatures. It contains the review of conceptual frame work and past research works

Chapter 3- Research Methodology

This chapter deals with adoption of methods applies in research such as research design, sources of data, data gathering procedure, population and sampling, research variables and data processing procedures etc.

Chapter 4- Data Presentation and Analysis

Fourth chapter concerns with presentation, analysis and interpretation of data. It deals with presentation of the available data ratio analysis and major tools for such analysis

Chapter 5- Summary, Conclusion and recommendations

Fifth chapter contains summary, conclusion and recommendations of the study. It provides recommendation.

Finally, at the end of the study Bibliography and Annex are presented.

CHAPTER-II
REVIEW OF LITERATURE

The review of literature is a crucial aspect of planning of the study. In this chapter, focus has been made on the conceptual framework and the review of literature of relevant to the Inventory Management of Trading Company. It is based on available literature in the field of research. For this purpose, it needs to review related literatures in this concerned area which help me to get clear ideas, opinions and other concepts. 'What other has said? What other has done? And what other have written?' these all and other related questions are reviewed which has provided useful inputs in this research work. Every possible effort has been made to grasp knowledge and information that is available from libraries, document collection center, other information managing bureaus, published –unpublished journals and reports of concerned company.

2.1   Conceptual Framework

The review of textbooks and other reference materials such as: newspapers, magazines, research articles, journals and past thesis have been included in this topic. Under the Inventory Management many subject matters are considered like the Inventory Management policy of the company, Ordering Process, proper distribution, audit of the stock management etc.

"Inventory means all the materials, parts, supplies, expenses tools and work-in-process or finished products recorded on the book by an organization and kept in its stocks warehouses or plant for some period of time." (**Goel**, 1985: 255)

"An inventory system is the set of policies and controls that monitor levels of inventory and determine what level should be maintained, when stock should be replenished and how large orders should be."(**American Institute of Certified Accountants**, 1961:43)

"Inventory is considered to be a separate business facility that is an aggregate stock of materials or products set apart physically from the other stage of the corporate workflow process in a stock room, warehouse, retail store, or supermarket or inventory might comprised of a file or library of information" (**Gorden, Chen and MC**, 1982:75)

"Inventory is composed of assets that will be sold in future in the normal course of operation. The assets which firms store as inventory in anticipation of need are raw materials, work–in-progress and finished goods."(**Khan and Jain**, 1992: 726)

"Inventory is an Idle resources which is useable and have value. The idle resources many be man, money, materials and plant requisitions." (**Kothari**, 1996: 322)

Every organization, either service or trading should maintain optimum size of inventories for the smooth operation and to meet the consumer demand. Under stock or over stock of inventory may cause increase of opportunity costs. Therefore, an organization has to implement scientific and convenient inventory control system to avoid the problem of stock-out and over stock of inventories.

2.2   Nature of Inventory

Inventory play vital role in operation of any organization. Proper management of inventory leads an organization towards its targeted goals. An organization invest large portion of its fund in inventory. Inventories are the current assets of any business organization. It is the stock of the products, raw materials, work in process goods and other spares that can be sold in future in normal course of business operations. Inventories are stocked in many forms according to their nature. Goods those play vital role in smooth production and operation of the organization are primary inventories whereas miscellaneous items are those needed to operate plants, machines and other ordinary workshops are known as secondary inventories.

Although, manufacturing companies hold four type inventories these are

i) Raw Material

ii) Work–in–process

iii) Final products

iv) Supplies, spares and stores

Trading house normally deals with the final products only. Normally they import/purchase final products from manufacturing companies and supply it to final consumer. In other words, they play role in distribution channel to bring the final product from manufacturing companies to ultimate consumer. In this process they have to invest a large portion of their funds in inventory. Trading companies supply the product to ultimate users in regular basis and it is not possible without holding of proper inventory.

2.3 Importance of Holding Inventory

To operate an organization smoothly, inventory management is very much essential. Inventory is backbone of any business organization specially for trading houses inventory management is for better and smooth operation of organizational activities.

The important of holding inventory to an organization is as follows:

i) To keep organization economically sounds.

ii) Enables smooth flow of goods and supplies in markets.

iii) Provide protection against the uncertainty of demand and supplies.

iv) Enables smooth flow of goods and services.

v) Prepare for the uncertain changes in internal and external environment.

vi) Enables proper utilization of available funs

2.4   Concept of Inventory Management

"The inventory management is assumed to be required to maintain an adequate supply of correct material at the lowest total cost. The responsibility of determining the material requirement implied by the marketing, forecast and the materials safely and in good condition for its subsequent issue and identifying surplus stock and taking action to reduce it."(**Muhlemann, Okland and Lockyer**, 1996:364)
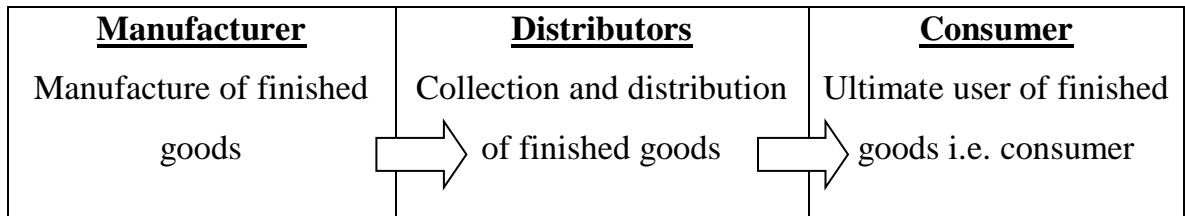
"Inventory management provides a cushion for future price fluctuations. About 90 percent part of working capital is invested in inventories and it is necessary for every management go give proper attention to inventory management. A proper planning of purchasing, handling, storing and accounting form a part of inventory management. An efficient inventory management will determine" (**Sharma and Gupta,** 2005:195)

"Inventory management, in particular, focuses on maintaining optimal level of raw materials required for the production of semi finished and finished goods. Holding inventories more than necessary is as much costly as the danger of under-stocking. Over-stocking is costly in terms of fixed and variable cost of carrying inventory, under-stocking frequently troubles the production flow and causes a loss of revenues and higher production and transportation costs."(**Pradhan**, 1996:179)

From the above definition it is clear that the inventory management involve planning of the optimal level of material. It also clear that control of relevant costs and convenient time table for procurement with economic order size, warehousing shipping and supply. It is staffed by trained and efficient employees and must be directed by the top level management. It involves both financial and physical dimensions and these dimensions are interrelated and can not be looked isolation.

Table No. -2.1

Channel of Distribution of Trading Company

Manufacturer	Distributors	Consumer
Manufacture of finished goods	Collection and distribution of finished goods	Ultimate user of finished goods i.e. consumer

2.5 Objectives of Inventory Management

Minimizing the inventory cost and run smooth production process for steady sales at competitive price is the main objective of inventory management. However some objectives of inventory management are presented below.

The objective of inventory management should be to avoid excessive and inadequate levels of inventories and maintain sufficient inventory for the smooth production and sales promotion. Effort should be made to place and order at the right time with right sources to acquire the right quantity at the right price and quality. Effective inventory management objectives can be summed up as follows- (**Pandey,** 1995: 902)

- ❖ Ensure a continuous supply of materials to facilitate uninterrupted production.
- ❖ Maintain sufficient stock of raw material in period of short supply and anticipated price changes.
- ❖ Maintain sufficient finished goods inventory for smooth sales operations and efficient customer services.
- ❖ Minimize the carrying cost and time.
- ❖ Control investment and keep it at an optimum level.

"The basic reasons for keeping inventory are that it is physically and practically impossible to meet the needs of customers whenever and wherever they are needed. In addition to this reason, other reasons for maintaining inventory are as follows" (**Regmi, Joshi, Chaudhary and Fago**, 2003:85)

- ❖ To maintain independence of operations.
- ❖ To meet variation in production demand.
- ❖ To allow flexibility in production schedule.
- ❖ To take advantages of economic purchase order.
- ❖ To provide a safeguard for variation in raw materials delivery and to increase return on investment.

The main objectives of inventory management can be listed as below (**Goel**, 1997:256)

- ❖ Production against fluctuation in demand
- ❖ Bette use of men, machine and materials
- ❖ Production against fluctuation in output
- ❖ For production economies
- ❖ Control of stock distribution

"The objective of inventory management consists of two counterbalancing" (**Khan and Jain**, 1992:727)

- ❖ To minimize the firm's investments in inventory
- ❖ To meet the demand for the product by efficient organization of the firm's production and sales operations.

"The various objectives of inventory management can be summarized up as follows" (**Man mohan and Goel**, 1997:669)

- ❖ Availability of all items of inventory
- ❖ No excessive investment in inventory
- ❖ Reasonable price

- ❖ Minimum wastage
- ❖ Avoidance of risk of spoilage
- ❖ Information about availability of stock.

The core objectives of inventory management are to enlarge profitability by minimizing the cost related with investment in inventory like most financial decision making. The inventory management problem involves a trade off between risk and return. Carrying large inventory reduces the risk of loss in sales and production delays, but income may decline because total costs related with holding inventory rise up. If the organization manages to minimize carrying cost, then the ordering cost definitely rise up because of high number of orders. This also affects in overall profitability of the firm. If there is not sufficient stock of inventory in the organization, then it may suffer from stock-out, high price, production deficiency and supply burden during the period of uncertainty. Therefore, the objective of inventory management is to find out the optimum level of investment in inventory which equals level of carrying and ordering cost. It reduces both holding and ordering cost and maximizes the total income.

2.6 Importance of Inventory Management

"The entire process of material control can be divided into three stages-purchase control, store control and issue control. Various essential relating to material control are given in brief as follows" (**Jain and Narang,** 1993:2.4)

- ❖ Material Planning
- ❖ Material Purchasing and receiving
- ❖ Material Storing
- ❖ Material issuing
- ❖ Material Accounting

"Inventory management is an important function of an organization covering various aspects of inputs process, i.e. it deals with raw materials, procurement of machines and other equipments necessary for the production process and spares parts of the maintenance of the plant. Thus in a production process inventory management can be considered as a preliminary to transportation process. It involves planning and programming for the procurement of material and capital goods of desired quality and satisfaction at reasonable price and at the required time. It is also concerned with market exploration for the items be purchased to have up to date information, storage, stock control and inspection of operation related to material and many other functions" (**Goel**, 1985:237)

"The importance of inventory management can be realized when it is said that purchase account for nearly 50 percent of an organization's annual expenditure, nearly 80 percent of the working capital is tied up in inventory and the carrying cost is almost 25 percent a year. That material represents 40 to 60 percent of the sales price or 60 percent to 80 percent of production cost of a product and that even a saving of 5 percent in material cost will substantially increase the profit margin of an enterprise." (**Nair**, 1994:3)

"Inventory management focuses on three basic questions" (**Weston & Brigham**, 1978:490)

- ❖ How many units of each inventory item should the firm hold in stock?
- ❖ How many unit of each inventory item should be ordered at a given time?
- ❖ At what point should inventory be ordered?

Inventory management is a scientific way of proper management of organization's inventory whether it is product oriented or service oriented. Inventory management helps an organization to better capacity utilization, smooth operation of sales process, steady supply system, broaden marketing strategy and generate high revenue.

2.7   Factor Affecting Inventory Management

Inventory management is a scientific way of planning and controlling of inventories, though, it is not avoidable from various obstacles. There are various factors affected in inventory management and control.

"Some important factors that influence inventory management are as follows" (**Gopalkrishna** , 1993: 23)

- ❖ State of health of nation economy
- ❖ Price trend and validity
- ❖ Direct and indirect taxes
- ❖ Foreign exchange regulation
- ❖ Import policies
- ❖ International market condition
- ❖ Business cycle
- ❖ Corporate objectives
- ❖ Technology available
- ❖ Demand for the items
- ❖ Transportation losses
- ❖ Total lead time
- ❖ Rejection rate
- ❖ Working capital
- ❖ Plant utilization
- ❖ Communication system
- ❖ Delegation of Power
- ❖ Information available
- ❖ Seasonal Factors
- ❖ Location of plant
- ❖ Availability of items
- ❖ Location of suppliers

- ❖ Information of substitute product
- ❖ Techniques to determine forecasts

'Factors influencing the choice of order quantity are as follows' (**Weston & Brigham**, 1978:49)

- ❖ Shortage of future supplies
- ❖ Future price increases
- ❖ Obsolescence
- ❖ Steps to reduce safety stock
- ❖ Performance reporting etc.

Another important factor of management is material handling system ' A poor material handling system always results in accumulation of work-in-process and lower motivation. Scientific material handling is concerned with moving the right quantity of materials at the right time, at right price. It deals with the science involving with movement, packing and storing of materials.' (**Gopalkrishanan**, 1993: 23)

After all the above definitions we come to conclusion that every organization is running to achieve some goals. To achieve their targeted goals every organization should go through various kind of challenges and pressures. There are so many internal and external factors that affect the smooth operations of an organization. Economic condition of the country, political environment, banking facilities, development of technology, international market conditions, inflation, these are the major factors that affect inventory management.

2.8   Structure of Inventory Management in Organization

In trading companies, department or organizations there is a separate department which looks after the inventory management process because company's 80 percent of investment were engaged in inventory. In lack of proper management of inventory, organization can not set the proper vision for future planning and

forecasting. Normally trading companies keep the inventory management planning in the following way

- ❖ Material policy making, planning and program
- ❖ Purchasing/ordering/opening LC
- ❖ Inventory control
- ❖ Receiving/importing
- ❖ Store keeping
- ❖ Sales
- ❖ After sales service

Trading companies has to focus on several factors before ordering and planning to open LC for required product. They have to analyze all the micro factors that effect their inventory management. Trading companies normally go through the above mentioned point to have better inventory control.

2. 9   Cost Concept of Inventory

Cost is certainly a considerable factor in purchasing, producing and maintaining inventory. Minimization of cost with the optimum uses of available resources is the basic objective of inventory management. Various factors should be composed and are applied in order to get optimum and ideal inventory to bring the least cost consequence in the company. Lack of adequate knowledge regarding inventory policies to production manager derives critical situation for economic purchases. The cost concept of inventory management identifies the inventory cost as follows

2.9.1   Ordering Cost

Ordering cost is also known as procurement cost. It is major cost in stock maintenance. It involves set-up, requisitions, LC, ordering, transporting, receiving and inspecting costs. It will be clearer about ordering cost from the definition given below

"Ordering costs are known as acquisition or set-up costs. This category of cost I associated with the acquisition or ordering of inventory. Firms have to place orders with suppliers to replenish inventory of raw materials. The expenses involved are referred to as ordering costs. Apart from placing orders outside, the various production departments have to acquire materials from the stores. Any expenditure involved here is also a part of the ordering cost. Included in the ordering costs are costs involved in (a) preparing a purchase order or requisition form and (b) receiving and recording the goods received to ensure both quantity and quality. It is, therefore, called a set up cost." (**Khan & Jain**, 1992:727)

Ordering cost are normally assumed as fixed costs and stated as rupees per order it is also called Total Ordering Cost. It is calculated as below:

Total Ordering Cost (TOC) = Number of Order x Ordering Cost per Order

Hence,

$$\text{TOC} = \left(\frac{A}{Q}\right) \times O \dots\dots\dots\dots\dots\dots(i)$$

Where,

TOC = Total Ordering Cost

Q = Ordering Quantity

A = Annual Requirement

O = Ordering Cost per Order

2. 9.2. Carrying Cost

Carrying cost is the cost per unit of holding item in inventory for a specified time period. Carrying costs vary with quantity ordered based on average inventory. These costs are associated with carrying the inventory itself such as capital costs.

Handling and storage cost. Spoilage costs, Insurance & Tax payment and system costs.

The cost of holding inventory includes

- Operating and operational capital
- Allowances for obsolescence
- Deterioration pilferage
- Insurance and
- Inventory taxes etc.

Total Carrying costs (TCC) = Average Inventory x Carrying Cost per unit

Hence,

$$TCC = (Q/2) \times C\ldots\ldots\ldots\ldots\ldots (ii)$$

Where,

TCC = Total Carrying Cost

Q   = Ordering Quantity

C   = Carrying Cost Per unit

2.9.3   Total Cost

Total cost refers to those combined of ordering cost and carrying cost. A company spends how much to get inventory in stock is called total cost. Thorough the calculation of total cost a company can predict how much fund is used in company's inventory. After calculation of total cost a company can formulate marketing strategies to proper pricing the products in market. Total cost is calculated as follows:

Total Cost (TC) = Total Ordering Cost + Total Carrying Cost

Hence,

$$TC = \{(A \div Q)xO\} + \{(Q \div 2)xC\} ....(i + ii)$$

Where,

TC = Total Cost

Q = Ordering Quantity

A = Annual Requirement

O = Ordering Cost per Order

C = Carrying Cost per Unit

2.10   Purchasing Management

Purchasing is major and vital process of inventory management. It is the first phase of inventory management. Purchasing includes various process sub-process and steps that have to be taken for effective result to control the overall inventories of the organization.

In other word, purchasing is the first phase of material management. This is related to the purchase of correct equipments, materials, parts, component and suppliers in the right quantity of right quality from right location at right time and cost. It is an operation of market exploration to purchase goods and services.

"Purchasing management plays a very important role in an organization because purchasing has its effect on every vital factor concerning the manufacture, quality, cost, efficiency and prompt delivery of goods to customers. It is the most important function of materials management as the moment an order is placed for the purchase of materials, a substantial part of the company's finance is committed which affects cash flow position of the company. Thus, if the business size of a business concern permits, there should be a separate purchasing department and

the responsibility for purchasing all types of materials should be entrusted to this department."(**Jain & Narang**, 1995: 2.6)

2.11 Inventory Valuation

Inventory plays a vital role in better fund allocation. A large portion of fund is invested in inventory. So in lack of proper inventory management a company's fund may be misused that is why inventory valuation is very much important for a company. Normally if we look at the matter it is seems an easy way to i.e. just calculate inventory unit by the respective cost price. But in practice it is not as easy as stated above. There are lots of tools and techniques are used to valuate inventory.

"The primary basis of accounting for inventory is cost, which has been defined generally as the price paid to considerate given to acquire and assets. As applier to inventories, cost means principle the sum of applicable expenditure and charges directly and indirectly incurred in bringing an article to its existing condition and location." (**American Institute of Certified Public Accountants**, 1961: 43)

There are various process developed for inventory valuation such as cost price method, market price method and standard price method etc, however, cost method is regarding as the best effective method for valuing the inventories.

2.12 Methods of Inventory of Management

A company wants total control on its inventory. They don't want to invest excess fund in inventory and they want to utilize the available source of fund in different operational activities of the company. To have better control on inventory management, normally companies are using the following methods.

2.12.1 First in First Out (FIFO) Method

In this method oldest items on hand are issued out first. Each issue- out is made out of the oldest goods in stock, therefore, the ending inventories consist of the most recently acquired goods.

Materials are first issued from the earliest consignment on hand and priced at the cost at which that consignment was placed in the stores. In other words, materials received first are issued first. It follows those units costs are apportioned to cost of production according to their chronological order of receipts in the store.

FIFO method is simple to understand and easy to operate. It is a logical method because it takes into consideration the normal procedure of utilizing first those which are received first. This method is also suitable in times of falling price of the materials of jobs or works orders will be high while the cost of replacement of material will be low. But in case of rising price this method is not convenient because the issue price of materials will be low. When price rise the issue price does not reflect the marked price as materials are issued from the earliest consignment.

2.12.2 Last in First out (LIFO) Method

As against the first in first out method, the issues under this method are priced in the reverse order of purchase i.e. the price of the latest available consignment is taken. This method is sometimes known as the replacement cost method because materials are issue at the current cost to jobs to work under except when purchase was made long ago.

"This method is based on the assumption that last item of materials purchased are the first to be issued. Thus, in this method the price of the last consignment is used for pricing materials issued until it is exhausted then the next consignment and so on through successive consignment"- (Ipid:376)

2.13 Review of Previous Research

There are so many researches have been done in the field of inventory management. There are so many manufacturing and trading houses are running their operation in Nepal since last few decades. Those researches have find out the practice of inventory management in Nepalese business environment.

Miyan, Surphuddin had conducted a thesis on **"Inventory Management, A Case Study of Gorkhapatra Corporation"** submitted to faculty of Management TU. The main objective of studies were to collect the information underlying constraints in existing management and control system of inventory and their impact towards the corporations' profitability. Corporation was run at profit accept in a few years. The studies also examined the existing inventory management system applied by corporation to analyze the relationship between inventory material cost and profit. And to suggest for some effectiveness tools and techniques for corporation as the corporation was not following any tools techniques and models to determine optimum level of inventory this result increased in unnecessary costs involving ordering and carrying cost. According to inventory management techniques there was no systematic in ordering size, lead time and safety stock. The purchase decision was made by the purchase manager through both quotation and tender. The study had recommended for the improvement in the present inventory management in the following manner. The corporation should define its goals and objectives clearly. It should follow the scientific tools and techniques i.e. purchasing order, EOQ, Safety Stock, Re-Order-Point, ABC Analysis etc. The company consider for proper storing was essential to improve. The ledger card can be used for record keeping system and

its scrap material should be recycled. The corporation should procure a color machine for this competitive world.

Gaire, Tara Nath had conducted the thesis on **"Inventory Management of Bottlers Nepal Limited"** submitted to the faculty of Management TU. The basic objective of the researcher was to examine the inventory policy, inventory management practice in Bottlers Nepal Limited. Inventory management system of Bottlers Nepal Limited was also neither scientific nor effective. Research was done to found out the police of inventory management. The company was using and the ways of managing inventory for the effective operation and the changes in inventory maintained by the organization during the study period and the impact of inventory on the profitability of the company. The inventory purchase and sales maintained by the company were fluctuated severally. It causes the decreased in the over all profitability of the organization.

Mr. Ram Kumar Shrestha conducted a research study "**Inventory Management of Nepal Lube Oil Limited**". His objective to indict the study was to identify the strength and weakness of NLOL regarding inventory management. His study focused on analysis on of the profitability and control of stock items of NLOL.

Mr. Shrestha has collected almost all data from secondary sources i.e. published/unpublished records of the company. He has also conducted inquiries and informal talk with the management head to gather primary data. The researcher used various financial and statistical approaches to analyze the gathered data.

Mr. Shrestha concluded that the NLOL could not use its available capacity due to top competition and liberalization policy of government of Nepal. Efficiency of inventory management in term of ratios is not fruitful. NLOL has to adopt effective service oriented strategy with marketing and distribution so that to

compete with others and has to apply proper inventory control system to strengthen stock level to serve the customers in required time.

Mr. Purushottam Prasad Dahal has carried out a research study on "**A Compare study on Inventory Management of Dabur Nepal P. Ltd. and Nepal Liver Ltd**." the aim of the study was to examine and find out the present position of inventory management of both the companies.

Mr. Dahal has uses both primary and secondary sources of data along with previous studies, articles and published/unpublished official records of both organization for the study.

Mr. Dahal finally concluded that the organizations taken for study use raw material from local sources, India and other countries. Purchasing of raw material in UNL is fluctuated whereas DNPL management of demand and supply. The researcher has suggested that the both organization should control the inventory management system.

2.14   Research Gap

In this globalize business age so many computerized software has been launched to maintain inventory management. Beside it, there are so many tools and techniques have been developed to optimize the inventories. However so many business houses are operating in Nepal and they are somehow managing their inventory system but maximum business houses are not implement scientific inventory management system in practice.

As stated above many studies have reported that, implementation of scientific inventory management is essential in Nepalese business organization. However, there has been very little research reported or the effectiveness of such use. To practice the scientific inventory management tools, it is most essential to improve the organizational effectiveness along with well trained and experienced

professionals. The purpose of the present study is therefore to ascertain the effective use of such tools as compared to traditional inventory management tools

CHAPTER-III
RESEARCH METHODOLOGY

Research Methodology is the way to solve systematically about the research problems. Research Methodology refers to the various sequential steps to be adopted by researcher, Methodology followed in this study as follows:

3.1 Research Design

A research design is the arrangement of condition for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Descriptive and exploratory research designs have been used to this study.

3.2 Sources of Data

The primary data are those which are collected a fresh and for the first time and thus happen to be original in character. The secondary data, on the other hand are those, which have already been collected by some one else and already, been passed through the statistical process. The researcher uses only one type source of data collection.

  a) Secondary Data

Study is mainly based on secondary data. So, the major sources of secondary data for this study are as follows:

 a) Annual sales reports of the company

 b) Published and unpublished bulletins, reports of the company

 c) Published and unpublished bulletins, reports of the Nepal Auto Mobile

   Dealers Association (NADA)

 d) Previous studies and reports

 e) Unpublished official record

 f) Various Internet Websites

3.3 Population and Sampling

More than 25 automobile dealers are operating business in Nepal. Out of these, AIPL has been selected as sample for the present study. Similarly, inventory levels of AIPL of 5 years from 2005/06 to 2009/10 A.D. have been taken as the sample for the study.

3.4   Data Collection Procedures

As the study will also be based on primary data, information will be collected developing a scheduled questionnaire and distributing these to employees of the company and clients. Question of open end (i.e. yes or no) will be included in questionnaire. Besides this, junior employees and clients are also being observed and responses have been drawn from them about relevant questionnaires.

3.5   Method of Data Analysis

Available data may be analyzed by using various tools and methods. They are mentioned below.

Data collected from various sources are managed and presented in proper tables and formats. Such tables and formats are interpreted and explained as necessary. The analysis of data is processed through various financial tools and statistical tools.

a) Financial Tools

b) Statistical Tools

3.5.1   Financial Tools

❖ ABC inventory control system

❖ Economic Order Quantity (EOQ)

❖ Re-Order Point (ROP)

3.5.1.1 Ratio Analysis

Ratio indicates the relationship between two variables. According to John R. Schermer Horn, JR, The financial projections allowed by the master budgeting process enable calculation of a number of financial ratios that further facilitate managerial control. Ratios can be a benchmark in evaluating financial performance of a responsibility center over time and in evaluating the potentials results associated with various budget projections. While calculating ratios, we can consider into various aspects like, liquidity, profitability, and turnover.

$$\text{Inventory Turnover Ratio} = \frac{Sales}{Closing\ Stock}$$

$$\text{Inventory to Sales Ratio} \ = \ \frac{Inventory}{Net\ Sales}$$

$$\text{Inventory to Current Assets Ratio} \ = \ \frac{Inventory}{Current\ Assets}$$

$$\text{Inventory to Total Assets Ratio} \ = \ \frac{Inventory}{Total\ Assets}$$

3.5.2   Statistical Tools

Main statistical tools used are Mean, Standard Deviation, Coefficient of Variation, Correlation etc.

3.5.2.1   Mean

"This is also company known as the arithmetic average. Even though in general means any measure of central location, when we use the word average in our daily routine, we often mean the arithmetic average. The mean is computed by adding all the data values and dividing by the number of data values. The symbol used for sample average is X, so that" (Chandan, Prof. Singh and Khanna, 1994:59)

$$\overline{X} \ = \ \frac{\Sigma X}{N}$$

Where,

ΣX =   Sum of total observations.

N =   No. of observations.

$\overline{X}$ =   Mean of total observations.

3.5.2.2 Standard Deviation

"The standard deviation is the square root of the average of the squared distance of the observation from the mean. The formula for the standard deviation is" (Levin and Rubin, 1995:105)

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\Sigma X^2}{N} - \left(\frac{\Sigma X}{N}\right)^2}$$

Where,

σ	=	Standard deviation
σ^2	=	Variance
N	=	Number of observations
$\overline{X}$	=	Mean of observations

3.5.2.3 Coefficient of Variation

"The coefficient of variation is not an absolute measure; it is a relative measure of dispersion. It is used in comparing the variability of two or more sets of data. Since it is a ratio, the calculation procedure of coefficient of variation is as follows" (Chandan, Sing and Khanna, 1994: 69)

$$C.V. = \frac{\sigma}{\overline{X}} \times 100$$

Where,

σ	=	Standard deviation
$\overline{X}$	=	Mean
C.V.	=	Coefficient of Variation

3.5.2.4 Correlation Analysis

"Correlation analysis is the statistical tool generally used to describe the degree to which analysis used to measure the strength of the association between two variables like on extent of selling and distribution expenses and sales volume of the product. Correlation is concerned with relationship between two related and quantifiable variables. If two qualities vary in sympathy so that a movement in the one tends to be accomplished by a movement in the some or opposite direction in the other, the same or opposite direction in the other, the quantities are said to be correlated. Correlation can either be positive or negative, whether correlation is positive or negative; it would depend upon the direction in which the variables are moving. If both variables are changing in the same direction then correlation is said to be positive but when the variations in the two

variables took place in opposite direction the correlation is termed as negative." (Kothari, 1992: 223)

"The coefficient of correlation symbolically known by "r", it is another important measure to describe how well one variable is explained by another. It measures the degree of relationship between two casually related variables. The value of this coefficient can never be more than + 1 or -1. For a unit change in independent variables if here happens to be a constant ratio change in the dependent variable in the same direction than the value of the coefficient will be (+1) indicative of the perfect positive correlation, but if such a change occur in the opposite direction the value of correlation will be (-1) indicating the perfect negative correlation. If the correlation has a zero value then it means there exist no correlation between the variables under study". (Ibid. 229)

Correlation Coefficient (r):

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]} \sqrt{[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

Where,

r_{xy}	=	Correlation between X and Y
ΣXY	=	Sum of Product of X and Y
$\Sigma X \Sigma Y$	=	Product of Sum of X and sum of Y
N	=	No of pair of observations.

3.5.2.5 Regression

"Using the relationship between a known variable and an unknown variable to establish the unknown one is termed as regression analysis. Thus regression analysis studies the statistical relationship between the variables". (Ibid, 206)

"In establishing relationship between the two variables the independent variable (X) and the dependent variable (Y), we can make relationship in linear or "straight line" relationship. So that, the relationship between the two variables can be adequately described by a straight line." (Chandan, Singh and Khanna, 1994:243)

"In case of simple linear regression analysis a single variable is used to predict another variables on the assumption of linear relationship the given variables. The variables to be predicted to be called dependent variables

and the variable on which the prediction is based are called the independent variables. Simple linear regression equation is stated as follows:

$$Y = a + bX$$

Where,

Y	=	Dependent variable
X	=	Independent variable
a	=	Value of the Dependent variable when the Independent variable has a value of zero.
b	=	is a constant indicating the slope of the regression line, it Indicates the amount of change in the dependent variable For a unit changes in the independent variable.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Presentation and analysis of data is very important stage of research study. Its main purpose is to change the unprocessed data into understandable form. It is the process of organizing the data by tabulating and then placing that data in presentable form by using various tables, figures and sources.

The basic objective of this study is to analyze present practice of inventory management system in AIPL. To fulfill the said objectives, collected information is analyzed in this section. To achieve the fruitful result it is tried to divide the analysis in two sections. The first part represents the analysis of inventory management and second part represents the analysis of its effect on the present positions of inventory management by using different financial tools.

4.1   Analysis of Inventory Management in AIPL

Inventory management is the planning, directing, control and co-ordination of those activities which are concerned with inventory requirement. The major functions of inventory management are purchasing of goods, store and stock control, receiving and issue of goods, transportation and material handling of the material and value analysis. AIPL imports vehicle through the LC of Nepal Investment Bank Limited.

4.1.1   Purchasing

AIPL deals for Mahindra & Mahindra Vehicles and spares parts. It deals around 2700 items of spares parts and more than 32 models of vehicle (including commercial (Pick-Up) and passenger). All these vehicle and spares parts are

imported from different location of India. The market trend of Nepal is very much fluctuating, that's why AIPL faces a lot of problems while ordering the goods.

AIPL deals with Mahindra & Mahindra for its different models of vehicles. Pick-Ups and Cars are imported from Maharastra and Nashik. Similarly Utility Vehicles and Tractors are imported from Maharastra and Nashik. AIPL sales around 1050 vehicle per year through it show room and Dealers.

AIPL imports spares parts from Maharastra and Nashik respectively through demand draft. Approximately, 2700 spare parts are in stock of AIPL to provide better after sales service to its customers.

4.1.2   Receiving and Store Keeping

After forecasting of sales by the marketing and sales team, AIPL opens Letter of Credit (LC) through the bank. The ordered vehicles receive by AIPL normally 30 to 45 days after the opening of LC. But it depends upon the nature of products and the manufacturing plant of the product. Vehicle dispatched from Maharastra and Nashik arrive at Raxaul within 15 days. After releasing from custom through its clearing and forwarding agency, the vehicles send to concern location as per requirement of the company thorough its Birgunj office.

Spare parts are received through demand draft and they are also sending to concern places through the transportation all over the Nepal. Sometimes necessary spares send through the Air cargo as per requirement.

4.1.3 Issuing and Pricing

AIPL normally do pricing on the supervision of Mahindra & Mahindra. It cannot set pricing without Mahindra & Mahindra approval. For better pricing and to monitor all the sales and promotional activities, Mahindra & Mahindra has appointed its area officer for Nepal. He looks after all thing related to price, Stock, LC and another Promotional activities.

AIPL always price it vehicle as per the market requirement and the competitive product pricing is also considered. AIPL issue its product on FIFO to liquidate its stock in time.
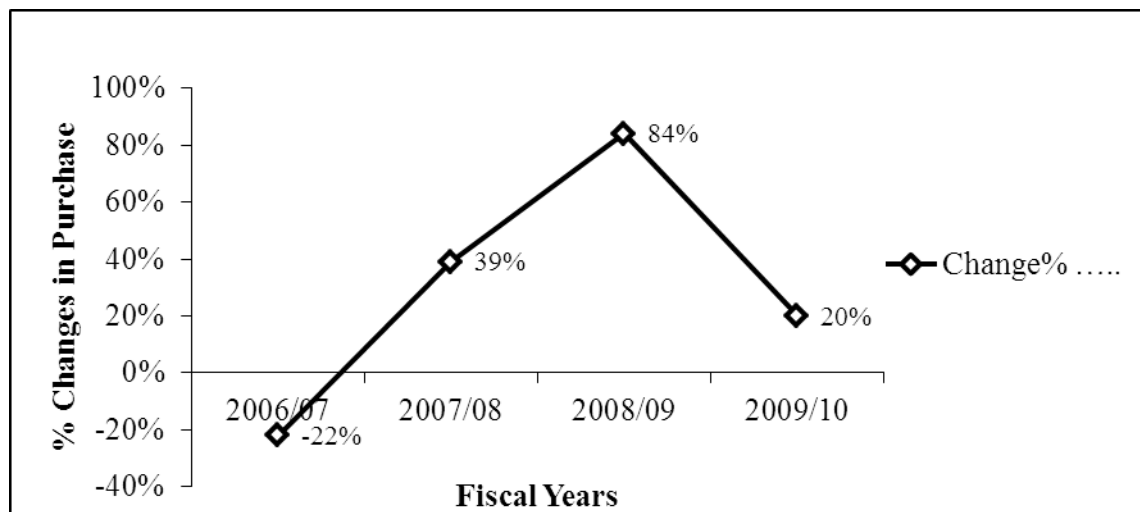
4.2   Total Purchase of Products in Term of Value (Rs. in Lakhs)

Table No: – 4.1

Fiscal Year	Total Purchase	% Changes in Purchase
2005/06	4188.59	…..
2006/07	3247.39	-22%
2007/08	4517.81	39%
2008/09	8301.68	84%
2009/10	9937.25	20%

Figure No: – 4.1

Percentage Changes in Purchase of AIPL

The above table no. 4.1 shows the purchase trend of products in terms of monetary value over the study period from 2005/06 to 2009/10. From 2005/06 to 2006/07 purchases of products decreased by -22%. But in fiscal year 2007/08 the purchase

increased by 39% and it's again increase by drastically in fiscal year 2008/09 and 2009/10 comparison to the base year 2005/06.

From the above analysis it shows that the purchase of product of AIPL is in increasing trend although there is decreasing in the fiscal year 2006/07.
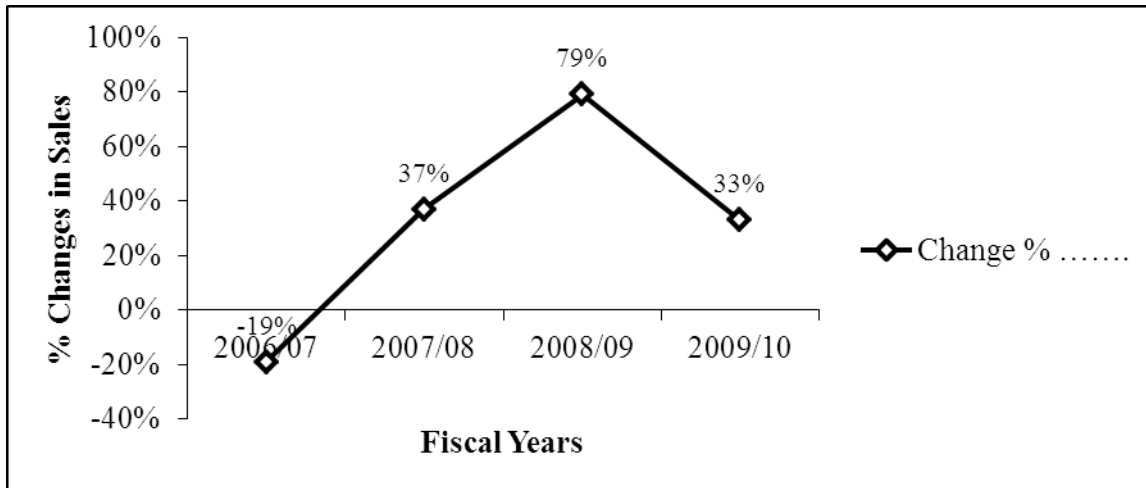
4.3 Total Purchase and Sales in Term of Value (Rs. in Lakhs)

Table No: – 4.2

Fiscal Year	Total Purchase	Change%	Total Sales	% Changes in Sales
2005/06	4188.59	…..	4940.25	…….
2006/07	3247.39	-22%	3977.43	-19%
2007/08	4517.81	39%	5432.35	37%
2008/09	8301.68	84%	9706.45	79%
2009/10	9937.25	20%	12912.78	33%

Figure No: – 4.2

Percentage Changes in Sales of AIPL

The table no. 4.2 shows that the sales trend is increasing in the year 2007/08 and in the year 2008/09 comparison to the base year 2005/06. Although in the year 2006/07 it decreased by -19% and in the same year purchase is also decreased by

-22%. But in the year 2007/08 and 2008/09 the sales volume is increased by 37% to 79% comparison to the base year 2005/06.

From the above analysis it seems that the purchase and sales are not co-related because when purchase was increased the sales were not increased.
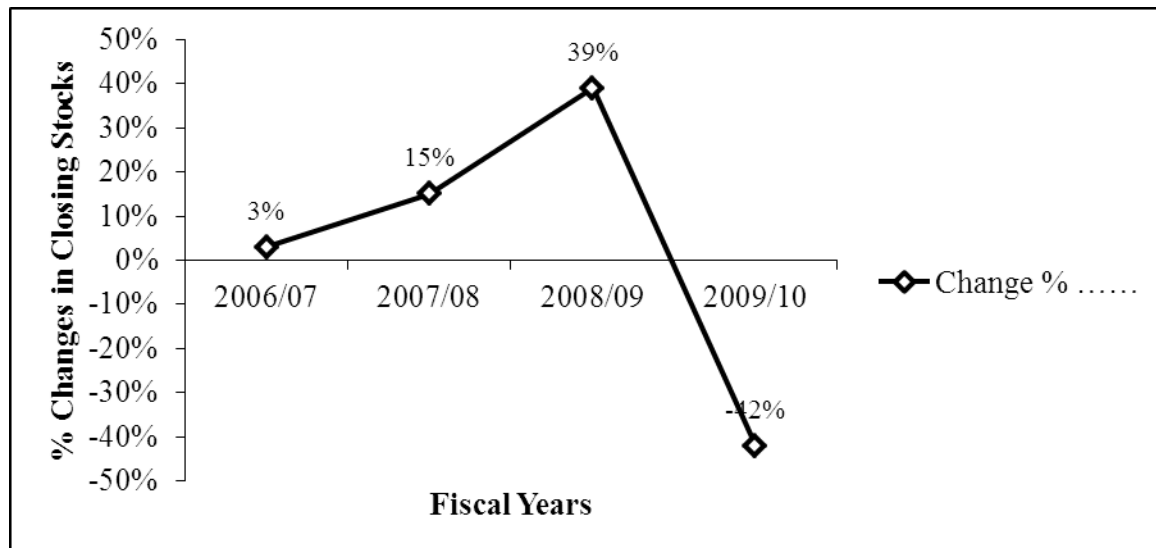
4.4 Inventory Position of the Organization in Term of Value (Rs. in Lakhs)

Table No: – 4.3

Fiscal Year	Closing Stock	% Changes in Closing Stock
2005/06	654.88	……
2006/07	673.16	3%
2007/08	776.83	15%
2008/09	1076.62	39%
2009/10	629.29	-42%

Figure No: – 4.3

Percentage Changes in Closing Stock of AIPL

The above table no. 4.3 shows that investment in inventory is in fluctuating trend in AIPL. The inventory stock for the fiscal year 2006/07, 2007/08 and 2008/09

44

were increased by 3%, 15% and 39% respectively that the base year 2005/06. The inventory for the year 2009/10is decreased by -42%.

4.5 ABC Analysis

ABC analysis is a widely used classification techniques to identify various items of inventory for the purpose of inventory control. This is important because an organization can't pay the same degree of control on all types of inventory. The price wise normally organization put the largest investment in category A and semi largest investment in category B.

   a) In category 'A' AIPL puts the inventory of Vehicles in terms of value (both commercial and passengers)
   b) In category 'B' AIPL puts the inventory of Spares parts in terms of value.

4.6 Economic Order Quantity (EOQ)

An organization should be careful in time of ordering the goods and products. EOQ is used to determine the idle quantity that the firm should order. EOQ is calculated as follows.

$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where,

A   =   Annual Requirement

O   =   Ordering Cost per Order

C   =   Carrying Cost per order.

AIPL normally orders its products by analyzing the cultural environment, market trends, political situation of the country and development works in future. AIPL get its product through opening of L/C, so AIPL not use the EOQ model.

4.7   Just in Time (JIT)

JIT is a Japanese production management concept. It can be used to reduce dependent demand of inventory. It is basic philosophy. This applies equally to manufacturing and non- manufacturing organization. It is about total requirement with no waste, i.e. no unnecessary use of materials, human or physical resources. Therefore it can be seen that this philosophy applies equally running a chemical plant, a management consultancy. AIPL have not applied this concept fully.

4.8   Turnover Ratio

A turnover ratio measure the relationship between two variables and it's also shows the effect of change in one variable to another variable this is the best measurable financial tools to conclude the data.

4.8.1   Inventory Turnover Ratio (ITR)

It measures the efficiency of inventory management and how quickly inventory can be sold. It indicates the relationship between the cost of goods sold and the inventory level.

As we know that higher 'ITR' is better than low ratio, high turnover ratio indicates that a firm has good inventory management system and it is able to earn profit selling quickly over a period of time. Likewise, low turnover ratio indicates that a firm has poor inventory management system and firm has more stock of goods for

sales. Due to this, inventory involves cost in term of interest/opportunity, rent, depreciation, insurance, taxes and so on.

Therefore, the company has to keep optimum level of inventory. Inventory turnover ratio can be calculated by using this formula.

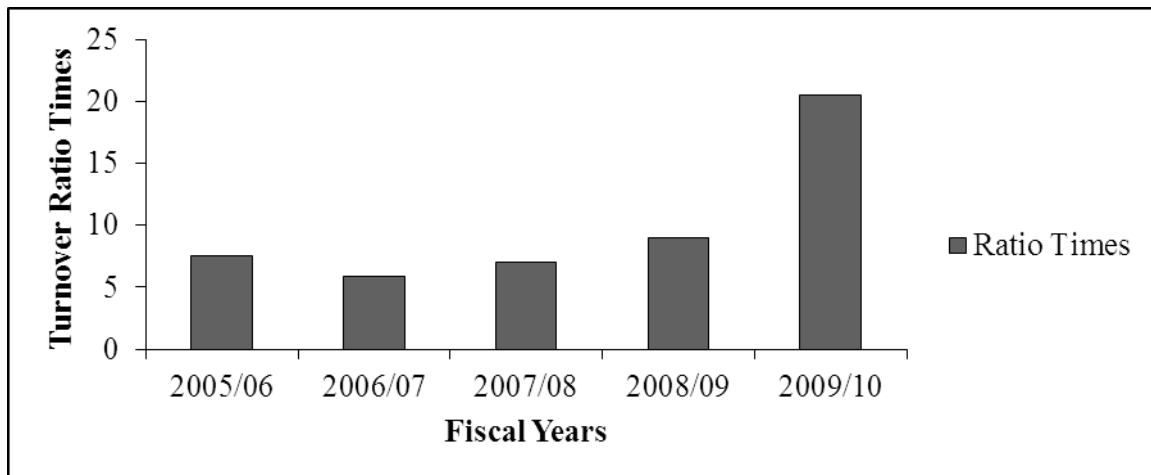$$\text{Inventory Turnover Ratio} = \frac{\text{Sales}}{\text{Closing Stock}}$$

Table No: - 4.4

Inventory Turnover Ratio in Terms of Value (Rs. in Lakhs)

Fiscal Year	Sales	Closing Stock	Inventory Turnover Ratio Times
2005/06	4940.25	654.88	7.54
2006/07	3977.43	673.16	5.91
2007/08	5432.35	776.83	6.99
2008/09	9706.45	1076.62	9.02
2009/10	12912.78	629.29	20.52

Figure No: – 4.4

Inventory Turnover

Ratio

From the table no. 4.4 can calculate that the inventory turnover ratio of the company is declined in the year 2006/07 from 7.54 times to 5.91 times. Again it increase to 6.99 times in the fiscal year 2007/08 similarly 9.02 times in the fiscal year 2008/09 and 20.52 times in the fiscal year 2009/10. This indicates that the inventory turnover ratio in AIPL is slightly in increasing trend.

4.8.2 Inventory Holding Days

Inventory Holding Days represent the number of day's company holds the average inventory. The formula that can be used to calculate inventory holding days is as follows:

$$\text{Inventory Holding Days (IHD)} = \frac{\text{Closing Stock}}{\text{Sales}} \times 360$$
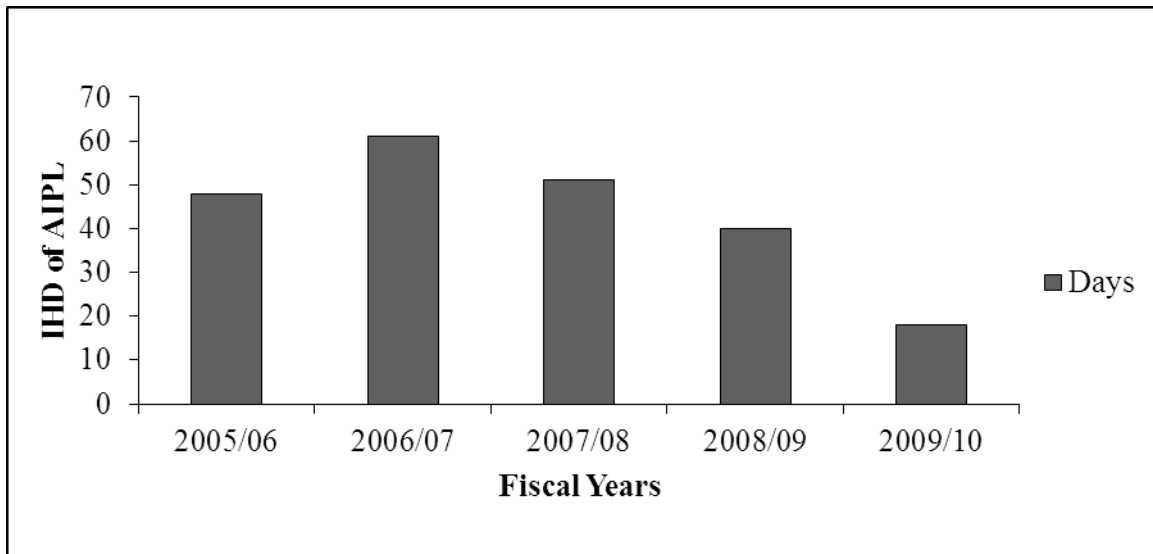
Table No: - 4.5

Inventory Holding Days in Term of Value (Rs. in Lakhs)

Fiscal Year	Closing Stock	Sales	IHD Days
2005/06	654.88	4940.25	48
2006/07	673.16	3977.43	61
2007/08	776.83	5432.35	51
2008/09	1076.62	9706.45	40
2009/10	629.29	12912.78	18
Mean			44

Figure No: – 4.5

Inventory Holding Days of AIPL

In the above table no 4.5 we represent the Inventory Holding Days of AIPL. Throughout the study period from 2005/06 to 2009/10 AIPL hold inventory on an average for 44 days. In fiscal year 2005/06 the inventory holding days is more than the average which is not good for company accordingly in the year 2006/07 inventory holding day's raises to 61 days which is above the average. In fiscal year 2008/09 and 2009/10 the holding days is satisfactory but in the year 2006/07 and 2007/08 the inventory holding days extremely raises which is not good for company.

4.8.3 Inventory to Current Assets Ratio

In order to evaluate the investment made in the inventory, this ratio is computed. Generally, inventory constitutes 50% to 60% of the current assets in trading companies. This ratio is calculated as:

$$\text{Inventory to Current Assets Ratio} = \frac{\text{Inventory}}{\text{Current Assets}}$$

Here inventory includes closing stock of Spares Parts and Finished Goods (vehicles). Current assets includes inventory, trade and other receivable, cash and bank balance and pre-paid advance, loans deposits
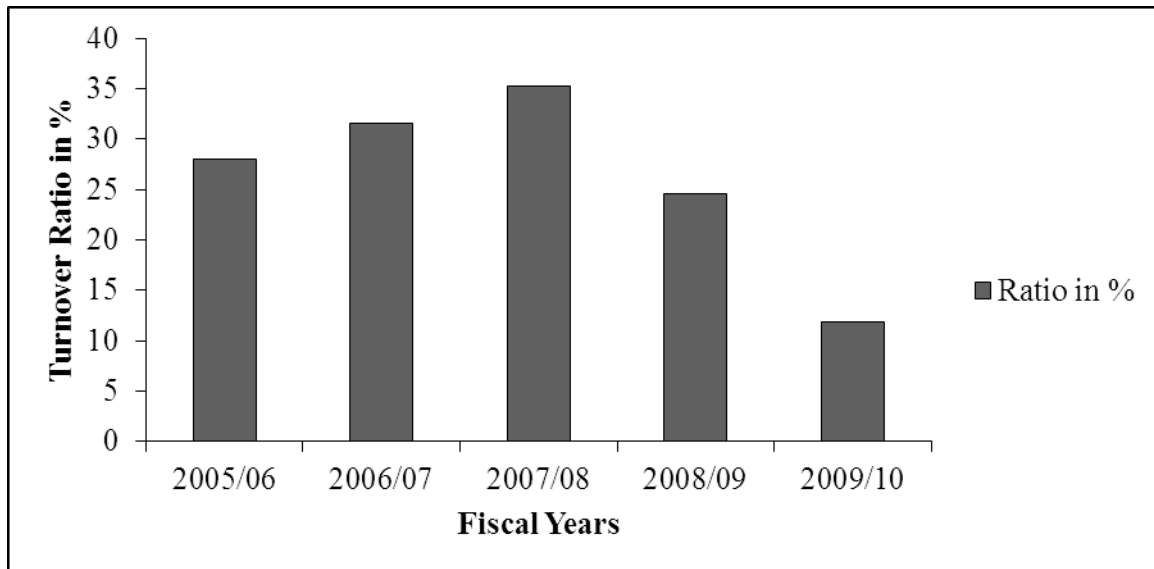
Table No: – 4.6

Inventory to Current Assets Ratio in Term of Value (Rs. in Lakhs)

Fiscal Year	Closing Stock	Current Assets	Ratio in %
2005/06	654.88	2333.40	28.07
2006/07	673.16	2128.91	31.62
2007/08	776.83	2202.95	35.26
2008/09	1076.62	4381.90	24.57
2009/10	629.29	5289.84	11.90
Mean			23.90

Figure No: – 4.6

Inventory to Current Assets Ratio

According to above table no. 4.6 AIPL has a average Inventory to Current Assets Ratio is 23.9%. Analyzing the above data, AIPL has turnover ratio high than it average in fiscal year 2005/06, 2006/07, 2007/08 and 2008/09 but it has decreased to 11.9% in the fiscal year 2009/10 comparison to the base year 2005/06.

4.8.4 Inventory to Total Assets Ratio

Inventory to Total Assets ratio is calculated to evaluate the ratio is calculated as follows:

$$\text{Inventory to Total Assets Ratio} = \frac{\text{Inventory}}{\text{Total Assets}}$$

Here, inventory includes closing stock of spares parts and finished product (vehicles) and total assets includes fixed assets and current assets.
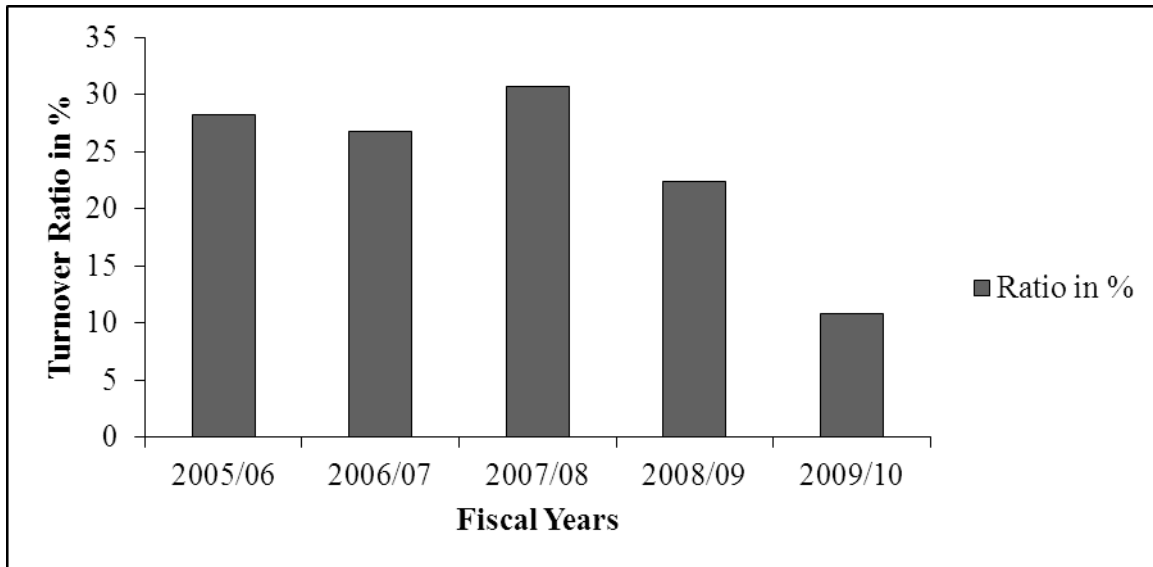
Table No: – 4.7

Inventory to Total Assets Ratio in Term of Value (Rs. in Lakhs)

Fiscal Year	Closing Stock	Total Assets	Ratio in %
2005/06	654.88	2324.25	28.18
2006/07	673.16	2509.52	26.82
2007/08	776.83	2531.20	30.69
2008/09	1076.62	4797.58	22.44
2009/10	629.29	5803.44	10.84
Mean			23.79

Figure No: – 4.7

Inventory to Total Assets Ratio

From the above table no. 4.7 it seems that the average inventory to total assets ratio is 23.79%. AIPL has sometimes crossed it inventory to total assets ratio and sometimes it lies below average. We can see in the fiscal year 2007/08 the ratio raise to 30.69% compare to base year 2005/06 but it decrease to 26.82, 22.44% and 10.84% respectively in fiscal year 2006/07, 2008/09 and 2009/10.

4.8.5 Inventory to Working Capital Ratio

Inventory to net working capital ratio explains the relationship of closing stock and working capital. This ratio measures how much closing stock of finished goods is kept by the company as a working capital. Generally, working capital is considered total current assets-total current liabilities.

$$\text{Inventory to Working Capital Ratio} = \frac{\text{Closing Stock}}{\text{Working Capital}}$$

Table No: – 4.8

Inventory to Working Capital Ratio in Term of Value (Rs. in Lakhs)

Fiscal Year	Closing Stock	Working Capital	Ratio in %
2005/06	654.88	13798.22	4.75
2006/07	673.16	11089.13	6.07
2007/08	776.83	36747.02	2.11
2008/09	1076.62	13146.90	8.19
2009/10	629.29	10410.26	6.04
Mean			5.43

Figure No: – 4.8

Inventory to Working Capital Ratio
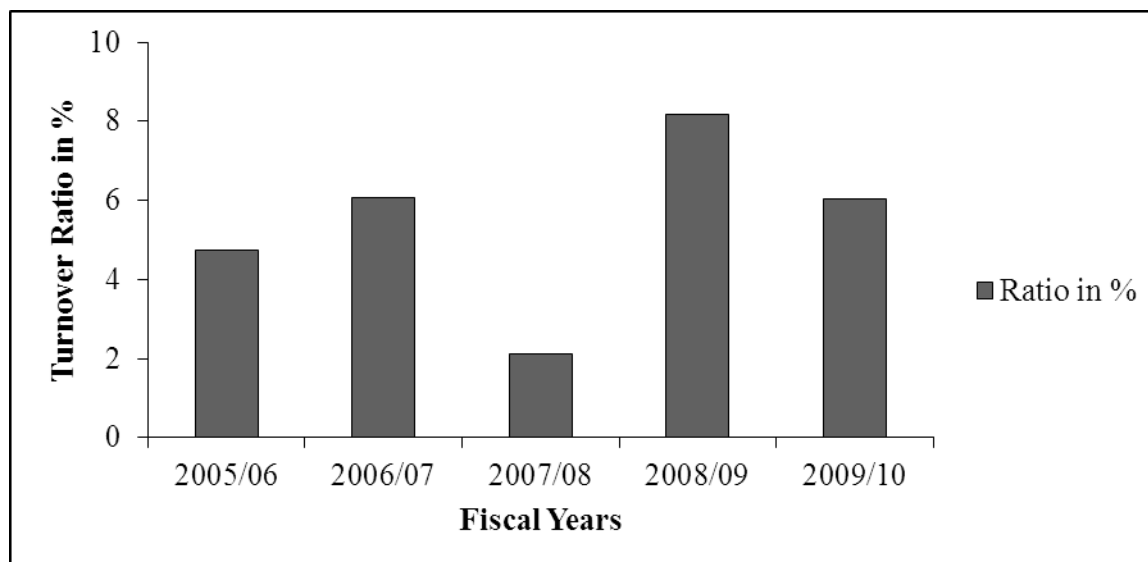
From the above table no. 4.8 it is clear that the ratio is very much low in fiscal year 2007/08 as the inventory level is low in the same year. In the fiscal year 2008/09 ratio is 8.19 % which is very much satisfactory. In fiscal year 2009/10 it is slightly decrease than the fiscal year 2008/09 but it is satisfactory compare to the base year 2005/06.

4.8.6   Purchase to Gross Profit Ratio

This ratio tells how much inventory is needed to generate a unit profit. The required formulas to calculate it as follow.
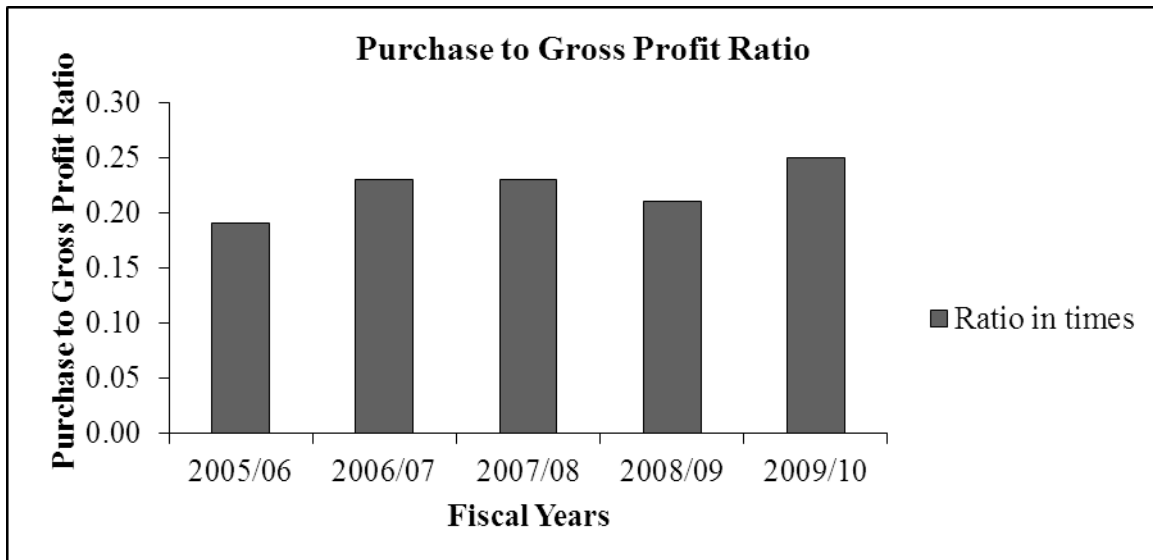
$$\text{Inventory to Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Material Consumed}}$$

Table No: – 4.9

Purchase to Gross Profit Ratio in term of value (Rs. in Lakhs)

Fiscal Year	Gross Profit	Purchase	Ratio in times
2005/06	795.34	4188.59	0.19
2006/07	748.40	3247.39	0.23
2007/08	1018.22	4517.81	0.23
2008/09	1715.23	8301.68	0.21
2009/10	2528.21	9937.25	0.25
Mean			0.22

Figure No: – 4.9

From the above table no. 4.9 and chart no. 5, it is clear that the inventory to gross profit ratio of AIPL is higher in the fiscal year 2009/10. However the ratios are low in the fiscal year 2005/06 and 2008/09.

4.9 Regression Analysis

Regression Analysis in the general sense means the estimation or prediction of the unknown value of one variable from the known value of the other variable. It is specially used in business and economics to study the relationship between two or more variables that are related casually. SIRF Gation first developed the theory of regression analysis. Regression analysis is used as a tool of determining the strength of relationship between two variables. The analysis used to describe the average relationship between two variables is known as simple linear regression analysis.

4.9.1 Regression Results

This topic is related with the analysis of the relationship between closing stock and sales, purchase and sales as well closing stock and gross profit based on the historical data. The regression results have been presented below.

4.9.2 Regression of Closing Stock (Y) and Sales (X):

The regression equation shows a positive relationship between Closing Stock and Sales of AIPL. The computation is depicted in Annex 1. The slope coefficient of 0.0093 means that marginal propensity to earn sales revenue is Rs 930 lakhs meaning that if value of closing stock increased by 0.0093, on the average sales goes by each rupee. The intercept value of 'a' is 693.51 meaning that the Closing Stock would be 693.51 lakhs if the sales were zero.

The coefficient of determination 'r^2 'is 0.0363 indicates that about 3.60% of the variation in statistics closing stock can be explained by the relationship to sales. This would be considered a good fit to the data, in the sense that it would substantially improve a management to predict company performance in closing stocks.

Standard Error of estimate of regression line measure of dispersion of variation about the regression line. Here, r< PE (0.1905<0.2907), so the value of "r" is not significant at all i.e. there is no evidence of correlation (PE= 0.6745xSE)

4.9.3   Regression of Gross Profit (Y) and Closing Stock (X)

The regression of closing stock and gross profit is positive, which indicate that positive correlation exists between closing stock and gross profit that is one rupee decrease in closing stock leads to an average of about 0.49 decreases in gross profit. The computation is depicted in Annex -2

The coefficient of determination 'r^2 'is 0.0141 indicates that about 1.41% of the variation in statistics gross profits can be explained by the relationship to closing stocks. This would be considered a good fit to the data, in the sense that it would substantially improve a management to predict company performance in closing stocks and gross profit.

4.9.4   Regression of Working Capital (Y) and Closing Stock (X)

The regression coefficient of closing stock and working capital is positive which indicates that positive correlation exists between closing stock and working capital, which is one rupee increase in closing stock leads to an average of about 6.04 increased in working capital. The computation is depicted in Annex-3.

The coefficient of determination 'r^2 'is 0.0101 indicates that about 1.01% of the variation in statistics working capital can be explained by the relationship to

closing stocks. This would be considered a good fit to the data, in the sense that it would substantially improve a management to predict company performance in working capital

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4.10   Major Finding of the Studies

The inventory management of AIPL and its impact on gross profit has been analyzed by using various financial and statistical tools. The major findings are as follows

- ❖ AIPL Purchasing trend is fluctuating. Percentage change in purchasing is very much different.
- ❖ AIPL inventory level is also high when sales level is high, it seems that the organization should keep eyes on the purchasing management
- ❖ In fiscal your 2006/07 all the level of purchase, sales and inventory has gone down due to the political environment of the country.
- ❖ AIPL is not applying the method Just in Time (JIT) purchase concept
- ❖ Inventory Holding Days of AIPL is also going high per fiscal year. It is lack of implementing LIFO method.
- ❖ Total Assets of AIPL is totally in increasing trend it is good for a trading house that its Total Assets Increasing yearly
- ❖ Working Capital of AIPL is in Fluctuating Trend Working Capital is the backbone of any trading house so it should be increasing as per the increment in Sales and profit
- ❖ AIPL is not using Always Better Control (ABC) Analysis.
- ❖ Inventory to total assets ratio of AIPL is Satisfactory.
- ❖ AIPL give more emphasis on inventory in term of investment and value.
- ❖ AIPL is not applying Economic Order Quantity (EOQ) tools properly to have better inventory management

- ❖ AIPL has warehouse problem in Raxaul yard to keep the received good in better condition.
- ❖ AIPL do not use software to keep record of inventory.
- ❖ AIPL should not have a separate inventory management department rather than using the sales team and account team to control its inventory and keeping records.

CHAPTER V
SUMMARY, CONCLUSION AND RECOMMENDATIONS

The brief introduction of this study has been already presented in the first chapter. In the second chapter the available literature about the inventory management has been reviewed. Research methodology has been explained in the third chapter, and the available data have been presented and analyzed in fourth chapter. This is a last chapter of this study and present summary, conclusion and recommendations.

5.1   Summary
This study of the practice of inventory management in Agni Incorporated Pvt. Ltd. (AIPL) has been prepared to fulfill the requirement of Master's of Business Studies (MBS). Mainly this study is based on the data provided by the company. While selecting the company for analysis we found that AIPL is one of the largest automobile industries which is operating its activities in the field of automobile industry since last two decades and no another company in automobile sector in Nepalese market is compete to it. Hence there is not yet any study has done in the automobile traders company.

The main objectives of AIPL are to fulfill the automobile needs of the Nepalese people through out the vehicle import and after sales service. Another main objective of AIPL is to help the government in transportation sector by supplying different types of vehicles.

The main objective of the study is to evaluate present inventory position of AIPL and its management as well. What sort of practice is using by AIPL to manage its inventory is also the main objective of this study. This study is to find out the problems in inventory management of AIPL.

This study includes analysis of inventory management of AIPL, ratio analysis, regression analysis, for this purpose, the data of five fiscal years 2005/06 to 2009/10 has been collected and analyzed.

5.2   Conclusion
The role of inventory management is most important in trading company. Finished product, spare parts are the main inventory in this company. They imported finished product and spare parts from India. Conclusions of this study are as follows.

❖ Purchasing and selling department system is very strong in AIPL. It shows that AIPL is some where implementing inventory system.

❖ The theory of inventory management has not been implemented in AIPL. EOQ model and other theoretical tools are not used properly.

❖ Procurement of Raw material and finished goods in AIPL showed positive trend. It indicates that there is appropriate purchasing policy and good forecast in AIPL. Hence in one year the purchase was declined but that was due to the country economic environment. It seems that AIPL is proper balancing demand and supply.

❖ Sales trend is also positive in AIPL which is due to the proper management of purchase and inventory.

❖ Working capital is also in positive trend in AIPL. AIPL is enough fund for working capital which helps AIPL to manage the enough level of inventory to maintain the continue supply in market.

❖ The tools of ABC analysis are used in AIPL but there is no use of JIT tools.

❖ Turnover ratios of AIPL are also normal, but inventory holding days had increased. That was due to the sales was increased extremely which AIPL had to keep enough level of inventory that's why inventory holding days was increased.

❖ There is gap between theory and practice of inventory management in trading companies in Nepal.

5.3   Recommendations

The study focuses on inventory management system for better performance of the organization. On the basis of the study, the following suggestions are recommended for the organization.

❖ There is lack of proper planning while making purchase of goods in AIPL, because the purchase is extremely increased in the fourth fiscal year comparison to the base year. Fluctuation in the purchase will affect the forecasting of stock level.

❖ There is need of maintaining re-order level, maximum stock level, and minimum stock level and as well Economic Order Lever. This helps the management to strike balance between liquidity and profitability in the organization.

❖ The sale of the AIPL is in decreasing trend in second fiscal years and it suddenly increases in last three years. AIPL has to increase its network through out the country as its sales is increasing day by day and AIPL has to maintain proper level of inventory to keep its market share proper and stable.

❖ AIPL has to minimize its inventory holding cost. Inventory occupied huge amount of working capital in an organization. AIPL has less working capital in last year that is not sound for an organization; to operate organization smoothly it should have to maintain working capital properly.

❖ Hence the sales trend is increasing in AIPL but its gross profit is not like that comparatively. AIPL has to control on other overheads and most importantly AIPL has to minimize inventory holding cost.

❖ AIPL inventory holding days is increasing trend. It is very much dangerous to an organization. So AIPL has to minimize the inventory holding days which will helps the organization to minimize the inventory holding cost and increase in profit

❖ Inventory to Current assets ratios are also not uniform in AIPL. It indicates that there is not proper management of current assets in organization. AIPL has low inventory to current assets ration in mid of the last two fiscal years, it is below the average. It should be uniform.

❖ At last I recommend to the AIPL that it should be main focus on managing the inventory level. Because in previous year there was

lowest competitor in market of pickup segment in Nepal but now days there are lots of competition in automobile sector (specially in pick-up segment). To grab the market opportunity AIPL has to increase its working capital level to compete in market for long time.

BIBLIOGRAPHY

Books:

Agrawal, Dr. Govinda Ram, **Marketing in Nepal, Fundamental Management and Strategy,** Educational Enterprises (P) Ltd, Kathmandu, Nepal.

American Institute of Certified Accountants (1961) **Accounting Research and Terminology Bulletins,** New York USA: Vol. 43.

Bosten SE (1975) **Managerial Finance,** Houghton Migtllin Cochan J.

Dobler, D.W, Lee, L and Burt, D.N (1984) **Purchasing and Materials Management and Cases** McGraw Hill Book Company, USA.

Donald, Doubler W. and David, Burt N (1996) **Purchasing and Supply Management** 6th Edition.

Garret, Ternard I. and Silver Milton (1986) **Production Management Analysis,** Harcourt Brace Javanovich Inc, New York.

Gitman LJ (1988) **Principles of Managerial Finance,** Harper & Row Publishers, New York, USA.

Goel BS (1985) **Production Operation Management,** Pragati Prakashan, Meerut, India.

Goel BS (1992) **Production and Operation Management** 6th Edition Published By KK Mittal, Pragati Prakashan.

Goel S.L. (1997) **Modern Management Techniques,** Deep and Deep Publications, Rajouri Garden, New Delhi- 1100227.

Gopalkrishnan P (1993) **Purchasing and Material Management,** Tata Mcgraw Hill Publishing, New Delhi.

Gorden KC, Chen & MC Grrah RE (1982) **Production Management,** The Dryden Press, Japan:2.

Harbert J Tichmond (1969) **Effective Inventory Management Facts and fiction,** Financial Executive.

Jain SP & Narang KL (1995) **Cost Accounting,** Kalyani Publisher, Ludhiyana, India.

Jain SP and Narang KL (1993) **Financial Management Accounting**, Kalyani Publisher, New Delhi.

Joseph, Buchan and Emest, Koeinigsberg (1970) **Scientific Inventory Management,** Published by Prentice-hall of India Private Limited, New Delhi.

Khan MY and Jain PK (1992) **Financial Management,** Tata McGraw Hill Publishing, New Delhi.

Koenigsberg E (1970) **Scientific Inventory Management,** Prentice Hall of India P. Ltd, New Delhi, India.

Kothari CR (1996) **Quantitative Techniques,** Vikash Publishing House P Ltd.

Magee JF (1990) Guides to Inventory Policy, Harvard Business Review, USA.

Man Mohan and Goel SN (1997) **Principal of Management Accounting,** Sahitya Bhawan Publication, Agra.

Management Development Institute (2000) Kansas, **Strategic Purchasing and Supply Management.**

Megee, John F (1990) **Guides to Inventory Policy, II** Harvard Business Reviews.

Muhlemann A, Oakland J & Lockyer K (1996) **Production and Operation Management,** McMillan India Ltd.

Munakarmi SP (2000) **Management Accounting,** Buddha Academic Publishers and Distributors Pvt. Ltd, Kathmandu, Nepal.

Nair NK (1994) **Purchasing and Material Management,** Vikash Publishing House Pvt. Ltd., New Delhi.

New Delhi Handling and Whitin, T.M. **Analysis o Inventory System,** Eaglewood Diffs, New Jersey Printer.

Paisecki D (2004) **Optimizing Economic Order Quantity,** Management Consulting Group, USA.

Pandey IM (1992) **Financial Management,** Vikash Publishing House Pvt. Ltd., New Delhi.

Pandey IM (1995) **Financial Management,** Vikash Publishing House Pvt. Ltd., New Delhi.

Pradhan S (1996) **Basic of Financial Management,** Educational Enterprises P. Ltd, Kathmandu, Nepal.

Prof. Dr. Arsham H (2000) **Inventory Control and ABC Inventory,** University of Baltiimore, USA.

Regmi LK, Joshi PR, Chaudhary AK and Fago G (2003) **Production and Operation Management,** Buddha Academic Publishers and Distributors Pvt. Ltd, Kathmandu, Nepal.

Sharma N (1998) **Accounting and Auditing,** Ekta Books Distributors P. Ltd, Kathmandu.

Sharma RK and Gupta RK (2005) **Management Accounting,** Kalyani Publishers, New Delhi.

Weston JF & Brigham EF (1978) **Essential of Managerial Finance,** The Dryden Press, Chicago, USA.

Weston JF and Copeland TE (1992) **Managerial Finance,** The Dryden Press, Chicago, USA.

Dissertations:

Dahal Purushottam Prasad **A Compare Study on Inventory Management of Dabur Nepal Pvt. Ltd. and Nepal Liver Limited.** An unpublished Master's Degree Thesis, Submitted to the Faculty of Management, T. U.

Gaire, Tara Nath (2009) **Inventory Management of Bottlers Nepal Limited**, An unpublished Master's Degree Thesis, Submitted to the Faculty of Management, Shankar Dev Campus.

Miyan Surphuddin (2006) **Inventory Management, A Case Study of Gorkhapatra Corporation**, An unpublished Master's Degree Thesis, Submitted to the Faculty of Management, T. U.

Shrestha Ram Kumar **Inventory Management of Nepal Lube Oil Limited**, An unpublished Master's Degree Thesis, Submitted to the Faculty of Management, T.U.

Journal and Reports:

Annual Balance Sheet report Agni Incorporated Pvt. Ltd, From 2005/06 to 2009/10

Annual Journal reports of Nepal Automobiles Dealers Association, **NADA**

Various issue of Monthly magazine Auto Nepal

Web sites:

www.agniinc.com.np

www.economywatch.com/world-industries/automobile/

www.inventoryops.com

www.mahindra.com

www.nepalauto.com

ANNEX-1

Regression Equation of Closing Stock (Y) on Sales (X)

Fiscal Year	Sales (X)	Closing Stock (Y)	X^2	Y^2	XY
2005/06	4940.25	654.88	24406070.06	428867.81	3235270.92
2006/07	3977.43	673.16	15819949.40	453144.39	2677446.78
2007/08	5432.35	776.83	29510426.52	603464.85	4220012.45
2008/09	9706.45	1076.62	94215171.60	1159110.62	10450158.20
2009/10	12912.78	629.29	166739887.33	396005.90	8125883.33
Total	$\sum X=$ 36969.26	$\sum Y=$ 3810.78	$\sum X2=$ 330691504.92	$\sum Y2=$ 3040593.58	$\sum XY=$ 28708771.67

Hence,

$$N = 5$$

$$\overline{X} = \frac{\sum X}{N}$$

$$= \frac{36969.26}{5}$$

$$= 7393.85$$

$$\therefore \overline{X} = 7393.85$$

$$\overline{Y} = \frac{\sum Y}{N}$$

$$= \frac{3810.78}{5}$$

$$\therefore \overline{Y} = 762.16$$

Let the regression equation of Closing Stock (Y) on Sales (X) be

$$Y = a + bX\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ (i)}$$

Where,

X = Independent Variables.

Y = Dependent Variables.

a = Intercept of the line.

b = Regression coefficient of Y on X

i.e.

$$b_{yx} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{N\Sigma X^2 - (\Sigma X)^2}$$

$$= \frac{5 \times 28708771.67 - 36969.26 \times 3810.78}{5 \times 330691504.92 - (36969.26)^2}$$

$$= \frac{143543858.37 - 140881716.62}{1653457524.60 - 1366726184.95}$$

$$= \frac{2662141.75}{286731339.66}$$

$$\therefore \quad b \quad = \quad 0.0093$$

$$a \quad = \quad \bar{Y} - b\bar{X}$$

$$= 762.16 - 0.0093 \times 7393.85$$

$$= 762.16 - 68.65$$

$$\therefore \quad a \quad = 693.51$$

Substituting the values of a and b in equation (i), we get regression equation of Y (Closing Stock) on X (Sales) is

Y= 693.51+0.0093×X

Simple Coefficient of Determination (r^2)

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]} \sqrt{[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{5 \times 28708771.67 - 36969.26 \times 3810.78}{\sqrt{(5 \times 330691504.92 - (36969.26)^2} \times \sqrt{(5 \times 3040593.58 - (3810.78)^2}}$$

$$= \frac{143543858.37 - 140881716.62}{\sqrt{1653457525 - 1366726185} \times \sqrt{15202967.89 - 14522044.21}}$$

$$= \frac{2662141.75}{\sqrt{286731339.70} \times \sqrt{680923.68}}$$

$$= \frac{2662141.75}{16933.14 \times 825.18}$$

$$= 0.1905$$

$$\therefore r_{xy} = 0.1905$$

$$r^2_{xy} = (0.1905)^2$$

$$\therefore r^2_{xy} = 0.0363$$

$$\text{Standard Error} = \frac{1 - r^2}{\sqrt{n}}$$

$$= \frac{1 - 0.0363}{\sqrt{5}}$$

$$= \frac{0.9637}{2.2361}$$

$$= 0.4310$$

$$\therefore S/E = 0.4310$$

$$\text{Probable Error} = 0.6745 \times S/E$$

$$= 0.6745 \times 0.4310$$

$$= 0.2907$$

$$\therefore P/E = 0.2907$$

ANNEX-2

Regression Equation of Gross Profits (Y) on Closing Stock (X)

Fiscal Year	Closing Stock (X)	Gross Profits (Y)	X²	Y²	XY
2005/06	654.88	795.34	428867.81	632565.72	520852.26
2006/07	673.16	748.4	453144.39	560102.56	503792.94
2007/08	776.83	1018.22	603464.85	1036771.97	790983.84
2008/09	1076.62	1715.23	1159110.62	2942013.95	1846650.92
2009/10	629.29	2528.21	396005.90	6391845.80	1590977.27
Total	∑X= 3810.78	∑Y= 6805.40	∑X2= 3040593.58	∑Y2= 11563300	∑XY= 5253257.24

Hence,

$$N = 5$$

$$\overline{X} = \frac{\Sigma X}{N}$$

$$= \frac{3810.78}{5}$$

$$\therefore \overline{X} = 762.16$$

$$\overline{Y} = \frac{\Sigma Y}{N}$$

$$= \frac{6805.40}{5}$$

$$= 1361.08$$

$$\therefore \overline{Y} = 1361.08$$

Let the regression equation of Gross Profits (Y) on Closing Stock (X) be

Y = a + bX……………………….. (i)

Where,

    X = Independent Variables.

    Y = Dependent Variables.

    a = Intercept of the line.

    b = Regression coefficient of Y on X

i.e.

$$b_{yx} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{N\Sigma X^2 - (\Sigma X)^2}$$

$$= \frac{5 \times 5253257.24 - 3810.78 \times 6805.40}{5 \times 3040593.58 - (3810.78)^2}$$

$$= \frac{26266286.20 - 25933882.21}{15202967.89 - 14522044.21}$$

$$= \frac{332403.98}{680923.68}$$

$$= 0.49$$

$$a = \overline{Y} - b\overline{X}$$

$$= 1361.08 - 0.49 \times 762.16$$

$$= 1361.08 - 372.06$$

$$\therefore a = 989.02$$

Substituting the values of a and b in equation (i), we get regression equation of Y (Gross Profits) on X (Closing Stock) is

$$Y = 989.02 + 0.49 \times X$$

Simple Coefficient of Determination (r^2)

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]}\sqrt{[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{5 \times 5253257.24 - 3810.78 \times 6805.40}{\sqrt{(5 \times 3040593.58 - (3810.78)^2}\times\sqrt{(5 \times 11563300 - (6805.40)^2}}$$

$$= \frac{26266286.20 - 2593382.21}{\sqrt{15202967.89 - 14522044.21}\times\sqrt{57816500.01 - 46313469.16}}$$

$$= \frac{332403.98}{\sqrt{680923.68}\times\sqrt{11503030.85}}$$

$$= \frac{332403.98}{825.18 \times 3391.61}$$

$$= 0.1188$$

$$\therefore r_{xy} = 0.1188$$

$$r^2{}_{xy} = (0.1188)^2$$

$$\therefore r^2{}_{xy} = 0.0141$$

$$\text{Standard Error} = \frac{1 - r^2}{\sqrt{n}}$$

$$= \frac{1 - 0.0141}{\sqrt{5}}$$

$$= \frac{0.9859}{2.2361}$$

$$= 0.4409$$

$$\therefore S/E = 0.4409$$

$$\text{Probable Error} = 0.6745 \times S/E$$

$$= 0.6745 \times 0.4409$$

$$= 0.2974$$
$$\therefore P/E = 0.2974$$

ANNEX-3

Regression Equation of Working Capital (Y) on Closing Stock (X)

Fiscal Year	Closing Stock (X)	Working Capital (Y)	X²	Y²	XY
2005/06	654.88	13798.22	428867.81	190390875.17	9036178.31
2006/07	673.16	11089.13	453144.39	122968804.16	7464758.75
2007/08	776.83	36747.02	603464.85	1350343478.88	28546187.55
2008/09	1076.62	13146.90	1159110.62	172840979.61	14154215.48
2009/10	629.29	10410.26	396005.90	108373513.27	6551072.52
Total	$\sum$X= 3810.78	$\sum$Y= 85191.53	$\sum$X2= 3040593.58	$\sum$Y2= 1944917651.08	$\sum$XY= 65752412.60

Hence,

$$N = 5$$

$$\overline{X} = \frac{\sum X}{N}$$

$$= \frac{3810.58}{5}$$

$$= 762.16$$

$$\therefore \overline{X} = 762.16$$

$$\overline{Y} = \frac{\sum Y}{N}$$

$$= \frac{85191.53}{5}$$

$$\therefore \bar{Y} = 17038.31$$

Let the regression equation of Working Capital (Y) on Closing Stock (X) be

$$Y = a + bX\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{ (i)}$$

Where,

        X = Independent Variables.

        Y = Dependent Variables.

        a = Intercept of the line.

        b = Regression coefficient of Y on X

i.e.

$$b_{yx} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{N\Sigma X^2 - (\Sigma X)^2}$$

$$= \frac{5 \times 65752412.60 - 3810.78 \times 85191.53}{5 \times 3040593.58 - (3810.78)^2}$$

$$= \frac{328762063.02 - 324646178.69}{15202967.89 - 14522044.21}$$

$$= \frac{4115884.33}{680923.68}$$

$$= 6.04$$

$$a = \bar{Y} - b\bar{X}$$

$$= 17038.31 - 6.04 \times 762.16$$

$$= 17038.31 - 4606.90$$

$$\therefore a = 12431.41$$

Substituting the values of a and b in equation (i), we get regression equation of Working Capital (Y) on Closing Stock (X) is

$$Y = 12431.41 + 6.04 \times X$$

Simple Coefficient of Determination (r^2)

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2]}\sqrt{[N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{5 \times 65752412.60 - 3810.78 \times 85191.53}{\sqrt{(5 \times 3040593.58 - (3810.78)^2} \times \sqrt{(5 \times 1944917651.08 - (85191.53)^2}}$$

$$= \frac{328762063.02 - 324646178.69}{\sqrt{15202967.89 - 14522044.21} \times \sqrt{9724588255.42 - 7257596783.74}}$$

$$= \frac{4115884.33}{\sqrt{680923.68} \times \sqrt{2466991471.68}}$$

$$= \frac{4115884.33}{825.18 \times 49668.82}$$

$$= 0.1004$$

$$\therefore r_{xy} = 0.1004$$

$$r^2_{xy} = (0.1004)^2$$

$$\therefore r^2_{xy} = 0.0101$$

$$\text{Standard Error} = \frac{1 - r^2}{\sqrt{n}}$$

$$= \frac{1 - 0.0101}{\sqrt{5}}$$

$$= \frac{0.9899}{2.2361}$$

$$= 0.4427$$

$$\therefore S/E = 0.4427$$

$$\text{Probable Error} = 0.6745 \times S/E$$

$$= 0.6745 \times 0.4427$$

$$= 0.2986$$

$$\therefore P/E = 0.2986$$