IMPACT OF SUPPLY CHAIN MANAGEMENT AND INVENTORY MANAGEMENT ON THE FINANCIAL PERFORMANCE OF SELECT ORGANISATIONS: A TRIANGULAR RELATIONSHIP

Thesis Submitted for the Award of the Degree of

DOCTOR OF PHILOSOPHY

in

Management

By

Sourabh Kumar

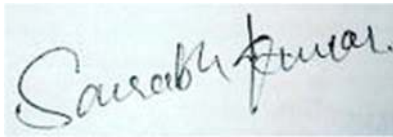**Registration Number:41800690**

Supervised By

Dr. Amit Dutt (11148)

Management (Professor)

Professor, Lovely Professional University

LOVELY PROFESSIONAL UNIVERSITY, PUNJAB
2023

DECLARATION

I, hereby declared that the presented work in the thesis entitled "Impact of Supply Chain Management and Inventory Management on the Financial Performance of Select Organisations: A Triangular Relationship."in fulfilment of degree of **Doctor of Philosophy (Ph.D.)** is outcome of research work carried out by me under the supervision of Dr. Amit Dutt, working as Professor, in the Division of Academic Affairs of Lovely Professional University, Punjab, India. In keeping with general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigator. This work has not been submitted in part or full to any other University or Institute for the award of any degree.

(Signature of Scholar)

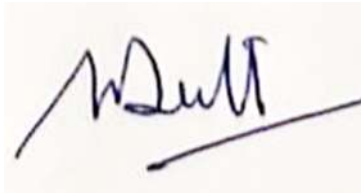Name of the scholar: Sourabh Kumar

Registration No.: 41800690

Department/school: Management/Mittal School of Business

Lovely Professional University,

Punjab, India

CERTIFICATE

This is to certify that the work reported in the Ph.D. thesis entitled "Impact of supply chain management and inventory management on the financial performance of select organisations: a triangular relationship." submitted in fulfillment of the requirement for the reward of degree of **Doctor of Philosophy (Ph.D.)** in the Operation Management, is a research work carried out by Sourabh Kumar (Registration No.) 41800690, is bonafide record of his/her original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.

(Signature of Supervisor)

Name of supervisor: Dr. Amit Dutt

Designation: Professor

Department/school: Division of Academic Affairs

University: Lovely Professional University

Abstract

Supply chain management and inventory management are an integral part of any organisation and most of the manufacturing firm's working depends upon effective supply chain and inventory management. Thus, it also has a significant impact on the financial performance of the firm with respect to many financial parameters and Key Performance Indicators (KPIs). This study is proposed to examine the impact of supply chain management and inventory management on the financial performance of the manufacturing firms. Throughout the process of review of literature, the researcher has found relevant gaps like elimination of demand management, inclusion of qualitative factors, ignorance of liquidity management, sole concentration on physical logistics operations and non-inclusion of all the key financial parameters towards addressing the issue of impact of supply chain on financial performance of the company. Such gaps have formed a foundation for the problem statement and key objectives of the study. The work analysis both quantitative and qualitative factors/variables in order to get the best analysis and results. Both primary as well as secondary data is used, and hypothesis to be tested through Correlation, ANOVA, Linear Regression and Multiple Linear Regression in order to provide better relational diagnosis and analysis to the problem statement. Three main hypotheses are developed and tested using various statistical methods mentioned above. These hypotheses test the triangular relationship between financial performance of the firm with respect to supply chain management and Inventory management and vice versa. Various KPIs of the firm performance where computed using collected survey data from 5 automobile firms namely Maruti Suzuki India Ltd., Tata Motors Ltd., Mahindra & Mahindra Ltd., Bajaj Auto Ltd. and Hero MotoCorp Ltd. in the north India. This research methodology is developed to analyse strategically the impact of supply chain and inventory management on the financial performance of the manufacturing firms, taking all the possible parameters and KPIs into consideration. Results of statistical analysis found positive relationship between Good Supply Chain Practices on the overall firm's financial performance. All the Results were interpreted with a significance level of $p < 0.01$. Same is found true for the inventory management practices. This study finally proves that there is positive and statistical significant relationship between Supply Chain Management performance and

Inventory management performance on the financial performance the firm's under consideration. Not only that, it was also found that if a firm's which financially more performant and manage Supply Chains and Inventories better.

ACKNOWLEDGEMENT

Table of Contents

List of Tables

List of Figures

xvi

List of Acronyms

Acronym	Description
AHP	Analytical Hierarchy Process
ANOVA	Analysis of Variance
ANP	Analytic Network Process
ASEAN	Association of Southeast Asian Nations
BPMN	Business Process Modeling Notation
CPFR	Collaborative Planning, Forecasting and Replenishment
CSR	Corporate social responsibility
CTP	Certified treasury professional
EOQ	Economic order quantity
ERP	Enterprise resource planning
FIFO	First In First Out
FM	Financial Management
GDP	Gross Domestic Product
GUI	Graphical User Interface
ICT	Information and Communications Technology
IM	Inventory Management
IOT	Internet of things
JIT	Just in time
KPI	Key Performance indicators
LIFO	Lat In First Out
LSP	Logistics Service Providers
MCDA	Multi-Criteria Decision Analysis
MRP	Material Requirements Planning
PLS	Partial least squares
ROI	Return on Investment
SCM	Supply Chain Management
SOP	standard operating procedure
SEM	Structural Equation Modeling

SPSS	Statistical Package for Social Sciences
VMI	Vendor-managed inventory
WACC	Weighted average cost of capital

Chapter 1

Introduction

In the economic environment, to meet the needs of business concerns, firms require money. Every kind of commercial activity is dependent on finance. Hence finance is the organization's lifeblood. Doesn't matter how small or big a firm's business concerns are, they all require funds, inventory and a strong supply chain to run their daily tasks.

Recent socio-economic developments have raised interest in supply chain and its management. Due to high demographic and socioeconomic developments especially growing population as well as increasing double-income families, there is huge demand for new innovative products (Van der Vorst et al., 2000) with advanced additional features. Additionally with the globalization the knowledge as well as reach of global products has increased. Thus, both nationally and internationally, globalization as well as modernization had a significant impact on the manufacturing firms. Consequently, new markets have emerged. Customers now demand more from suppliers in terms of increased efficiency, serviceability, and flexibility while still receiving low rates. These changes led to various modifications in the marketplace which makes us to explore more about concepts of supply chain and inventory management in regard to the finances of the company. Hence, businesses are currently attempting to maintain their costs, quality, technology, productivity, efficiency, and other strategic advantages as a strategy to use in a highly competitive environment on a worldwide scale through management of finances, inventories and supply chains.

1.1 Supply Chain

A network of numerous interconnected commercial activities is referred to as a supply chain. It is a process through which various business partners (such as wholesalers, retailers, distributers, importers, exporters etc.) exchange goods, products, data, services, information, and processes so as to increase productivity and make the business more efficient and easy. A supply chain includes all of the (tech target, 2022)steps from the supplier's distribution of raw materials to the manufacturer to the

ultimately delivering it to the consumers. A supply chain focuses on the fundamental tasks that must be completed by organisation in order to transform raw materials or component parts into finished goods or services. Corporations make use of supply chains to share loads, save costs& time as well as to enhance their availability in the market.

.
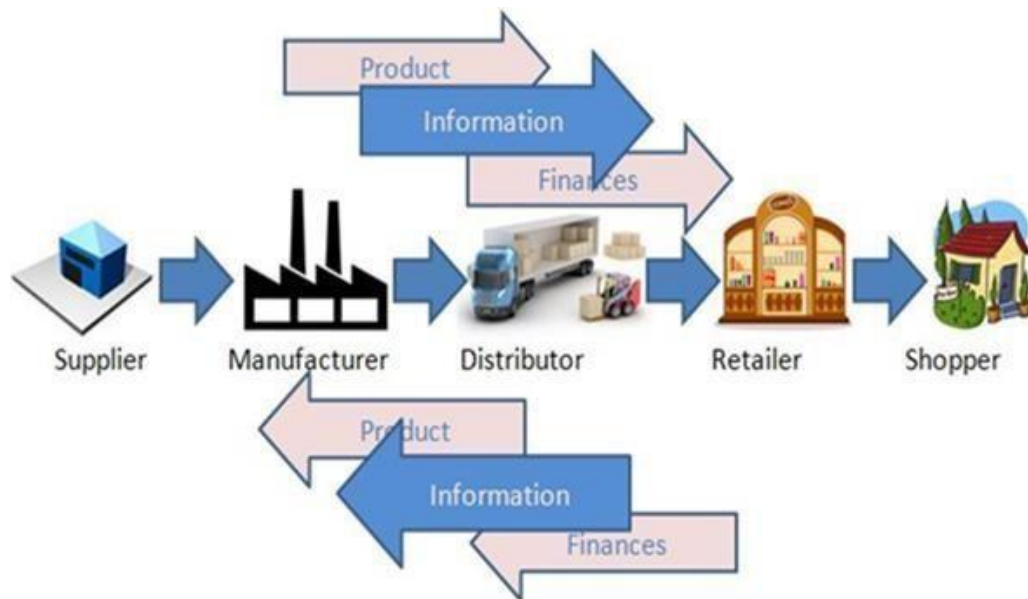
Figure 1.1: Supply Chain from supplier till shopper (tutorials point, 2022)

1.2 Steps of Supply chain

Figure1 shows the order of fundamental steps of a supply chain and are also mentioned in brief as follows:

- Sourcing raw materials: With the help of supply chain, raw materials are being supplied to the manufacturing firms to produce products or parts of products.

- Refining those materials into basic parts: Some products or their parts may require refining or require combining various parts from different sites to get the desired product.

- Transferring those products to distributers, wholesalers, retailers, company warehouse etc.

- In case of e-commerce delivering it to shopper/customer.

- Then again Customer support as well as providing return services, returning back to warehouse or any shop.
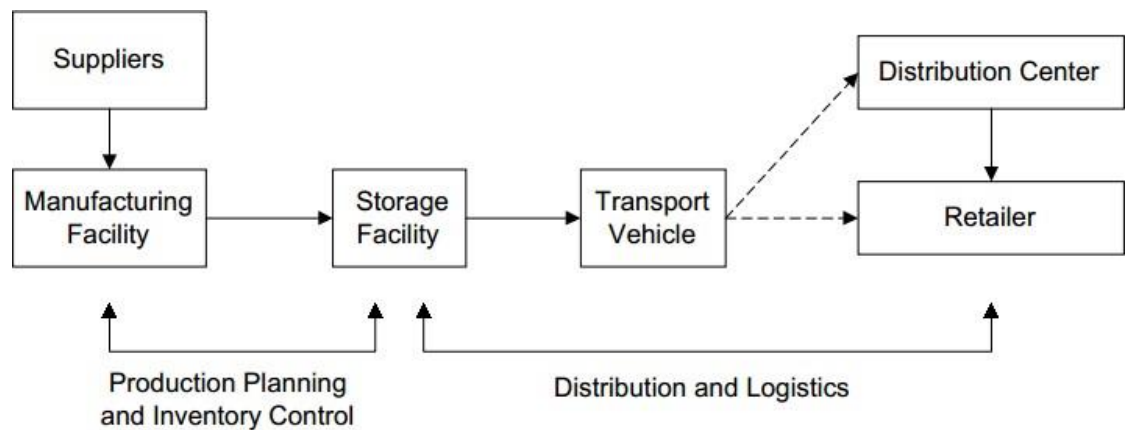
Figure 1.2: Process of Supply chain (Beamon et al., 1998)

1.3 Supply Chain Management (SCM)

Literature contains plenty of definitions of SCM and can be categorized into three different types: a management philosophy, implementation of a management philosophy, and a set of management processes. In general there are various definitions given by various authors mentioned in Figure 1.3.

SCM as a philosophy sees the supply chain as a single unit, in spite of fragmented parts, each part doing its own function. In other words, to handle the complete flow of goods from the supplier to the final customer, the SCM philosophy therefore expands the idea of partnerships into a multifirm effort.

According to the review, SCM possesses the following traits:

1. A systematic technique to handle the total flow of products or service inventory from the manufacturer to the final customer.
2. A strategic orientation towards cooperative hard work to synchronize intra-firm and interfirm operational and strategic abilities.
3. A customer centric to develop distinctive and personalized sources of customer value that will result in customer satisfaction

Next is SCM as a Collection of Tasks to Put into Practice Management Philosophy. Businesses that adopt SCM as a philosophy must set up management techniques that allow them to act or conduct in accordance with the philosophy. Finally, SCM can be seen as a set of Management Processes. Many authors have defined SCM as set of activities and some other authors have discussed on management processes. SCM as a process is defined as a structured and quantified series of actions intended to deliver a certain outcome for a given client or market. Also some authors suggested SCM is the practice of controlling how people, information, and commodities move across organizational boundaries in order to improve customer service and economic value. Ross Supply chain process is defined as the real physical business activities, structures, and procedures that describe how a specific supply chain transfers products and services from production through distribution. In other words, a procedure is a particular sequencing of labour activities over time and space, with a start and end, inputs and outputs that are easily defined, and a structure for action.

A key cross-disciplinary idea in contemporary business management and study is SCM. Because a supply chain that is optimized results in cheaper costs and a quicker production cycle as SCM is an essential procedure. Providing the appropriate quantity of the right product at the right time to the right consumers at the economic rate is the goal of supply chain management. A company's total performance is directly impacted by quality of SCM.

SCM has grown in importance over the last few years in contemporary company and manufacturing processes. The techniques used by businesses to manage their operations, supply chain structures, and strategic alliances are changing as a result of recent technological advancements, particularly in information technology and the growing use of web-based platforms. Many businesses today use cutting-edge techniques and technologies to enhance their supply chain operations. Through a novel theory in the business management of sustainable competition, it improves corporate sustainability and efficiency. The management of the supply chain is now essential for businesses that provide goods and services to final consumers. It boosts organizational effectiveness and sustainability.

1.4 Types of Supply Chain

There are various kinds of supply chains that one can incorporate in their organizations and mentioned in Table 1. In general- functional products need efficient supply chains while products that are innovative need responsive supply chains (Fisher et al., 1997). Major types of supply chain are discussed subheadings below:

1.4.1 Agile supply chain

A supply chain needs to have four distinctive qualities in order to be true agile, as illustrated in Figure 1.4. The agile supply chain is responsive to the market. Market sensitivity implies the supply chain's capability to detect and respond to actual demand. Instead of demand-driven, maximum businesses are forecast-driven. Businesses are required to develop estimations based on previous sales or shipments, and then turn these projections into inventory because they have no direct feed-forward from the market in the form of data on real customer needs(Christopher et al., 2000).
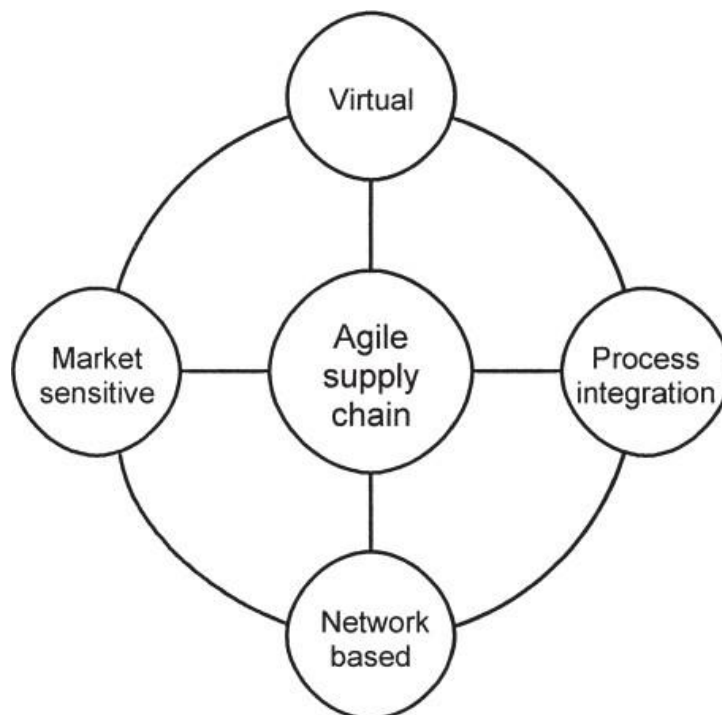
Figure 1.3: Components of Agile Supply Chain (Christopher et al., 2000)

By the use of information technology a virtual supply chain is being created to transmit data between customers and providers. Instead of being inventory-based, virtual supply networks are information-based.

Only process integration will allow shared information among supply chain partners to be effectively utilized. Process integration entails joint product creation, common systems, shared information, and cooperative working between buyers and suppliers. As businesses concentrate on concentrating their core skills and outsource all other activities, this sort of collaboration in the supply chain is becoming more and more common. This new kind of relationship is necessary in the world because a greater dependence on suppliers and alliance partners is now unavoidable.

The fourth component of agility is provided by confederation joined together i.e. a network of partners connected to each other. It is becoming increasingly evident that individual industries no more participate as stand-alone entities, but rather as supply chains

Various Supply Chains	
1	Agile Supply Chain
2	Fast Supply Chain
3	Flexible Supply Chain
4	Efficient Supply Chain
5	Generic Supply Chain
6	e-Commerce Supply Chain

Table 1-1: Various Supply Chains

1.4.2 Fast supply chains

So as to meet peak consumer demands(Barnes et al., 2006), fast fashion is a business strategy that tries to shorten the lead times for transporting new fashion products into stores and the processes involved in the purchase cycle. The conventional supply chain format has come under pressure because of changes in consumer lifestyle and the resulting needs for novelty. As the current century has progressed, shops like

H&M and Zara have switched their competitive edge from price to quick responsiveness to shifting fashion trends and consumer demand. Retailers must therefore be adaptable enough to react quickly to shifting consumer demands, putting the desired product in stock within weeks or even just a few days in order to meet those demands before they change once more and, more importantly, before the competition.

Supply chain management related to fast fashion, emphasis it places on reducing lead times. This makes a pointer that in modern retailing, supply chains rather than individual companies (Hines et al., 2004) compete, hence effective SCM has been identified as a critical success component. To enhance the effectiveness of the system that delivers customer value, more businesses are now relying on partnerships with other supply chain participants as part of their supply chain strategies.

1.4.3 Flexible supply chain

As per (Duclos et al., 2003)a flexible supply chain consists of six different elements, all of them are briefly mentioned below-

1. Operation System Flexibility includes ability to set up activities and assets at each supply chain node to respond to changing customer patterns.
2. Market Flexibility is the ability to change new and old items in large quantities and cultivate tight relationships with customers, including product designs.
3. Logistic flexibility includes ability to accept and distribute goods at a reasonable cost as sources of supply and customers change (cancelling order in middle before delivery, globalization, postponement, customer location changes,).
4. Supply flexibility is the ability to reorganize the supply chain to change product supply to meet customer demand.
5. Organizational flexibility is the element that matches labour force skill to supply chain needs in order to fit into customer service or demands.
6. Information System flexibility is the last element that match evolving client demand with information system architectures and systems.

1.4.4 Efficient supply chain management

It is planned (Modi et al., 2010) to show up in the firm's supplies flowing quickly and evenly in both directions. The performance of the company's supply network is measured by how quickly materials are moved. The even flow of goods and the absence of harmful variations are indicators of the firm's supply chain stability.

1.4.5 Generic Supply Chain

As soon as the extraction and sourcing of raw materials is performed, a general supply chain is established. A logistics company then transports the raw ingredients to a supplier who functions as the manufacturer, or most likely to several manufacturers, who process and refine them to create a finished good.

After being wholesaled by a distributor, that finished item is then transferred via supply chain to the stores Consumers can purchase the product from the local vendor at a physical store. Once the buyer buys and pays for it, the cycle is said to be complete, but the product's demand drives the manufacture of additional raw materials to restart the cycle.

1.4.6 Supply Chain for an e-Commerce Company

The e-commerce business runs a website where it offers a range of goods for sale. As soon as customer orders merchandise, technologies like a checkout cart, an order system, or a third-party product like Wix handle the placed order. Next, payment operations of placed orders are handled by the payment processors, which actually form a new supply chain.

Though typically these payment processors use third parties such as PayPal, Stripe and various banks get involved and other service providers while some use their own systems. As soon as customer orders, the warehouse ready that order and make sure the product is ready for delivery. Either internal to the organization or some third-party logistics service can handle the inventory.

Subsequently, the warehouse sends the order to the shipping firm. Again, the shipping may be handled internally or through a third party. The customer receives the package when it gets to their door and with this cycle is said to be complete and can be revived if customer raise an exchange or return request.

1.5 Inventory Management(IM)

The American Production and Inventory Society (APICS) (Toomey et al., 2000) describes IM as a part of business management that deals with organizing and managing inventories. Maintaining a desired stock level of particular products or items is the IM's primary duty. Products, customers, and the (manufactured or purchased) process that makes the product available must all be taken into account in the systems that plan and control inventories. The price for managing Inventory is a hidden expense that is used throughout the entire process but is still included in the final product.

1.6 Accounting for Inventory

Inventory that is sold generates revenue (net suite, 2022). Prior selling the inventory, inventory consumes cash even if it is an asset on the balance sheet. Hence, too much stock costs money and decreases cash flow. Inventory is a current asset since businesses often aim to sell their finished items within a year of production (investopedia, 2022). Inventory must be physically counted or measured before it can be recorded on a balance sheet. Now-a-days modern inventory management systems that can track inventory levels in real time are routinely used by businesses.

The evaluation of stock is major area, since the accounting method used to construct an appraisal directly affects the total cost indicated to the cost of goods sold in a fiscal year and, as a result, the amount of revenue netted. The following is the formula for defining the cost of products sold throughout a fiscal year(Khan et al., 2018):

$$Cost\ of\ goods\ sold$$
$$= Beginning\ inventory\ + Purchases\ - Ending\ inventory$$

As a result, the cost allocated to terminating inventory serves as the primary foundation for the cost of goods sold, which brings us full circle to the accounting

method used to calculate it. There are a variety of possible inventory accounting techniques mentioned as follow.

1.6.1 Periodic Inventory System

Every single purchase is recorded using this approach in a purchase account. Following the completion of the physical stock, the remaining funds from the purchase account are transferred to the inventory account, which is then adjusted to give the ending inventory cost. Periodic inventory accounting does not track inventory on a regularly, but it does allow a company to recognize the beginning inventory and ending inventory within a financial year. An actual physical stock count is used to track inventory. The cost of items sold is determined in periodic inventory system using the formula:

$$Cost\ of\ goods\ available\ for\ sale = Beginning\ inventory + Purchases$$

$$Cost\ of\ goods\ sold = Cost\ of\ goods\ available\ for\ sale\ \text{-}\ Ending\ inventory$$

1.6.1.1 Perpetual Inventory System

Compared to periodic inventory accounting systems, perpetual inventory accounting systems use additional records. Each stock item is maintained on a separate account. These inventory records provide information on purchases, stock in hand, and cost of products sold. Systems of perpetual accounting give management a very high degree of stock control. Through point-of-sale inventory systems, a perpetual inventory accounting system reports the stock balances of the store after each transaction. Systems of perpetual inventory give business owners evidence of what, when, where, and for how much a product is sold. Consequently, it enables businesses to use a centralized inventory accounting system. The main benefit of conducting a routine stock count is to determine how much inventory has been sold, lost, stolen, or is deteriorating.

1.6.2 Specific Identification Method

Follow each stock item's cost separately, and when you sell the particular item to which the cost has been assigned, you add that cost to the cost of goods sold. This strategy is only effective for precisely expensive and exceptional items, such as

vehicles, buses, cars (automobiles), or works of art, because it necessitates a tremendous amount of data outlining. In the majority of other situations, it is not a practical technique.

1.6.3 Weighted Average Method: -

Because the cost of any new bought stock is combined with in-hand stock cost to get a new weighted average cost, which is then applied once more when more stock is acquired, the inventory under this method is typically of one layer (although it can be used in the inventory with multi-layer then it requires very high level of tracking of individual items).

Inventory items are so muddled and mixed together so it is not possible to assign a specific cost to a specific item. It is impossible to assign a cost to a single piece of inventory since they are so commoditized (i.e., replicas of one another). For instance, if you purchased 100 oil barrels at Rs2000, 2100, and 2200, your average cost would be Rs2100. When a drum of oil is sold, the weighted average technique assumes that the cost was Rs2100, regardless of what was actually paid for that particular drum.

1.6.4 Next in First Out Method (NIFO):-

The strategy aims to bill for suppliers or the cost of the goods sold at a true cost that is as close as possible to the market rate. The price of materials that have been ordered but not yet received is utilized as the next price, or the cost of items sold. In other words, even though the company hasn't actually received the items, the cost of commodities supplied for further processing or vending is based on the most recent price at which the company has committed. For instance, There are 200 units of material A already in stock that were acquired for $1 each, and a buy order for 200 additional units at $2 has been placed. They will give the things to the production department at a cost of $2 per unit if a request for 75 units is submitted (the price at which the materials are yet to be received). Even when using multiple layers of inventory, the cash flow is still very strong. The cost of materials issued or items sold is subtracted from the overall cost of materials or goods purchased to determine the value of inventory as of a specific date. This method's calculations for issue pricing are intricate, hence it isn't frequently employed.

1.6.5 First in, first out method (FIFO):-

The things in hand are the most recent ones since the FIFO technique assumes that anything acquired first must be sold or consumed for production first. This method is desirable primarily from a theoretical perspective because it closely aligns with the actual stock progress in the majority of corporations. When costs are increasing (which is typically the case in most economies), the assumption that the most basic units acquired would be used first results in the cost of items supplied being charged with the lowest amount first. Lower cost of goods sold results in increased operational revenue, which increases the tax burden on income. The benefit of using this strategy is that the oldest supplies are eliminated, and only the recent inventory on hand is remaining.

1.6.6 First Expired First Out (FEFO):-

The FEFO technique assumes that things purchased with the earliest expiration date must be sold or consumed for production first, meaning the items in hand have a longer shelf life. The ones that should have expired recently are the costs of the goods sold or the materials used. The benefit of using this strategy is that the early expiry supplies are eliminated and only the most recent inventory on hand are left behind.

1.6.7 Last In, First Out Method (LIFO):-

The oldest objects are currently in hand since the LIFO approach assumes that the last-obtained goods must be first sold or consumed for production. Considering that the latest units purchased are the early ones used indicating that the cost of goods sold is likely to be higher, which consequently hints to less operating earnings, and fewer income taxes. In most firms, this method does not go with the natural flow of stock; in fact, the LIFO technique is prohibited under International Financial Reporting Standards. The issue with this approach is that it can take years for the oldest stock layers to be removed.

1.6.8 Highest In, First out (HIFO):-

The HIFO technique assumes that the products purchased with the highest value must be first sold or consumed for production, meaning that the items in your possession are the less expensive ones. When costs are increasing (which is typically the case in

most economies), the assumption that the most expensive units purchased would be used first means that the highest costs will be added to the cost of goods sold first. Because operational revenue is lower when running costs are higher, income taxes and dividends aren't as high of a burden. The issue with this approach is that it can take years for the lowest value stock layers to be eliminated.

1.7 Inventory Management Techniques (IMT)

Along with the accounting it is also a necessity to manage inventory for better ADMINISTRATION, control, utilization of space and knowledge of inventory (which, where and how much of quantity of a product is there) in the warehouse. The Figure 7 has mentioned various Inventory Management Techniques and sub headings below discuss the same.

1.7.1 Always Better Control

Large businesses frequently use the Always Better Control famously known as ABC (Aro-Gordon et al., 2016) technique to effectively manage a sizable number of inventory items. The method seeks to achieve effective material control by grouping the inventory into 3 categories, A, B, and Q, based on their respective values as illustrated in(Aro-Gordon et al., 2016)

1.7.2 Just-In-Time (JIT)

JIT (Aro-Gordon et al., 2016, Atnafu et al., 2018) is a strategy that targets to restock inventory for businesses just when it is needed, as the name would imply. It will be the favoured strategy for tremendously expensive inventory items with substantially higher purchasing prices, holding costs, or ordering costs as comparison its orders are low demand. The strategy prevents excess inventory and the expenses that a product may cost as an inventory. Hence, organizations receive inventory only when the need for more stock is approaching. Making sure the vendor delivers on time is essential for the JIT method to succeed. This is done in an effort to avoid the costly and permanent business disruptions that rise due to inventory delivery delays, which are a significant operational management problem for many manufacturers. By decreasing in-process inventory and related carrying costs, just-in-time scheduling, an emerging discipline in planning, seeks to increase return on investment.

1.7.3 Vendor-Managed Inventory (VMI)

In a seller-consumer relationship, VMI allows the vendor to monitor, plan, and control inventory for their clients. Vendor is responsible for maintaining the inventory within previously agreed-upon levels, while the client concentrates on increasing demand accuracy. In exchange for prompt inventory replenishment which contributes in improving overall capacity planning and institutional efficiency, the customer organization foregoes its order-making duties. It is possible to create mathematical models that reduce the whole cost of the inventory management system (including vendor and buyer/customer charges).

1.7.4 Bulk-Purchasing

This is a tried and well tested method(Aro-Gordon et al., 2016) for managing inventory and foundation of this idea is- buying items in bulk will result in significantly reduced costs. The method can only be used if management knows that the inventory item in issue belongs to a fast-moving group. This inventory management scheme can be considered and can do a lot of savings, if a product is in high demand. Its disadvantage is that purchasing in large numbers may take longer than purchasing in smaller amounts since the latter require less production and storage time. Bulk purchase is a desirable inventory management strategy since inventories often account for more than half of a manufacturing enterprise's current assets and a sizeable amount of the assets and working capital of the majority of companies.

1.7.5 Economic order quantity (EOQ)

This method explains that inventory control needs to be set up logically (Atnafu et al., 2018) so that the company can determine when and how much to order. Estimating EOQ can be used to do this. Financial request amount uses correlation to set up their stock re-establishment on the best possible basis. The arrangement, for instance, could be planned on a monthly, quarterly, half-yearly, or annual basis. This technique enables businesses to have negligible or zero limit charges inside of their circulation focuses. EOQ makes an effort to improve stock management and utilization in this way.

1.8 Finance

Any type of business, no matter how big or little, needs money to operate. Finance is the science and art of managing money, and it can be characterized as some form of capital, a fund, an investment, etc. (Paramasivan et al., 2009) including financial services and financial instruments. Finance is the term used to describe the timely provisioning of funds. The finance function is responsible for raising capital and applying it effectively to business issues. Finance is necessary for all of these issues, whether they relate to supply chains, inventories, or their management.

Finance is defined as "the Science on study of the management of funds" in the Ninth New Collegiate Dictionary of Webster's, and Fund Management is defined as "the system that includes the circulation of money, the granting of credit, the making of investments, and the provision of banking facilities."

Definitions of Business Finance	
By Wheeler	Business finance is a business activity that concerns with the acquisition and conversation of capital funds in meeting financial needs and overall objectives of a business enterprise‖
Guthumann and Dougall	―Business finance can broadly be defined as the activity concerned with planning, raising, controlling, administering of the funds used in the business‖
Parhter and Wert	Business finance primarily deals with ‒raising, administering and disbursing funds by privately owned business units operating in nonfinancial fields of industry‖
Encyclopaedia of Social Sciences	The financial issues faced by corporate organizations are dealt with by corporation finance.

Figure 1.4: Various Definitions of Finance (Paramasivan et al., 2009)

1.9 Types of Finance

Since finance is a crucial and vital component of business issues, it affects all aspects of corporate operations. It is employed in all areas of activity and goes by various names. Two main categories can be used to categorize finance:
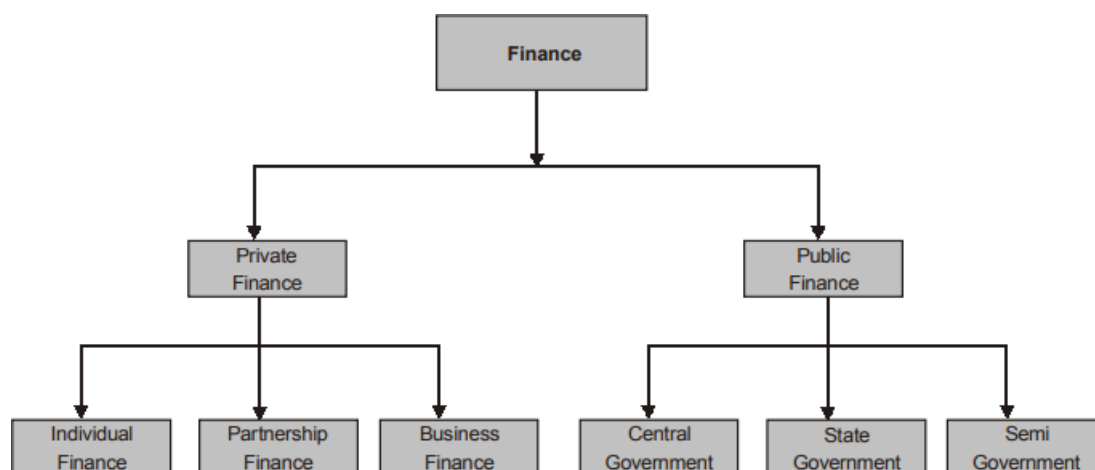
Figure 1.5: Classification of Finance. Finance has typically two types- Private Finance and Public Finance.

1.10 Financial Management

An essential component of general management is financial management. It is focused on the responsibilities of the business firm's financial managers. According to Solomon's description of financial management, "it is concerned with the effective use of a significant economic resource, namely, capital funds." As per S.C. Kuchal, the most frequently used as well as accepted definition of financial management is that ‒it deals with procurement of finances and their appropriate utilization in the organization."

Effective money management in the firm is the major focus of financial management. Financial management as it is used by commercial organizations is called as business finance or corporate finance.

The successful acquisition and efficient use of capital, which results in the capital's optimal application, are the objectives of financial management. It is the financial manager's most important function. Therefore, the financial manager must decide the

fundamental goals of financial management. The two main components of financial management objectives include: 1. maximising profit 2. Maximizing wealth.

1.11 Approaches to financial management

The essential function of the financial management approach is the scope of the financial management in different fields. Financial management is an evolutionary idea rather than a revolutionary one. With the use of numerous advances, the definition and use of financial management have altered over time. Theoretically, the financial management strategy can be classified into two main categories Traditional as well as Modern approach.

1.11.1 Traditional Approach

The traditional approach was used in the early years of financial management between the years of 1920 and 1950. This strategy is based on prior performance and conventionally recognized practices. The primary component of the conventional strategy is raising money for the business concern. The following significant area is part of the conventional approach.

- Obtaining money from a lending organization.
- Arranging money using different financial tools.
- Discovering the numerous funding sources.

1.11.2 Modern approach

The contemporary strategy uses analysis to look at the company's financial issues. This method states that the finance function includes both the acquisition of money and their distribution to diverse applications (osgu, 2021). Financial management is concerned with the problems associated with fund-raising and the effective and prudent distribution of cash. Principal Elements of a Modern Approach how big should a business be, and how much should it expand? What structure should it use to hold its assets? How are the necessary monies to be raised?

1.12 Functions of Financial Management

Including funds accusation and distribution, there are various other vital functions that finance management requires to perform and those functions are explained in sub headings below(Paramasivan et al., 2009):

1.12.1 Estimating Financial Requirements

The Finance Manager's main responsibility is determining the financial needs of the company concern, determining the extent of money required to buy fixed assets and forestall how much money will be necessary in the future to cover working capital needs.

1.12.2 Acquiring Necessary Capital

The finance manager should focus on how the finance is mobilized and where it is to be accessible, after determining the financial requirement. Additionally, it has a very critical outlook.

1.12.3 Investment Decision

The financial manager must wisely choose the finest investment options and take into account the fair and reliable returns. To assess the well-organized use of investment, one must be experienced in capital budgeting methodologies. When making capital investments, the manager must pay close attention to the criteria of safety, liquidity, and profitability.

1.12.4 Cash Management

In the field of finance nowadays, cash management is extremely important since good cash management not only ensures efficient use of cash but also enhances a company's short-term liquidity situation.

1.12.5 Improve Profitability

The efficacy and wise use of finances by the business concern is the only factor that influences whether or not the company is profitable. Strong financial control tools including budgetary control, ratio analysis, profit analysis, and cost volume are used by financial management to support the organization's profitability position.

1.12.6 Surge the Value of the Firm

Financial management is crucial, when it comes to improve investment and business wealth. The final goal of every corporate enterprise is to maximize profit, and greater profitability drives up investor and national wealth.

1.12.7 Promoting Savings

Savings are only feasible when a firm produces more profitability and maximizes wealth. Corporate as well as individual savings are encouraged and mobilized with the aid of effective financial management. Financial management is important to the operation of any corporation or company enterprise.

1.12.8 Interrelation with Other Departments

The finance manager works with a variety of functional divisions, including marketing, production, people, systems, research, and development, among others. Money managers should be well-versed in a variety of subjects in addition to those directly linked to finance. He needs to keep cordial contacts with each of the corporate organization's functional departments.

1.13 Key Performance Indicators

Metrics are crucial to any finance as well as to both the successful management inventory and its overall supply chain. The selection of relevant performance measurements is a crucial step in designing of supply chain and analysis. The efficacy of an existing system, as well as the comparison of competing alternative systems, is determined using collection of performance measures(Beamon et al., 1998). Numerous performance measures are recognized in the literature as crucial in assessing the efficacy and efficiency of the supply chain. Broadly there are two types of Indexes used to determine the efficiency of an organization- qualitative or quantitative Measure. Both these measures are discussed in sections below.

1.14 Qualitative Performance Measures for Supply Chain

Qualitative performance metrics are those for which there is not a single direct numerical measurement; however some of them could be measured. These measures have been acknowledged and considered crucial for the growth of an organization.

- **Consumer Contentment**: The degree to which internal or external consumers were satisfied with the product or service that was provided. Three components make up customer Contentment. (Christopher et al., 1994).

- **Pre-Transaction Contentment**: contentment related to service components that occur before the purchase of the product

- **Transaction Contentment**: contentment to those directly involved in the physical distribution of the goods.

- **Post-Transaction Contentment**: satisfaction related to the support given for the product while it is being used.

- **Flexibility**: how well the supply chain can adapt to new changes in the demand pattern.

- **Information and Material Flow Integration**: the degree to which information is shared and goods are transported by all supply chain

- **Effective Risk Management**: There is inherent risk in every connection in the supply chain. This describes the scope to which these negative impacts can be curbed.

- **Supplier Performance**: It measures how frequently suppliers deliver raw materials in good condition and on schedule to manufacturing facilities.

1.15 Quantitative Performance Measures for Supply Chain

Modern warehouse, labour, and transportation supply chain execution systems provide a huge amount of data points for metrics that can be used to lay the groundwork for a continuous improvement programme. These metrics are the figures and ratios that a business monitors to gauge how effectively it serves clients. The subsections below address some of the more popular and useful metrics used in warehousing and distribution.

1.15.1 Dock-to-stock

This matrix shows how much time passes between when a product is delivered and when it is added to stock. The operations and cash flow will be hampered if a product is not in a picking position and ready to send to a client. Both physical and Warehouse Management System (WMS) activity should be tracked by this measure. Don't rely

exclusively on the WMS timestamps since if a product comes right before a break or the end of a shift, it could remain on the dock without being documented in the system.

Differentiate between items based on attributes like expiry date, batch need, serial number, etc. that have an influence on receipt and handling speed. If merchandise needs to be physically separated when it is received, include that time in your metrics; it may be monitored independently. The formula for calculating dock to stock is mentioned below (Report et al., 2022).

$$Dork\ to\ stock = Total\ Time\ Taken\ to\ Stock\ Incoming\ Shipments \\ /\ Count\ of\ Shipments\ Received$$

1.15.2 Cash to Cash Time

The cash-to-cash (C2C) cycle (Hutchison et al., 2007), a.k.a cash conversion. It is the amount of time between a corporate pays its bills and when it receives money from clients. This index can be measured by evaluating the days of inventories, the days of payables, and the days of receivables.

Despite the fact that C2C criteria differ greatly by industry, a study indicated that top companies frequently had cash conversion C2Ccycles of less than a month. A shorter cycle indicates money is used more frequently for your core tasks and spends less time with third parties. An analysis of 22,000 publicly traded companies found a strong correlation between shorter conversion cycles and improved profitability in 75% of the cases. The supply chain operates more effectively as conversion cycles get shorter.

$$C2C\ cycle\ time = receivable\ days\ + inventory\ days\ - payable\ days$$

1.15.2.1 Benefits of C2C

The increase in operational and financial performance is the primary focus for decreasing the C2C cycle. C2C maximizes company's profit margin since cash available for operations has a multiplier effect dependent on cash turnover. A shorter conversion cycle increases the present value of the net cash flows produced by the

assets, which, in turn, increases the value of the company. Depending on which C2C variable is enhanced, financial gains might be significant. Benefits might include a one-time rise in cash from the sale of inventories or receivables, or from delaying the payment of accounts payable; and a decrease in important continuing costs like the weighted average cost of capital (WACC) and inventory carrying costs (ICC).

1.15.3 Fill rate

The fill rate, sometimes referred to as the demand satisfaction rate, is the percentage of customer demand that is satisfied by stock availability within a given time frame without the need for backorders or missed sales (Song et al., 1998). It indicates the sales or service provided more effectively if inventory management was better. The order fill rate should be as high as possible. Companies often maintain their FR between 85 and 95 percent.

$$Fill\ rate = (1 - [(\ total\ items\ -\ no.\ of\ items\ shipped\ )/\ total\ items\ ]) \times 100$$

1.15.3.1 Types of Fill Rate

Although the order fill rate is most frequently used rate that most big business's track, there are many other significant fill rates that might shed light on how effectively a business' SCM procedures are working. There are several types of fill rate cited in the literature, as follows (indeed, 2022):

- **Order fill rate**: This rate is sometimes the most frequently used because it shows how successfully businesses are able to meet client expectations. High order fill rates are an indication that a company fulfills customer orders swiftly and effectively.
- **Line fill rate**: It is when clients place orders, businesses log the sales as line items on an order bill. The percentage of order lines that a corporation fills out on the bill in comparison to the total number of order lines is called as the line fill rate.
- **Case fill rate**: The case fill rate, which primarily affects wholesalers and distributors, is the proportion of product cases that a business initially ships out of all the product cases that the business orders.

- **Warehouse fill rate**: The warehouse fill rate and order fill rate are both measured in same manner. Supply chains Managers control out of all the orders how much portion of all client orders are fulfilled and shipped from their company's warehouse.

- **Vendor fill rate**: Companies that buy from vendors in wholesale and distribution frequently assess vendor fill rate. Out of all the vendors a firm receives orders from; this metric calculates the proportion of vendors that have shipped out orders.

1.15.3.2 Benefits of Fill Rate

The order fill rate is a critical supply chain management measure to monitor since it shows businesses how productive, effective, and quickly employees process and ship out client orders.

- Establishes reputation

When your business regularly completes client orders and maintains a high fill rate, it enhances its reputation and builds market confidence. This is due to the likelihood that clients will believe they can depend on your business to rapidly process and dispatch their purchases. When first-time clients like the ordering and delivery processes with business, they are also more inclined to make subsequent purchases.

- Encourages customer loyalty

A high fill rate might also be a sign that your business is building long-lasting relationships and maintaining devoted clients. Customers are more inclined to make repeated purchases from a business if they believe it can process and fulfill requests swiftly. As a result, increasing client retention may be dependent on raising the fill rate.

- Provides operational insight

Your business may assess how well the supply chain operations are doing by monitoring order, warehouse, case, and vendor fill rates. Lower fill rates can provide more information about the parts of the process that need improvement, and when a corporation is aware of this indicator, it can build plans more effectively. You may examine the strategies you employ to deliver your items to clients by analyzing the fill rate, too.

1.15.4 Supply Chain Cycle Time

It calculates how much time it would take to complete an order in its entirety if all upstream and internal inventory levels were zero (Hausman et al., 2004). The lengthiest (bottleneck) lag times at each supply chain stage are added up to determine the value. A three-tier chain, for instance, would have a supply chain cycle time of three weeks if each tier had a one-week lead time. After they started measuring this cycle, a high-tech corporation was able to cut the cycle time of their supply chain from over 250 days to below 190 days. Once they did this, several clear, straightforward improvements were made.

$Supply\ chain\ cycle\ time$
$$= time\ it\ takes\ to\ order\ and\ receive\ supplies$$
$$+ order\ fulfillment\ cycle\ time$$

1.15.4.1 Methods to decrease the Cycle time:

1. **Decrease waiting time:** The easiest and most direct way to reduce Cycle time is to reduce "wait times."
2. **Execute tasks in parallel:** A procedure usually needs a lot of jobs to be finished. Cycle time will be significantly reduced by running many procedures simultaneously (Work Breakdown Structure helps in identifying parallel tasks).
3. **Process Re-engineering:** Process re-engineering is the process of beginning a project to identify the best way to carry out an activity; the

results may include changing the order of tasks, eliminating particular responsibilities, etc. By using value stream mapping to conduct a value analysis, this will gain significantly.

4. **Management of Time:** By recognizing and resolving issues and bottlenecks early on, downtime can be reduced. Reviewing the work schedule and optimizing the shift timings for each job and team is another viable option.

5. **Employee Involvement:** To minimize cycle time, hold Kaizen workshops and gather modest improvement suggestions from the workforce. Ideas developed by those involved in the main process will produce superior outcomes.

1.15.4.2 Benefits

If your inventory management procedures are effective and sales projections are accurate, supply chain cycle time may not seem like it is worth measuring. The best methods to measure the responsiveness and effectiveness of suppliers are to know how soon one can organize the initial shipment of items and restock the inventory. Additionally, it will assist in recognizing and minimizing potential procurement risks and in developing a strategy for handling demand fluctuation. Thus, controlling Cycle time will have enormous advantages. So it should come as no surprise that operations managers, six sigma specialists, and top management are continuously working to cut Cycle time across all the firms.

1.15.5 Freight Transport costs

Three viewpoints for categorizing freight transport costs may be taken into account (Izadi et al., 2020): (1) From the standpoint of the freight transport operators, freight transport costs relate to the expenses they have to make in order to provide the services. These expenses are operating expenses. (2) From the perspective of the freight owners, the expenses of freight transportation mostly pertain to the fees or rates they pay to freight transportation companies. For quicker and more dependable shipment, some freight operators are willing to pay more. These choices influence how much time it costs to move goods.

(3) From a national viewpoint, freight transport expenses also comprise social, environmental, and economic consequences, including tangible, intangible, financial, and non-financial elements. These expenses are external expenses.

1.15.5.1 Road Transportation Costs

Road transportation cost depends on various costs and cost factors. The major three types of costs that are considered:

1. Operational costs – These are the expenses experienced during a business's regular operations. These expenses, which are both fixed and variable, are incurred internally by the carriers. Variable costs are additional expenses that fluctuate according on the volume of company activity or consumption. Fixed expenses, on the other hand, are constant regardless of consumption or activity levels. Some examples of operational costs include a range of government taxes and charges like -fuel excise and vehicle registration, other expenses are also included such as fuel, insurance, labour, vehicle maintenance, initial purchase of vehicles/rolling stock, handling costs..

2. Value of time: these elements include the value of non-financial expenses like travel time and service quality expenses. The choice of the shipping firm and the mode of transportation will be influenced by the importance of time considerations at the time of decision-making, such as dependability and trip time. It comprises flexibility, frequency, dependability, and travel time.

3. External costs – These expenses, which are not directly paid by the exporter, may result in a discrepancy between the costs to society and the choice the exporter must make. Environmental expenses include expenditures related to noise, air pollution, traffic, and accidents.
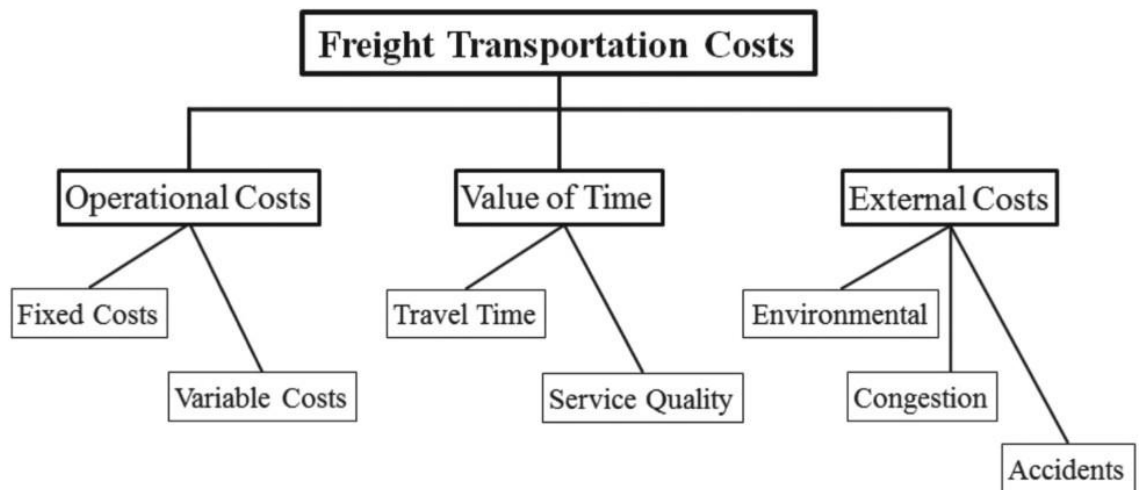
Figure 1.6: Three types of costs to consider while calculating Freight Costs(Izadi et al., 2020)
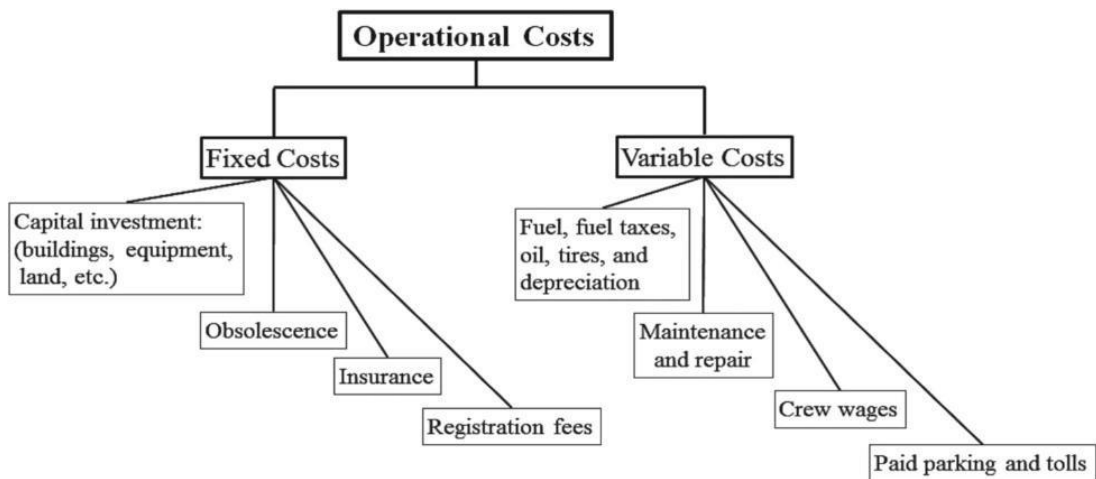
Figure 1.7: Various operational Costs (Izadi et al., 2020) considered in Freight Costs

How economically a company send its goods are determined by your freight cost per unit. It calculates your overall freight expenses by the quantity of items transported. One may compute units in pounds, things, or any other sensible unit of measurement.

Freight cost per unit = total freight cost / number of units

1.15.6 Perfect Order Index

"On time in full" (OTIF). Is a crucial logistical performance indicator. The term "OTIF" is not new, and it describes the proportion of client deliveries that were made on time and in full (or with the agreed-upon percentage of delay). Even though it seems straightforward, quantifying OTIF remains a challenge for many firms. The American Productivity and Quality Centre (APQC) developed the concept of "perfect order" to assist businesses in quantifying OTIF.

% of Orders Shipped On Time		% of Orders Complete		% of Orders Damage Free		% of Orders Accurately Documented
% of orders (a customer's order) shipped on or before the requested ship date or at least within a customer acceptable window	X	% of orders (a customer's order) shipped complete 100% filled with the first shipment	X	% of orders (a customer's order) received by the customer into inventory as free of visible damage	X	% of orders (a customer's order) paid for within specified contract terms due to accurate PO/invoice match, customs declaration, etc.

Figure 1.8: Components of Perfect Order Index (POI)

In order to evaluate the success of their own supply chains, enterprises may now utilise the perfect order index (POI), a widely accepted industry indicator. The perfect order index is a total score that evaluates the results of each of the four essential parts.

- Delivered on-time – the percentage of orders that arrive at their destination within the window of time that was mutually agreed upon between the shipper and the customer.

  - shipped complete –the percentage of orders that were dispatched using all lines and units;
  - shipped damage free – the percentage of client purchases are sent in pristine condition‖
  - Correct documentation - the proportion of total orders for which the client got a correct invoice and other necessary paperwork.

The perfect order index is created by multiplying each component by itself. A company, for instance, would have an 81.4% flawless order index if the client gave each of the four components a score of 95%.In other words, 10% of all customer purchases that are shipped out often include serious errors. Anywhere in the supply

chain, such as where additional safety stock must be maintained on hand to fulfill strictcustomer service requirements, might see millions of dollars in capital waste as a result of that.

1.15.7 Some other Metrics

There are plenty of matrices available in literature. Some other metrics that could be important in

1.15.7.1 On-time delivery:

The on-time shipping KPI will enables a benchmark shipping time relative to each product, optimizing- shipping and delivery processes, decreasing turnover time and increasing customer satisfaction levels. On-time shipping is a brilliant indicator of howlong it may need to ship a specific order to a client or partner. The proportion of deliveries that happen on time. The equation used to determine on-time shipping:

$$\text{On-time delivery} = [\frac{\text{total orders} - \text{orders that do not arrive on time}}{\text{total orders}}] \times 100$$

1.15.7.2 Damage-free delivery:

The proportion of deliveries that happen without any harm and are determined using equation:

$$\text{Damage-free delivery}$$
$$= [(\text{total orders} - \text{orders that arrive damaged})/ \text{total orders}] \times 100$$
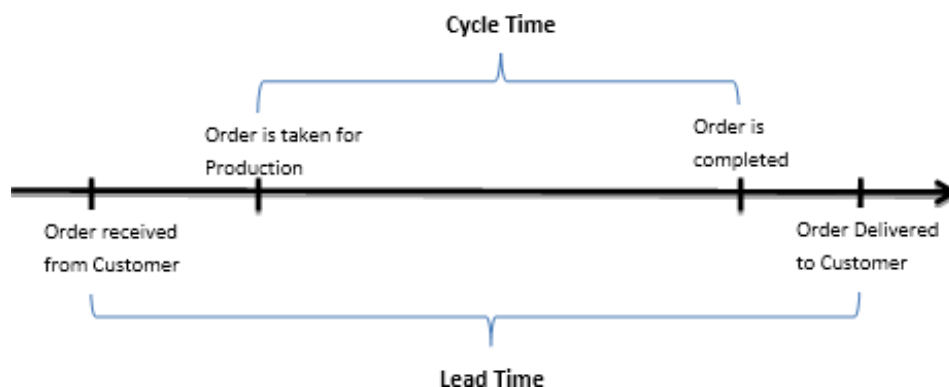
Figure 1.9: Damage free delivery

1.16 Performance Metrics for Inventory Management

A company can use a variety of key performance indicators (KPIs) to assess and evaluate the performance of the inventory department. One can find out how well an organization's inventory store is performing and take appropriate action. Metrics used in inventory management aid in stock monitoring and decision-making. One can track and improve the performance of a firm's inventory while looking at the effectiveness and efficiency using the metrics explained in the sub headings:

1.16.1 Average inventory

The volume of inventory a business keeps on hand on an average basis is called average inventory. The objective is for businesses to maintain a steady average inventory over the course of a year.

$$Average\ inventory = (beginning\ inventory + ending\ inventory)\ /2$$

1.16.2 Inventory Turnover Ratio

It is the number of times a business sells and buys back its stocks in a certain time frame, often a year. It also serves as a gauge for the firm's inventory management efficiency and liquidity. A low ratio suggests that there is a lot of unsold inventory, whereas a high ratio shows that stocks are selling quickly (Sunjoko et al., 2016). The corporation has to invest less money in raw materials, work-in-process, or completed items when there is a higher inventory turnover. Undoubtedly, lowering operating capital makes loans or new investments feasible. (Demeter et al., 2011).

$$Inventory\ turnover\ rate = cost\ of\ goods\ sold\ /\ average\ inventory$$

The quantity of inventory a firm has on hand on average over a given time is called average inventory. The objective is for businesses to maintain a steady average inventory over the course of a year.

$$Average\ inventory$$
$$= (beginning\ inventory + ending\ inventory)\ /2$$

1.16.3 Sell-through

Sell-through is (usually) defined as the percentage of items sent that are actually sold over a period of time. The ratio of inventory received from a manufacturer to inventory sold is known as the sell-through rate (Flores et al., 2014).

$$Sell\ through\ rate = (No.\ of\ units\ sold\ /No.\ of\ units\ received) \times 100$$

When the impact of size is little or nonexistent, sell-through may be a highly valuable tool for assessing managerial effectiveness. Examples include comparing two distinct replenishment strategies for the same store, the sell-through of items with comparable sales in the same shop, or merely comparisons in aggregate terms, such as total sales in relation to total shipments from the warehouse to retailers. This supports the theory that in-store stocks influence customers' decisions about which products to purchase from an assortment and can, thus, influence how many sales are made.

1.16.4 Inventory to sales

Inventory to sales, calculates the proportion of sales fulfilled by stock on hand, is an often used ratio. Assuming I_{it} and S_{it} represent i firm's inventory and the sales respectively in a given year, the inventory to sales (Ramey et al., 2004, Obermaier et al., 2009) can be evaluated by:

$$IS_{it} = \frac{I_{it}}{S_{it}}$$

A declining (rising) inventory to sales ratio over time means good (bad) news in so far as sales grow faster (slower) than stocks. The short-term expectation is that production rates will be increased (cut back) (Obermaier et al., 2009). For the long-term, decreasing trends in inventory to sales ratios may indicate improved efficiency.

1.16.5 Inventory Carrying Cost

I.C.C., or inventory carrying cost, expressed as a proportion of procurement costs. The portion of the overall cost that a business spends to keep goods in storage, commonly referred to as holding expenses or the cost of carrying inventory. Costs for the warehouse, insurance, rent, labour, and any unsold goods are all included.

The overall price varies according on the items a business carries, the quantity of SKUs, the storage location, the rate at which its inventory turns over, and if it hired a third-party fulfillment firm.

The standard assumption is that the inventory carrying cost will be 18% of the average inventory cost. However, the cost of keeping inventory has several parts. When determining the cost of keeping inventory, many aspects should be taken into account. Some Fixed Costs, Variable Costs, and Maintenance Costs are included in these components (Rajhans et al., 2015).

Included in fixed expenses are: (1) All employees' salaries (2) Electricity bill (3) Money set aside for a storage area, rent, or loan interest (4) Insurance paid for the storage space (5) Inventory insurance (6) Equipment costs for internal transportation (7) Price of storage apparatus. Transportation costs are among the variable costs. (8) Costs related to shrinkage, relocation, obsolescence, damage, packing & unpacking, and rejection. Costs associated with maintenance and operation of transportation equipment 9) Annual maintenance fees. Hence Total Inventory Carrying Costs can be given by

$$Total\ Inventory\ Carrying\ Costs$$
$$= Sum\ of\ al(fixed\ costs + Variable\ Costs$$
$$+ Maintenance\ cost)$$

1.17 Financial Performance Indicators

High-level metrics of earnings, sales, costs, or other financial outcomes with an emphasis on correlations obtained from accounting data are known as financial KPIs. KPI monitoring and measurement are effective practices for managing a successful firm. The finest KPIs for every business aid organizations in identifying their strengths and areas for development. The subheadings below discuss the KPIs and financial measures that are most frequently utilized.

1.17.1 Operating Profit Margin

The operational profit margin is the percentage of each dollar of sales that is left after paying all costs and expenses, except interest, taxes, and dividends on preferred stock. Higher the Operating Profit Margin better is the company's performance.

$$OperatingProfitMargin = OperatingProfits / Sales$$

1.17.2 Net Profit Margin

The percentage of each dollar in sales that remains after all costs and expenses, including as interest, taxes, and preferred stock dividends, have been subtracted is net profit margin (NPM) (Gitman et al., 2015). The bigger net profit margin implies better performance of company. The following formula is used to compute the net profit margin.

$$NetProfitMargin$$
$$= Earnings available for common stockholders / Sales$$

Therefore, a firm might be known to be good if it has a high NPM (Nariswari et al., 2007).

1.17.3 Gross Profit Margin (GPM)

The percentage of the sale that remains after the firm has paid for its goods is known as the gross profit margin. Therefore, a firm may be in excellent shape if it has a large GPM since the lower the relative cost of selling items. The GPM equation is (Nariswari et al., 2007):

$$Gross\ profit\ margin$$
$$= (\ et\ sales\ \text{-}\ Cost\ of\ Goods\ sold) / net\ sales\ x\ 100$$

1.17.4 Sales Growth Rate

Sales growth, one of the most important revenue KPIs for many businesses, displays the percentage change in net sales from one period to the next. Businesses frequently compare revenues to the same period the year before or to fluctuations in sales from quarter to quarter. Positive values represent increasing sales, whereas negative values represent decreasing sales. Calculating sales growth rate is as follows:

$$Sales\ growth\ rate$$
$$= (Current\ net\ sales\ \text{-}\ Prior\ period\ net\ sales)$$
$$/ Prior\ period\ net\ sales\ x\ 100$$

1.17.5 Return on Investment

It may be expressed as (Erdogmus et al., 2004) the proportion of net benefits to expenses.

$$Rate\ of\ Interest = (Benefits - Costs)/\ Costs$$

In financial parlance, using the ROI calculation, a project's costs and benefits are grouped into a practical profitability statistic. However, this metric does not account for the two crucial factors of time and risk that are included in every meaningful economic research.
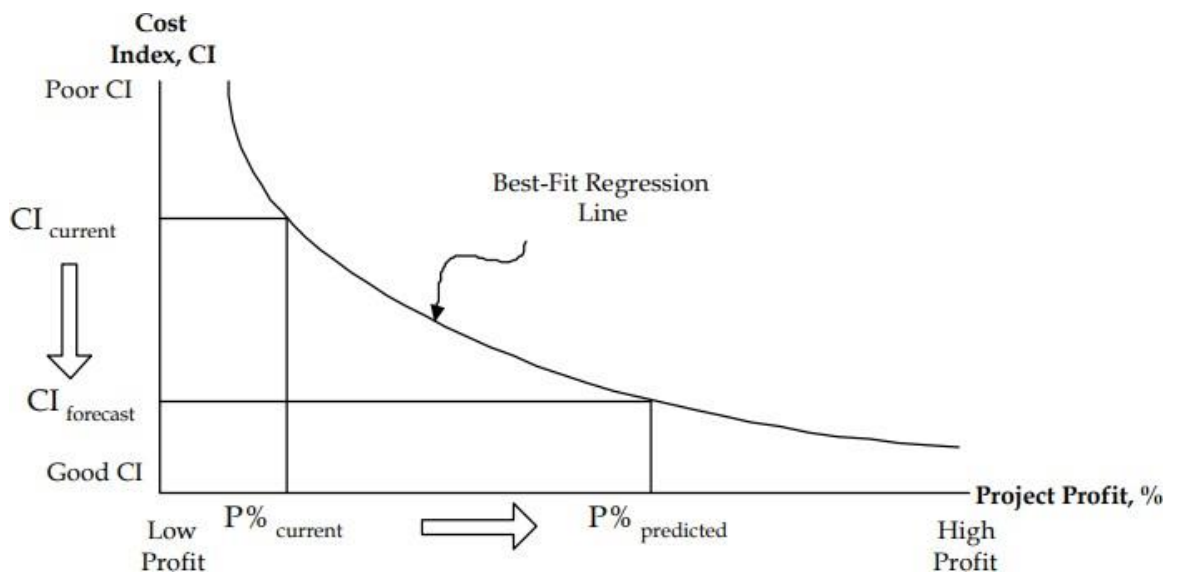
Figure 1.10: Low cost index indicates high profitability (high return on investment)

Figure 14 illustrate that if Cost Index (the quotient of original budget and actual cost) is high profit will be low and vice versa.

1.18 Summary

This chapter focused on introducing the Supply Chain Management, Financial Management (FM) and Inventory Management (IM). This chapter illustrated the need, types, issues and challenges associated with the SCM, FM and IM. This chapter also introduces Key Performance Indicators and need of the Key Performance Indicators providing many essential Key Performance Indicators for the FM and IM such as Dock-to-stock, Cash to Cash Time, Fill rate, Supply Chain Cycle Time, Freight

Transport costs, Perfect Order Index etc. As there can be many Key Performance Indicators for SCM, FM and IM we may need to look for the best ones in the literature, thus a thorough research is needed to be done for identification of such Key Performance Indicators, which is carried out in the next chapter.

Chapter 2

Literature Review

This research will focus on the triangular relationship between supply chain management, inventory management and financial performance in the companies. There are some reviews and findings in the previous research, being it a secondary research. Such previous findings have a crucial role to play in determining standards, parameters, and possibilities in the current research.

This study has been undertaken as a systematic literature review based on the original guidelines as proposed by (Kitchenham, 2009). In this case the goal of the review is to assess prior work done on the study of analyzing impact of Supply chain management, Inventory Management and Financial management on firm's financial performance, so this literature review can be categorized as a secondary literature review.

2.1 Research questions

The research questions addressed by this review are:

RQ 1. How much research has there been there since 2015 on this topic?

RQ 2. Which research topics are being addressed by the existing works?

RQ 3. What are the limitations of current research on this topic?

With respect to RQ1, it may be a concern that we started our search at the start of 2015. We recognize that the term __Supply chain management, Inventory Management and Financial management was too common usage in the time period during which literature reviews conducted. However, there were many related papers available on this topic.

To address RQ1, we identified the number of papers published per year, the journal/conferences that published them and whether or not they referenced the papers. With respect to RQ2, we considered the scope of the study and the Supply chain management, Inventory Management and Financial management topic area. With respect to RQ3, we considered most related papers to which were conducted on

this topic and respect to limitations of existing works we considered a number of issues:

RQ 4.1. Were the researches on the topic of Supply chain management, Inventory Management and Financial management on firm's financial performance limited?

RQ 4.2. Is there evidence that the research on the topic is limited due to lack of primary studies?

RQ 4.3. Is the quality of papers in this area appropriate, if not, is it improving?

RQ 4.4. Are researchers contributing to this area by defining practice guidelines?

2.2 Search process

The search process was a manual search of specific conference proceedings and journal papers since 2015. The selected journals and conferences are shown in Table 2.1. The journals were selected because they were known to include either empirical studies or literature surveys, and to have been used as sources for literature reviews related to the topic of Supply chain management, Inventory Management and Financial management on firm's financial performance.

Journal	No of papers
Elsevier / Science Direct	58
Emerald Publications	35
Springer	14
MDPI	13
Wiley	12
IEEE Explore	6
Other	25

Table 2-1: Paper Count from Conference proceedings and Selected Journals.

2.2.1 Inclusion and exclusion criteria

Peer-reviewed articles on the following topics, published between Jan 1st 2015 and July 2022, were included:

1. Supply Chain Management
2. Inventory Management
3. Financial Management

Research articles and Literature surveys on this topic with defined research questions, search process, data extraction and data presentation. The review also included articles where the topic was only one element of the articles as well as articles for which the topic was the main purpose of the article. Following were excluded:

1. Informal articles with no defined research questions; no defined search process; no defined data extraction process.
2. Papers discussing the general of Supply chain management, Inventory Management and Financial management topics.
3. Duplicate reports of the same study (when several reports of a study exist in different journals the most complete version of the study was included in the review).

2.3 Objective 1: Supply Chain Performance

Shen et al. (2020), Supply chain finance is a crucial topic. In this paper, they consider that a capital-constrained manufacturer can borrow money from either a bank (bank credit financing) or a retailer (trade credit financing). Our analysis compares supply chain performance under these two financing schemes. Furthermore, they extend their model to evaluate the impacts of retail competition and supply chain member's risk aversion on supply chains, which consist of one capital-constrained manufacturer and two competing retailers. They consider three financing schemes: only bank credit financing, dual trade credit financing, and bank and trade credit mix financing. They find that without retail competition, the retailer is always willing to use the trade credit financing; whereas with retail competition, if one retailer

provides the trade credit but the other does not, the credit provider could receive the superior profit. Last but not least, regardless of risk neutrality or aversion of supply chain members, their pricing decisions among three financing schemes are similar. This implies that the impacts of supply chain members' risk aversion are limited in supply chain financing scheme selection. More managerial insights are discussed.

Shekarian et al. (2020), This is the first review that analyzes factors influencing closed-loop supply chains. It concerns the investigation of those models which are designed based on the game theory. In order to an in-depth analysis, a content-based method is carried for 215 papers. The identified characteristics of the models are classified into twelve main categories. An important finding proves that sharing mechanism has got the priority by the researchers. Closed-loop supply chain (CLSC) as one of the important configurations of the circular economy (CE) has received considerable attention in sustainability matters. It is composed of characteristics that, when identified, studied, and categorized, help not only to a better understanding of the current contributions in the literature but also lead to formulating new models. This research presents one of the first in-depth studies to investigate factors influencing CLSCs. It concerns the investigation of the models which are designed based on the game theory (GT). Therefore, the reviewed works focused on cooperation and competition among the game participants. A systematic literature review is implemented as a four-step process consisting of material collection, a descriptive analysis, category selection, and evaluation stage to review and discuss the works that focus on CLSC and use GT simultaneously.

Munir et al. (2020), In this paper, covariance-based structural equation modeling is applied to test the developed hypotheses using data of 931 manufacturing companies obtained from the sixth version of International Manufacturing Strategy Survey (IMSS VI). The findings of the study suggest that internal, supplier and customer integration positively effects SCRM whereas the impact of internal integration is also partially mediated by supplier and customer integration. Additionally, the results present that SCRM partially mediates the relationship between internal integration and operational performance and

fully mediates the association between supplier and customer integration and operational performance. This paper contributes to research by proposing and empirically testing a holistic framework demonstrating the effects of SCI on SCRM, and consequently on performance outcomes to develop theoretical and managerial implications.

Dumitrascu et al. (2020), Increasing the sustainability of a system can be achieved by evaluating the system, identifying the issues and their root cause and solving them. Performance evaluation translates into key performance indicators (KPIs) with a high impact on increasing overall efficacy and efficiency. As the pool of KPIs has increased over time in the context of evaluating the supply chain management (SCM) system's performance and assessing, communicating and managing its risks, a mathematical model based on neural networks has been developed. This paper demonstrates that by using data mining, the relationship between certain problems that appear in the supply chain management of every company and specific KPIs can be identified. The paper concludes with a graphical user interface (GUI) based on neural networks using the multilayer perceptron artificial intelligence algorithm where the most trustworthy KPIs for each selected problem can be predicted.

Zhu et al. (2019), In recent years, financial institutions (FIs) have tentatively utilized supply chain finance (SCF) as a means of solving the financing issues of small and medium-sized enterprises (SMEs). Thus, forecasting SMEs' credit risk in SCF has become one of the most critical issues in financing decision-making. Nevertheless, traditional credit risk forecasting models cannot meet the needs of such forecasting. The forecasting result shows that RS-MultiBoosting has good performance in dealing with a small sample size. From the SCF perspective, the results suggest that to enhance SMEs' financing ability, ‚traditional' factors, such as the current and quick ratio of SMEs, remain critical. Other SCF-specific factors, for instance, the features of trade goods and the CE's profit margin, play a significant role.

Yu et al. (2019), Supply chains are becoming increasingly dynamic in response to changing business environments and technology. This has created challenges in

managing the flow of materials and created greater risk of disruption. As such this study investigates the impact of such dynamism on disruption orientations, resilience, and financial performance. Herein an integrated conceptual framework is developed and then tested using survey data from a cross section of 241 Chinese companies and structural equation modelling. The results of the study reveal that supply chain dynamism has a significant positive effect on supply chain disruption orientation and supply chain resilience. Supply chain resilience is also affected by supply chain disruption orientation. However, the financial performance impacts of supply chain disruption orientation are strictly through supply chain resilience.

Wuttke et al. (2019), Supply chain finance (SCF) makes the funding of the supply chain more efficient because it extends the financial strengths of buyers to their suppliers. Nevertheless, buyers sometimes struggle to persuade suppliers to adopt SCF quickly. They test their hypotheses using a unique data set from a leading financial technology platform provider. They find that suppliers with more limited access to financing tend to adopt SCF faster. In addition, suppliers adopt SCF faster if such adoption is associated with more pronounced reductions in their financing costs. Legitimacy motive drivers also impact supplier adoption speed. Specifically, their results suggest that mimetic and normative pressures accelerate the speed at which suppliers adopt SCF, while coercive pressures seem to have such an effect only when the buyer's stakes are high.

Wiengarten et al. (2019), This paper aims to explore the performance implications of supply chain integration (SCI) taking a strategic perspective. This study provides a much-needed comprehensive assessment of the SCI–performance relationship through critically re-evaluating one of the most popular propositions in the field of supply chain management. The results can be extrapolated beyond the dyad, as the authors conceptualize integration simultaneously from an upstream and downstream perspective.

Martin et al. (2019), The paper involves an exploratory multiple-case study design including data within eight buyer-supplier-financial service provider triads. The findings explain contextual situations for the provision of SCF practices based on the contingency approach. They distinguish endogenous, relationship-related

and exogenous contingencies within the aforementioned triads. Differentiation criteria are determined for the selection of SCF practices along the dimensions ‗time of financing' (pre- versus post-shipment) and ‗source of funds' (supply chain internal and external). Testable propositions and key learnings summarize the derived findings and form the basis to develop a contingency framework on SCF practices for the supply side.

Giannakis et al. (2019), Despite the ongoing calls for the incorporation of the cloud utility model, the effect of the cloud on elements of supply chain performance is still an evolving area of research. The purpose of this paper is to develop the architecture of a cloud-based supply chain management (C-SCM) ecosystem and explore how it enhances supply chain responsiveness (SCR).First, the authors discuss the potential benefits that cloud computing can yield, compared to existing mature SCM information systems and solutions through a comprehensive literature review.

Gelsomino et al. (2019), The objective of this paper is to assess the tangible benefits deriving from a multi-scheme SCF strategy. Based on the analytical formulation of the benefits of three relevant SCF schemes (Reverse Factoring, Inventory Financing and Dynamic Discounting), the paper formalizes a model that investigates the benefits that a buyer can achieve by onboarding suppliers onto these three schemes. The results show how working capital requirements and the cost of finance represent the key parameters to assessing the benefits of the concurrent adoption of multiple SCF schemes. Moreover, the funding limits of the SCF schemes themselves strongly affect the relevance of such strategies; strict limits will increase the relevance of having ‗alternative' schemes available to onboard suppliers. To highlight the managerial relevance of the model, the article provides a numerical example based on a real-world application.

Gardas et al. (2019), This research is intended to help the policymakers, managers and supply chain designers in the food industry and in agribusiness in formulating the policies and strategies for achieving food security, conservation of the environmental resources and for improving the financial performance of the industry. It is pioneering research focusing on the analysis of the PIs towards the

implementation of GSCM in the Indian agro-industries context using an ISM approach. This research adds value to the existing knowledge base by identifying the crucial PIs, exploring their mutual relationship and highlighting their level of influence in the case sector.

Dev et al. (2019), Proposed study attempts to handle real-time interrelated KPI problem of supply chain. One of the major issues a designer of Big Data Architecture has to trade with is incorporating real-time predictive analytics capability using offline synergistic approaches like simulation, fuzzy analytic network process, and Technique for Order Preference. Further, under this setting, which involves re-engineering of operational units, the present study proposes a simple, yet practical heuristic to quickly handle the unstructured relational key-performance-indicators (KPIs) data of a supply chain that are obtained from the results of the simulation. Within the big data framework, the proposed model can be used as a decision support tool by the companies to evaluate their KPIs in a real-time dynamic system.

Bals et al. (2019), While supply chain finance (SCF) is receiving growing attention in research, it remains limited in reach and fragmented in its implementation. At the same time, technological advances are changing the shape of the overall business ecosystem in which SCF is embedded. Therefore, the aim of this research is to conduct a systematic review of the SCF literature and develop a framework of analysis to support further exploration of the SCF ecosystem. This research expands on other recent systematic reviews of SCF literature and introduces the business ecosystem concept to the SCF domain. Based on the presented SCF framework, an agenda for future SCF ecosystem research is proposed.

Zhan et al. (2018), To illustrate to improve sustainable development and supply chain efficiency, they develop a model that explicitly captures the impact of payment on the sustainability efforts of suppliers in a supply chain and explores the conditions under which each financing mechanism benefits the players. They describe the equilibrium strategies between the supplier and retailer in each financing mechanism, compare the preferences of each player between the AF and RF models, and find a Pareto zone of a reverse factoring financing plan in which all

players prefer model RF over model AP. They also conduct some numerical experiments to show how the payment ratio and payment term of model RF affect supply chain sustainability and efficiency.

Xu et al. (2018), A bibliometric analysis of SCF literature was conducted and key papers and evolution of SCF research were identified. Four clusters were identified and content analysis was carried out to obtain additional insights. Seven future research directions were advanced based on the bibliometric and content analysis. Supply Chain Finance (SCF) is an effective method to lower financing costs and improve financing efficiency and effectiveness, and it has gained research momentum in recent years. Based on the clusters identified, they carried out a further content analysis of 112 papers, identifying research gaps and proposing seven actionable directions for future research. The findings provide a robust roadmap for further investigation in this field.

Tseng et al. (2018), Supply chain finance has received increasing attention. The combination of sustainable development and supply chain finance requires a deeper discussion to address the theoretical and managerial gaps. Thus, this study adopts the fuzzy Technique for Order of Preference by Similarity to Ideal Solution (fuzzy TOPSIS) to develop a sustainable supply chain finance model under uncertainty to identify the existing problems and deficiencies of financing patterns. Expert assessments were performed, and the results indicate that economic factors have a significant effect on other aspects and that delivery management policies are the most effective tools for reinforcing sustainable supply chain finance practices. Moreover, the findings provide a theoretical foundation that can reinforce the understanding of sustainable supply chain finance, and the managerial implications provide a precise guideline for firms to improve their performance.

Song et al. (2018), SCF utilizing receivable transfers, closed-loop business, relational embeddedness, and a combination of outcome control and behavioral control can also reduce ex post information asymmetry. For these reasons, compared with commercial bank-dominated SCF, SCF adopted by FSPs in the supply chain can better reduce information asymmetry. This study contributes to the emerging literature exploring the impact of SCF on SMEs accessing financing. In particular, this study

provides supply chain management and operations insights on SCF and their consequent influence. Previous research has focused on the direct dyadic relationship between lenders and borrowers while neglecting supply chain effects. Uniquely, this study explores the different ways commercial banks and FSPs implement SCF solutions.

Pinna et al. (2018), Even if sustainability is a relatively new research area, it has already shown an interesting number of measures and metrics mainly de-structured and at very different levels. Furthermore, a specific framework of Key Performance Indicators (KPIs) has not yet been developed for soft drink supply chains (SDSC). This variety is creating confusion among industries when they attempt to select a set of indicators for assessing sustainability in manufacturing in practical terms. A company should be able to analyze each element of its strategy and business model in order to understand which factors influence sustainability. Therefore, to address this challenge, Authors have collected sustainability KPIs SDSCs. KPIs helps soft drinks companies to have a more complete vision concerning their sustainability impact and to point out potential best practices. Finally, in order to provide a practical view of the methodology, a sample ispresented and discussed.

Lu et al. (2018), This research examines the moderating effect of market uncertainty on the causal effects from supply chain integration to operational performance of a typical supply chain. Based on an extensive and critical literature review, two exploratory conceptual hypotheses have been developed for the nonlinear relationship between the supply chain integration and operational performance of the original equipment manufacturer, and how may that relationship be moderated by a specific construct of market uncertainty. Empirical survey instrument has been designed and applied to gather the data from a wide spectrum of automotive industry in China.

Larsen et al. (2018), paper applies a systematic literature review using the sequence of planning the review, searching and screening literature, extracting information from the selected literature, and synthesizing and analyzing findings. In total, 112 papers were included. The study has identified 15 distinct opportunities for RSC-contribution to the firm's financial performance. The study has

identified 56 contingency factors. These are related to market segmentation, customer behavior, product design, and the firm's distributor network. The study includes an interrelationship network between factors and the RSC's contribution..

Laari et al. (2018), Despite the critical role of logistics service providers (LSPs) in improving the environmental sustainability of supply chains, there is still uncertainty about how LSPs can turn environmental management into competitive advantage. Based on a Finnish national logistics survey and financial reporting data from 266 LSPs, this article examines their competitive strategies and green supply chain management (GSCM), and tests their respective relationships with environmental and financial performance. Financial data are used to measure financial performance in a novel way. The findings indicate that leading LSPs with operational excellence and strong brands are more advanced in terms of GSCM than LSPs that do not excel in any competitive priority. GSCM practices are positively related to environmental performance, but not to financial performance. However, managers should not be discouraged by the apparent absence of short-term financial benefits of GSCM practices, which in any case could enhance future differentiation opportunities.

Kumar et al. (2018), Formulation of right strategies is believed to be able to bring sustainable performance across triple bottom line (TBL), i.e., economic, environmental and social aspects within and across organizations. The purpose of this research is to investigate the role of misaligned collaboration and dynamic capabilities on TBL performance. Misaligned collaboration signifies those configurations of collaboration that deviate from ideal profile of collaboration. The ideal profile of collaboration corresponds to superior performance. Collaboration has been operationalized through joint planning and resource sharing (JPRS) and collaborative culture (CC) which brings relational aspects into collaboration. Specifically, this research provides important extensions to the theory of profile deviation and dynamic capabilities (DC) perspective in the context of sustainable supply chain performance and misaligned collaboration utilizing the empirical evidence. Uniqueness of the proposed model is established by

comparing with four other alternate models. They find both JPRS misalign (misalignment of JPRS from the ideal profile) and CC misalign (misalignment of CC from the ideal profile) influence all dimensions of TBL through DCs. Only direct influence of CC misalign on operational and social performance is significant. Results convey the need of building DCs when collaboration is misaligned with its ideal profile, and this misalignment produces detrimental effects on DCs and TBL performance. This research contributes significantly by building unique model to develop and maintain sustainability. Further, theoretical and managerial contributions are highlighted and contested with existing knowledge.

Kot et al. (2018), The sector of small and medium-sized enterprises (SMEs) plays a key role in the economies of all of the countries in the world. These entities constitute the basis for the development of the national and global economies. In a contemporary complex and competitive business environment, the adaptation of appropriate strategies is a particularly important effort to furthering the development of companies from the SMEs sector. In this context, the application of the concept of sustainable supply chain management (SCM) in the operation strategy of SMEs seems to be a very important function. This supply chain also covers all three aspects of sustainable development: business, environmental, and social. The purpose of this article is to present the current state of the research in sustainable development in relation to managing the supply chain of SMEs, as well as the empirical findings in this area. The results found that all of the sustainability areas were very important in the supply chain management practices of the studied SMEs, despite the imbalance described in the literature. The study also presents the most important elements in the particular sustainability areas of SCM and SMEs.

Fang et al. (2018), Environmental sustainability is nowadays driving firms to not only develop internal green activities, but also extend toward green supply chain management (GSCM). The extensive application of external GSCM by firms can be partially justified from perspective of transaction costs. GSCM practices are often considered to be prudent because studies suggested that such practices have a positive impact on firm performance according to the resource-based view. However, crucial questions still surround the practice-performance relationship. First, what is the

overall relationship between GSCM practice and firm performance? Second, under what situation is the relationship stronger or weaker? To answer these questions, this paper focuses on quantitatively analyzing extant literature published in the field of GSCM. A random-effects meta-analysis is used to synthesize the empirical results of 54 selected literature with 245 effect sizes. Besides, subgroup analysis and meta-regression are applied to test potential moderators that may influence the strength of practice-performance relationship. They find that, internal and external GSCM practices are positively related, and they are both positively related to firm performance. Particularly, their relationship with environmental ($r = 0.518$) performance is the largest, followed by operational ($r = 0.481$) and economic ($r = 0.464$) performance. In addition, test of moderators discovers that industry type, ISO certification, export orientation and the cultural dimension of uncertainty avoidance all have moderating effect on the practice-performance relationship. Discussions and limitations are further addressed.

Fancello et al. (2018), Over the last twenty years, the intensification of trade flows and the rapid growth of demand for goods and services from new emerging countries have led to a deep change in global transport and a dramatic increase in the level of competitiveness among transportation and logistics service providers. To remain competitive, transport and logistics operators are required to carry out operations with maximum efficiency to meet the requirements of a continually growing and diversified demand. Supply Chain Management is one of the areas that have recently attracted much attention in logistics. The proposed study aims to provide simple quantitative tools based on Key Performance Indicators (KPIs) to support the evaluation process of intermodal supply chains. A sample of 44 real-world Mediterranean supply chains has been collected and analyzed. Four quantitative KPIs describing the relationship time-cost and the ratio cost/kilometer have been derived from empirical cost functions and used to characterize the various elements of the analyzed transport chains, and of the chains as a whole, from a cost perspective.

Chen et al. (2018), Researchers have long sought to understand how risks in supply chains (SCs) affect firm performance. Yet, they have not fully subjected claims

of how SC risks affect firm financial performance to theoretical and empirical scrutiny. The purpose of this paper is to investigate the links between SC risks and firm financial performance. The author analyzes how SC risks affect firm financial performance from the perspective of marginal financial performance (MFP) using survey and financial statement data. The author employs structural equation modeling to examine the hypotheses using 106 Taiwanese listed companies across 20 industries. The findings regarding the importance of industry-specific risk, organizational risk, internal business process risk, and demand risk are consistent with prior studies. The author finds that demand risk has an MFP of -0.20, the highest negative effect among the risk variables. The findings also show that industry-specific risk possesses an MFP of -0.16, the second-highest negative effect, despite having no direct effect on financial performance. This paper examines how SC risks affect MFP via combining survey and financial statement data. It does not assume the reported MFP estimates apply to all businesses in other countries. However, future research could triangulate their findings. This study combines survey and financial data to analyze how SC risks affect firm financial performance. Specifically, it provides a methodology for estimating quantitative cause-effect relationships between SC risk and firm financial performance, an important topic that receives less research interest in the field of supply chain management.

Castillo et al. (2018), As stakeholders continue to increasingly hold firms accountable for environmental and social performance in their supply chains, the importance of understanding how firms can be more sustainable becomes more prescient. Based on the underlying premise of stakeholder theory that business and ethics decisions are intertwined, the current research introduces the concept of supply chain integrity (SCI) to explore how the interdependence of business and ethics decisions can lead to improvements in sustainable supply chain management (SSCM) practices. Exploratory analysis employing secondary data sources in an elastic net (EN) logistic regression provides support for the proposed construct, by providing preliminary empirical evidence that SCI, measured through two sub dimensions of structural and moral SCI, can be linked to firm sustainability. The research contributes to the supply chain management literature by: (1)

introducing the concept of SCI; (2) performing an exploratory econometric analysis to provide initial validity of the SCI construct; and (3) providing a research agenda to guide further research on the concept of SCI and its role in SSCM.

Bastas et al. (2018), Maintaining profitability measures while conducting business through environmentally and socially sustainable operations is an optimization challenge for organizations globally and for their society. Aiming to contribute to the research streams on this global challenge, this paper studies the state of the art literature on two management methodologies along with sustainability management from an integration perspective: quality management with its intraorganizational focus and supply chain management with its interorganizational view. The paper establishes key themes, trends and new avenues for research through a structured systematic review. The systematic review undertaken includes both descriptive analysis and thematic synthesis of state of the art quality management, sustainability and supply chain management integration literature. Integration synergies of quality and supply chain management were established including performance improvements and integration increasing the effect of both methodologies. Incorporation of sustainability into quality and supply chain management was identified to be a highly emerging area with multi-dimensional (financial, ecologic and social) approaches highly in need for more sustainable supply chains. Ultimately, a new, emerging research area was revealed: sustainable supply chain quality management. Although, several reviews were conducted on the quality, supply chain and sustainability management practices, this study is one of the very few, undertaken from the perspective of all three approaches and cumulative integration. This contribution provides an initial theoretical framework to guide future theory building on a fruitful research avenue.

Alshehhi et al. (2018), This paper presents an analysis of the literature concerning the impact of corporate sustainability on corporate financial performance. The relationship between corporate sustainable practices and financial performance has received growing attention in research, yet a consensus remains elusive. This paper identifies developing trends and the issues that hinder conclusive consensus on that relationship. They used content analysis to examine the literature and establish

the current state of research. A total of 132 papers from top-tier journals are shortlisted. They find that 78% of publications report a positive relationship between corporate sustainability and financial performance. Variations in research methodology and measurement of variables lead to the divergent views on the relationship. Furthermore, literature is slowly replacing total sustainability with narrower corporate social responsibility (CSR), which is dominated by the social dimension of sustainability, while encompassing little to nothing of environmental and economic dimensions. Studies from developing countries remain scarce. More research is needed to facilitate convergence in the understanding of the relationship between corporate sustainable practices and financial performance.

Truong et al. (2017), The purpose of this paper is to provide an empirical evidence about the relationship between practices of supply chain management (SCM) and operational performance (OP).Based on a comprehensive literature review, a set of SCM practices has been identified and selected to develop a conceptual model as well as to establish their relationship to companies' OP. The measurement scales of the practices were developed in four steps: identification and development of initial instrument; personal interviews and Q-sort; large-scale data collection; and large-scale analysis in order to ensure unidimensionality, reliability and validity. Structural equation modeling was used to validate the model with the data were collected in Vietnamese garment enterprises. The study consolidated relationships between the SCM practices and OP. According to the research results, these practices have a ‒resonant‖ influence on OP that can explain 52.6 percent variance of this output concept. In particular, customer focus and supplier management both direct and indirect impact on OP while top management support and process control/improvement only have indirect and direct influences on OP, respectively. There are some limitations that can guide academics to new lines of future research: to extend the scope of the survey to include different countries and new situations, so results can be generalized; to consider the impacts of the SCM practices on the entire supply chain performance; and to explore additional factors that can further explain OP, such as operational environment, capital, technology, human resource, etc. The authors suggest that the SCM practices shouldbe implemented as an integrated system rather than independent practices, in which they interact with each other and improve OP. The empirical results of this

study provide an evidence to consider the SCM practices as reliable predictors for OP. According to the research, these practices interact with each other and have both direct and indirect effects on OP. In other words, through the mutual interaction among the SCM practices, they have the ‒resonant‖ influence on improving OP. Moreover, the proposed research model analyzing the relationship among SCM practices and OP and its validation using the Vietnam garment industry provided valuable insights both from theoretical and practical perspectives.

Song et al. (2017), This study investigates the impacts of three dimensions of green supply chain integration (GSCI) on operational and financial performance, from both a contingency and a configuration perspective. From the contingency perspective, they used hierarchical regression to determine the impacts of individual GSCI dimensions (green internal, customer and supplier integration) and their interactions on firm performance. From the configuration perspective, they used cluster analysis to develop patterns of GSCI, which were analyzed in terms of GSCI strength and balance. Analysis of variance was used to examine the relationship between GSCI pattern and firm performance. They used data collected from manufacturing firms in Shanxi, Shandong, Beijing, Guangdong and Jiangsu to test hypotheses. The findings from both the contingency and configuration perspective indicate that GSCI was related to both operational and financial performance. Furthermore, the interaction between green internal integration and green customer integration was positively related to both operational and financial performance, while the interaction between green internal integration and green supplier integration was negatively related to financial performance. The interaction between green customer integration and green supplier integration was positively related to financial performance.

Schmidt et al. (2017), Engagement in corporate environmentalism has become increasingly important across all tiers of the supply chain, from upstream raw material suppliers to downstream retailers. However, the contextual role of a firm's supply chain position (SCP) on the adoption of green supply chain management (GSCM) practices and their performance implications has not been

empirically explored. They derive a conceptual model combining the contingent natural resource-based view (NRBV) with stakeholder theory. The resulting hypotheses are tested using cross-industry data of 284 firms utilizing primary and secondary data. Findings reveal a phenomenon they term the Supply Chain Position Paradox: The closer a company is located toward the end consumer, the higher its GSCM practice levels. Conversely, performance gains decrease with company proximity to the end consumer. This paradox is grounded in a mismatch between the level of five specific GSCM practice categories and their respective performance implications. The introduction of SCP as an overlooked contextual factor adds new insights into the ‒GSCM practice–performance link‖ and extends current GSCM research. Moreover, their results yield insights to supply chain management executives in optimizing their GSCM practice portfolios.

Qi et al. (2017), This study aims to develop a comprehensive model that facilitates an understanding of relationships among operations strategies (OSs), supply chain strategies (SCSs), supply chain integration (SCI), and firm performance. It is a start to understand the role of operations strategies in supply chain design. They adopt structural equation modelling to test the relationships based on data collected from 604 Chinese manufacturers. The results show that a lean supply chain is appropriate for firms placing higher priorities on cost, quality and delivery strategies, while an agile supply chain is appropriate for firms competing on the flexibility strategy. Furthermore, both lean and agile SCSs require higher levels of SCI in terms of internal and external integration, but lean SCSs have a significantly higher impact on external integration than agile SCSs. The study refreshes the links between order winner/qualifier and supply chain strategies. Clear-cut differences exist concerning the role of operations strategy in supply chain management, indicating that appropriate supply chain design is very important for firms to achieve their operations objectives. This study contributes to a better understanding of the match between operations strategies and supply chain strategies, and offer a practical insights on investments in the development of supply chain integration.

Protopappa-Sieke et al. (2017), Supply chain finance and working capital management are important avenues to reduce supply chain costs. Small suppliers may

not have sufficient working capital to finance their operations and efficiently supply their customers. They develop a model that captures the fundamental aspects of financial and operational planning in a two-stage supply chain, with both strong and weak members. A strong member can negotiate for more favorable financing rates, more advantageous payment terms, and shorter lead times than a weaker member. They investigate two working capital allocation scenarios. In the dedicated working capital allocation scenario, the members of the supply chain each have their own working capital. In the joint working capital allocation scenario, the members of the supply chain have a joint pool of working capital. Our results demonstrate significant benefits when the members of the supply chain share the working capital. They also show that extending payment delays to a supplier upstream results in higher overall supply chain costs.

Paulraj et al. (2017), Many researchers believe the tremendous industrial development over the past two centuries is unsustainable because it has led to unintended ecological deterioration. Despite the ever-growing attention sustainable supply-chain management (SSCM) has received, most SSCM research and models look at the consequences, rather than the antecedents or motives of such responsible practices. The few studies that explore corporate motives have remained largely qualitative, and large-scale empirical analyses are scarce. Drawing on multiple theories and combining supply-chain and business ethics literature, they purport that instrumental, relational, and moral motives are behind a firm's engagement in SSCM practices. Specifically, they examine the links between corporate motives, SSCM practices, and firm performance. Using a sample of 259 supply-chain firms in Germany, they empirically test five hypothesized relationships. Our results reveal that relational and moral motives are key drivers, and that firms exhibiting high levels of moral obligations tend to outperform those primarily driven by amoral considerations. Findings of this study contribute to multiple literatures espousing sustainability management and can help policy makers, stakeholder groups, and scholars develop more robust strategies for encouraging firms to practice SSCM.

Li et al. (2017), This paper aims to investigate the impact of three critical dimensions of supply chain resilience, supply chain preparedness, supply chain alertness and supply chain agility, all aimed at increasing a firm's financial outcomes. In a turbulent environment, firms require resilience in their supply chains to prepare for potential changes, detect changes and respond to actual changes, thus providing superior value. Using survey data from 77 firms, this study develops scales for preparedness, alertness and agility. It then tests their hypothesized relationships with a firm's financial performance. The results reveal that the three dimensions of supply chain resilience (i.e. preparedness, alertness and agility) significantly impact a firm's financial performance. It is also found that supply chain preparedness, as a proactive resilience capability, has a greater influence on a firm's financial performance than the reactive capabilities including alertness and agility, suggesting that firms should pay more attention to proactive approaches for building supply chain resilience. First, this study develops a comparatively comprehensive definition for supply chain resilience and explores its dimensionality. Second, this study provides empirically validated instruments for the dimensions of supply chain resilience. Third, this study is one of the first to provide empirical evidence for direct impact of supply chain resilience dimensions on a firm's financial performance.

Lambert et al. (2017), Corporate success requires a change from managing individual functions to integrating activities into supply chain management processes. Supply chain management is about relationship management and the supply chain is managed link by link, relationship by relationship Management should implement processes that increase the profitability of the supply chain, not just the profitability of a single firm. While transaction efficiency is important, failure to recognize the value of a relationship orientation will limit supply chain profitability. Academics can benefit from the description of the 25-year evolution of the SCM framework and the research methods used to develop it. In a 2000 article in Industrial Marketing Management, ‒Issues in Supply Chain Management, Lambert and Cooper presented a framework for Supply Chain Management (SCM) as well as issues related to how it should be implemented and directions for future research.

The framework was comprised of eight cross-functional, cross-firm business processes that could be used as a new way to manage relationships with suppliers and customers. It was based on research conducted by a team of academic researchers working with a group of executives from non-competing firms that had been meeting regularly since 1992 with the objective of improving SCM theory and practice. The research has continued for the past 16 years and now covers a total of 25 years. In this paper, they review the progress that has been made in the development and implementation of the proposed SCM framework since 2000 and identify opportunities for further research.

Khan et al. (2017), This article investigates the impact of five determinants of the green supply chain practices on organizational performance in the context of Pakistan manufacturing firms. A sample of 218 firms was collected from the manufacturing industry. The green supply chain practices were measured through five independent variables including green manufacturing, green purchasing, green information systems, cooperation with customers, and eco-design. By using exploratory factor and simultaneous regression analysis, the results indicate that except green purchasing, rests of the four independent variables have been found statistically significant to predict organizational performance. However, the eco-design of green practices followed by green information systems has revealed the greatest impact on organizational performance. Therefore, the managers of the manufacturing firms should not only implement eco-design in their supply chain but also concentrate on proper monitoring and implementation of green information systems to increase their firms' performance. A main contribution of this research from theoretical side is that it is possible to notice a negative effect of ‒green purchasing towards organizational performance particularly in the scenario of Pakistan manufacturing industry. Another valuable result is that green purchasing is an important antecedent of firms economic performance in the US manufacturing firms (Green et al. 2012), although not significantly related to organizational performance in their study. In addition, they also discussed research limitations, areas for future research, and implications for practitioners.

Jin et al. (2017), Although several studies have explored the relationship between the operation and performance of a supply chain (SC), a general SC model cannot deliver the expected financial results at a company-wide level. In this paper, they argue that this cannot guarantee the maximization of a firm's overall value because short-term financial performance metrics do not reflect the risk to businesses and the invested capital. Owing to the varying natures of risk and the capital invested, firms with multiple divisions should assess each division separately, and the results can be compared for decisions concerning the allocation of the firm's capital and resources to maximize the overall value of its businesses. They propose a linkage model to consider operational activities and financial performance simultaneously in a firm's supply chain model. To exhibit the superiority of the proposed model that connects SC operation and financial indicators, they first compare the differences between models for maximizing profit and enterprise-wise economic value added (EVA) as objective functions. To examine uncertainty in the operational and financial parameters of the SC, the results of sensitivity analyses are then reported. Experimental results showed that their model, using the EVA approach, is more effective and superior in terms of maximizing the firm's overall value from the long-term perspective while satisfying the target values for financial ratios set by the firm's executives and shareholders for all periods, unlike the results of the general model.

Dubey et al. (2017), Green or sustainable supply chain management (GSCM/SSCM) has in recent years attracted much attention from academia and practitioners in all part of the world. In recent years, all humanity has experienced severe climate change which is widely attributed to human activity. Harmful emissions have made a major contribution to recent climate change which presents major challenges and threats to the entire human race in form of global warming, earthquakes, hurricanes, tsunami and floods. The purpose of this paper is to propose a conceptual GSCM/SSCM framework contributing to knowledge-based view theory and systems theory (ST) and provide an exhaustive list of further research directions. In this paper the authors have used a systematic literature review to identify building blocks of the conceptual framework, which is the principal contribution of the present paper. In this paper the authors have proposed a conceptual framework for sustainable supply chain network and at the end the authors have outlined

further research directions. The current paper is an attempt to develop a conceptual framework which is grounded in knowledge-based theory. The study helps to extent the prior works which lacks theory focused approach. The present work has immense theoretical value and can be useful to the policy makers or practitioners engaged in GSCM practices.

Chu et al. (2017), This study investigates the impact of three institutional pressures, namely government, customer, and competitor pressures, on the environmental and operational performance of firms. These three institutional pressures are examined by implementing green supply chain management, considering the role of top management and studying social capital between buyers and suppliers in the supply chain. Data were collected through an electronic mail survey from buyer firms in the manufacturing industry in Korea. With 241 complete and usable responses, they used structural equation modeling to test their hypotheses. Our findings revealed that the majority of their hypotheses were supported, which is in line with the existing literature. However, the impact of coercive pressure on top management support and the impact of structural social capital on performance were found to be insignificant. The major contribution of their study is that it broadens the framework of green supply chain management (GSCM) by integrating major and recent constructs in the GSCM theory, while also providing instructive managerial implications through empirical evidence.

Barber et al. (2017), The purpose of this paper is to theorize and develop seven dimensions (strategic supplier partnership, level of information sharing, quality of information sharing, customer service management, internal lean practices, postponement and total quality management) into a supply chain management (SCM) practices (SCMPs) construct and studies its causal relationship with the conceptualised constructs of supply chain performance (SCP) and manufacturing firms' performance (MFP). The study also explores the causal relationship between SCP and MFP. Data were collected through a survey questionnaire responded by 249 Jordanian manufacturing firms. The relationships proposed in the developed theoretical framework were represented through three hypotheses: H1 – there is a

significant relationship between SCMPs and SCP; H2 – there is a significant relationship between SCMPs and MFP; and H3 – there is a significant relationship between SCP and MFP. Linear regression, ANOVA and Pearson correlation were used to test the hypotheses. The results were further validated using structural equation modelling. The results indicate that SCMPs have a positive effect on SCP (H1), which in turn also positively affect MFP (H3). Despite this intermediary positive effect of SCMP on MFP through SCP, the study also suggests that SCMPs have a direct and positive effect on MFP (H2).This study provides hard evidence indicating that higher levels of SCMPs can lead to enhanced supply chain and firms' performance. It also provides SC managers of manufacturing firms with a multi-dimensional operational measure of the construct of SCMPs for assessing the comprehensiveness of the SCMPs of their firms. This study is among the very first SCM researches conducted on the Jordanian manufacturing sector, particularly, in relation to the practices that manufacturing firms in this country need to adopt to make their supply chains a solid competitive vehicle for their development. The results have broader implications for all manufacturing companies, particularly in developing economies where the growth of manufacturing and the development of integrated supply chains are key stages in economic development.

Sundram et al. (2016), The purpose of this paper is to employ a newly developed framework to examine the complex relationship between different components of supply chain practices, supply chain integration (SCI) and supply chain performance (SCP) in the Malaysian electronics sector. This study utilizes survey data of 156 electronics firms in Malaysia and tested the research framework and hypotheses. In addition to the traditional approach of Barron and Kenny (1986), the Sobel test as well as a bootstrapping approach, which is deemed for small sample size, is used to formally test the indirect effects of SCI in the model. SCI has fully and partially mediated the relationship between supply chain management practices (SCMPs) and SCP. SCI fully mediates the relationship between SCP and three of the SCMPs, namely, information quality, agreed vision and goals and postponement strategies. The relationship of supply strategic partnership, customer relation management, information sharing with SCP were partially mediated by SCI.

Risk and reward sharing is found to be non-significant. These insights allow managers to effectively utilize the different components of SCMPs for SCI and performance. For supply chain practitioners, the results of the study can be useful in integrating SCMPs and SCI on improving SCP. Practitioners should take into account the mediating effect of SCI in designing their supply chain management approach to production. To the authors' best knowledge, this paper is one of the first to address the mediating effect of SCI between SCMPs and overall performance of the supply chain.

Stevens et al. (2016), Twenty-five years ago IJPDLM published ‒Integrating the Supply Chain‖ (Stevens, 1989). The purpose of that original work was to examine the state-of-the-art in supply chain management (SCM). There have been substantial changes to the landscape within which supply chains function and changes to supply chains themselves. Given these changes it is appropriate to re-visit what is the new state-of-the art and determine whether the 1989 conceptualization requires extending. The authors also attempt to assess whether the evolution of SCM is associated with improved financial performance. The paper aims to discuss these issues. The authors take a conceptual approach to suggest that SCM is undergoing a transition to devolved, collaborative supply chain clusters. In addition, the authors consider imperatives and models for supply chain change and development. In line with the 1989 work, many of the observations in this invited paper are based on the primary author's experience. The authors use a selection of financial data from leading firms to assess whether benefits attributed to SCM and changes in supply chain operating models have affected financial performance. The authors formalize a model for the dynamics of SCM change. The authors also synthesize a number of models of SCM that extend the original, highly cited work. These include goal-oriented networks and devolved, collaborative supply chain clusters. The authors also find the associations between the evolution of SCM and measures of firm financial performance over time to be equivocal. This work proposes two additional operating models that firms can implement in order to improve the efficacy of their supply chains. The authors extend Stevens (1989) original work by synthesizing a number of additional models for SCI.

Mezouar et al. (2016), The hospital is a complex system where many actors are involved; The challenges that this environment is facing justify the focus on this research subject. The contribution of the paper includes a proposition of a four-level model, that describes the hospital drug supply chain, based on the combination of the Supply Chain Operation Reference (SCOR) and Business Process Modelling Notation (BPMN), and the identification of a set of key performance indicators (KPI) that assess how well the drugs management process within the hospital are effective and efficient and how to improve them.

Laari et al. (2016), The aim of this study is to identify the direct and indirect relationships between customer-driven green supply chain management (GSCM) practices and environmental and financial performance in manufacturing. Partial least squares methodology is used to test the hypotheses on a sample of 119 Finnish manufacturing firms. Contrary to the predominant view of internal GSCM practices being a precursor of all external activities, this article suggests that customer requirements are an important driver to implement internal GSCM practices. The findings confirm that manufacturers can respond to customer pressure by transferring environmental requirements upstream in the supply chain, either by collaborating or monitoring the suppliers' environmental performance. Environmental monitoring is found to be an enabler of environmental collaboration. Furthermore, performance outcomes of GSCM appear to depend on the type of practice. The results indicate that manufacturers with strong internal GSCM practices combined with arm's length environmental monitoring of suppliers are likely to perform well in environmental issues. If a firm seeks to improve financial performance, it needs to form more collaborative relationships with customers to achieve environmental goals.

Kirchoff et al. (2016), Empirical research provides evidence that green supply chain management (SCM) practices positively impact firm performance. Yet, questions remain regarding how firms configure their organizations and design green practices to achieve improved performance, especially in light of a constantly changing business environment. This research uses the resource-based and strategic choice theories to better understand the antecedent roles of two

strategic orientations, supply chain orientation (SCO) and environmental orientation (EO), on both the implementation and outcomes of green SCM practices. The paper aims to discuss these issues. Survey responses from 367 supply chain managers are tested through structural equation modeling. Findings suggest that a combination of SCO and EO capabilities positively influence the implementation of green SCM practices, and positively impact firm performance. Results also suggest that the capability bundle of SCO, EO, and green SCM should be adaptable to the changing business environment. This research contributes through the combination of the resource-based theory, supported by strategic choice theory, to better understand how managers configure and re-configure valuable green-related capabilities to adapt to the constantly changing business environment.

Gelsomino et al. (2016), The purpose of this paper is twofold: to classify the research to-date on Supply Chain Finance (SCF) according to the main themes and methods, and to propose directions for future research. The review is based on 119 papers mainly published from 2000 to 2014 in international peer-reviewed journals and in the proceedings of international conferences. The articles that provide a definition of SCF reflect two major perspectives: the ‚finance oriented' perspective - focused on short-term solutions provided by financial institutions, addressing accounts payable and receivable - and the ‚supply chain oriented' perspective - which might not involve a financial institution, and is focused on working capital optimization in terms of accounts payable, receivable, inventories, and sometimes even on fixed asset financing. While efforts were made to be all-inclusive, significant research efforts may have been inadvertently omitted. However, the authors believe that this review is an accurate representation of the body of research on SCF published during the specified timeframe, and feel that confidence may be placed on the resulting assessments. The paper presents a comprehensive summary of previous research on this topic and identifies the most important issues that need to be addressed in future research. On the basis of the identified gaps in the literature, four key issues have been highlighted which should be addressed in future research.

Chang et al. (2016), Supply chain integration (SCI) is recognized as strategic process management that can be instrumental for creating positional advantages associated with improved firm performance. However, despite rigorous execution, recent meta-analyses derive different conclusions about the benefits of SCI. They propose that these inconsistencies may be associated with selection bias, failure to consider the mediating routes by which SCI affects financial performance, and lack of investigation of moderators. To address these issues, they apply positional advantage theory and the resource-based view, and focus on mitigating the potential selection bias by aggregating findings from 170 previous investigations in a comprehensive meta-analysis, to examine how discrete dimensions of SCI enhance firm financial performance through three types of intermediate firm performance. The moderating effects of time, relationship quality, and national culture are also assessed. The findings confirm that each dimension of SCI indeed improves financial performance. However, contrary to expectations, relational and strategic types of intermediate performance associated with superior customer value positional advantage have stronger mediating effects than operational performance associated with lower cost positional advantage. In addition, time, relationship quality, and collectivist national culture strengthen the associations between some dimensions of SCI and firm performance. Our study findings are reconciled with those from recent meta-analytic studies, and implications arising from their conclusions that may inform practice about how to effectively leverage SCI are presented.

Caniato et al. (2016), Recently, in response to the credit crunch and the increased costs of financing, new solutions for supporting the financial management of supply chains, known as supply chain finance (SCF), have been developed. They exploit the strengths of supply chain links to optimize working capital. The purpose of this paper is to provide a reference framework that links together the objectives leading to the adoption of SCF solutions and several moderating variables. This paper adopts a multiple case study methodology, analyzing 14 cases of the application of SCF solutions among Italian companies. The main findings are the identification of the different objectives leading to the adoption of SCF; the analysis of the impact of moderating variables (the level of inter- and intra-firm collaboration, the level of the

trade process digitalization and the bargaining power and financial strength of the leading firm) on SCF adoption; and the formulation of a reference framework supporting the effective adoption of SCF solutions. This contribution is exploratory in nature; theory-testing contributions should be the focus of further research. Also, the sample is limited to Italian companies. Finally, the service provider's point of view has been marginally taken into consideration in this study. The article addresses the need for more empirical research on SCF. It provides a reference framework focused on the objectives and moderating variables leading to effective SCF adoption, providing a theory-building contribution on the general topic of SCF and on the specific topic of the adoption process of different SCF solutions.

Zhao et al. (2015), This study investigates both the favorable and adverse effects of SCI. There is an inverted U-shaped relationship between supplier integration and financial performance. Internal integration has a positive and significant effect on financial performance. There is an inverted U-shaped relationship between customer integration and financial performance. Top management support plays complementary roles to supplier integration, internal integration and customer integration. While most studies argue that supply chain integration (SCI) has positive effect on financial performance, some literature cautions that SCI may impair financial performance under certain conditions. Our research extends this research stream by considering the adverse effect of SCI. In this study, they examine how supplier integration, internal integration and customer integration contribute to or impede firms' financial performance and investigate the complementary roles of top management support in this process combining the resource-based view and transaction cost economics. Our findings from a survey of 195 firms in China indicate both favorable and adverse effects of SCI by showing an inverted U-shaped relationship between SCI and financial performance. Thus, either too little or too much SCI can impair financial performance. In addition, top management support can be considered as a complementary asset to SCI. This finding suggests that firms should focus on the important roles of top management support so as to improve financial performance through SCI more effectively. This study opens up new research avenues for SCI and suggests directions for future research and practice by exploring under what conditions SCI can help to improve financial performance.

Chorfi et al. (2015), Key Performance Indicators (KPIs) are very important for monitoring Supply Chains. The problem of selecting KPIs is considered as a multi-objective problem. This paper presents a framework for the ranking and the selection of KPIs using a Multi-Criteria Decision Analysis (MCDA). The research was carried out using Analytical Hierarchy Process (AHP) to make pairwise comparison of KPIs in terms of several criteria. The suggested framework is used for selecting relevant KPIs for monitoring a public sector pharmaceutical products supply chain in a developing country.

Choi et al. (2015), This study attempts to contribute to the growing research on green supply chain management (GSCM) strategies by relying on the Natural Resource Based View (NRBV) and relational view. Specifically, this study investigates the role of collaborative capability in moderating the effects of GSCM practices on firm performance. Using hierarchical regression, this study analyzes data from a survey of 230 South Korean manufacturers. The results show that the implementation of GSCM practices can improve both environmental and financial performance of the firm. Also, the findings indicate that firms can expect improved financial performance when they seek a synergistic effect by involving their partners in the GSCM implementation process.

Anand et al. (2015), A growing body of literature has begun in the direction of supply chain performance measurement. However, selecting the appropriate set of key performance indicators (KPIs) for measuring supply chain performance have always remained a challenge. The purpose of this paper is to identify the KPIs and categorize them specifically for measuring retail supply chain performance. A qualitative approach, based on literature has been adopted. Published literature from refereed journals on supply chain performance measurement has been considered and various approaches for developing KPIs have been studied to develop a theoretical framework for performance measurement in retail supply chain. The paper identifies key indicators for performance measurement and classifies them into four major categories: transport optimization, information technology

optimization, inventory optimization and resource optimization. These key indicators are arranged precisely for retail industry. A theoretical framework is proposed to link the performance of these constructs on financial performance of the firm. Future research can be carried out to validate the relevance and applicability of identified indicators. The study can be further conducted to measure the interrelationships between the KPIs and their impact on financial performance of the firm. This study proposes a list of indicators for retail industry, which are presented in appropriate categories so that it can be used by the focussed teams for further improvement. To the best of authors' knowledge, no other study has categorized the KPIs into groups, specifically for measuring retail supply chain performance. The researcher also intends to carry out further empirical study to test the proposed theoretical framework.

2.4 Objective 2: Inventory Performance

Teerasoponpong et al. (2022), Elevated business uncertainties and competition over recent years have caused changes to the data-driven supply chain management of sourcing and inventories across industries. However, only large-sized enterprises have the resources to harness data for aiding their decision-making and planning. By contrast, small- and medium-sized enterprises (SMEs) commonly have limited resources and knowledge, which affects their ability to collect and utilize data. Thus, it is a challenge for them to implement advanced decision support tools to mitigate the effects of market uncertainties. This paper proposes a decision support system (DSS) for sourcing and inventory management, with the aims of helping SMEs compile and exploit data, and supporting their decisions under business ambiguities. The DSS was developed using a simulation-optimization approach by incorporating an artificial neural network and a genetic algorithm for problem representation and optimizing decision support solutions. The exploitation of observational and empirical data reduces the burden of data compilation obtained from unorganized data sources across SME operations. Further, uncertainty factors such as raw material demand, price, and supply lead time were considered. When implemented in a medium-sized food industry company, the DSS can provide decision support solutions that integrate the selection of

recommended suppliers and optimal order quantities. It can also help decision-makers to shape their inventory management policies under uncertain raw material demands, while also considering service levels, sales promotions, lead times, and material availability from multiple suppliers. Consequently, implementation of the DSS helped to reduce the total purchased raw material costs by an average of 51.62% and reduced the order interval and on-hand inventory costs by an average of 54.24%.

Panigrahi et al. (2022), The purchase is becoming a more difficult cum tactical decision that affects the cost factor, quality factor, time factor and responsive factor of the buy and maintains them. The purpose of this study is to investigate the effect of inventory management (IM) practices on operational efficiencies (OEs) in Indian steel manufacturing firms. The study is based on a quantitative research design that has collected information from 321 key officials of Indian steel manufacturing firms. The analyses are carried out with the use of statistical techniques such as confirmatory factor analysis and structural equation modeling (SEM).The paper finds that inventory management (IE) has a considerable impact on the OE of steel manufacturing firms in India. The manufacturing industry must highlight the significance of inventory management practice (IMP) for enhancing firm efficiencies in a volatile environment with the help of management teams. Understanding the impact of IE practices on firms' OE would be helpful for company shareholders and investors. The paper suggests the manufacturing industry to emphasize the role of inventory management practices to have better productivity of the firm. This research focuses on the relationship between IMP and OE. Effective and efficient use of inventory will be helpful in reducing the overall cost of production and reduced costs to customers.Companies require resources to attain a long-term competitive edge. Also, as a consequence, the research is compatible with resource-based view (RBV) theory.

Panigrahi et al. (2022), This study aims to examine the effect of supply chain agility (SCA) on operational performance (OP) measurements of steel manufacturing firms. It also investigates the role of cost efficiencies concerning enhance OPs. The study is based on an experimental research design by collecting data from responses 398 responses of key officials of India's steel manufacturing firms. Analyses are carried to explore this modern concept with the help of Smart-partial least

square (PLS) version 3.3.2 with confirmatory factor analysis and PLS structural equational modelling. SCA factor (SCAF) directly has influenced the firm's OP. It also represents cost efficiencies that have partial mediation between the SCAF and OP. The impact of cost efficiencies on OPs is strongly significant as compared to the impact of SCAF on cost efficiencies. Management teams in the manufacturing industry should stress the role of SCA as a comprehensive concept in responding to market needs in a volatile environment. SCA reflects one of its winning strategies in today's dynamic and competitive world. Managers must thoroughly know the ramifications of agility to develop a mechanism for determining the procedures and identifying inequality in SC operation. This study speaks explicitly about the linkage between SCAF, OP, CE. It is an addition to the existing theories of RBV. Enhancements in OP measurements, specifically performance and flexibility, will lead to better firm performance. Study conceptualizing the complementing effects of SCA (IS capability) and OPs and second cost efficiencies play positive partial mediating effect in between the link. The achievement of SC agile is especially a critical approach to Boost customer satisfaction and differentiate market position.

Nirmala et al. (2022), Inventory Management and Control System is a very essential component for a firm. Inventory is estimated as quite possibly the most imperative resources of an endeavor. The executives of Inventory should be proactive, accurate and effective. Inventory is significant for each business to ensure smooth running of the creation interaction. A study has been taken in a startup, SRI DEVI SNACKS to know about the inventory and the control system to be adopted. The inventory management was analyzed and the control system was executed through ABC Analysis, VED Analysis & EOQ.

Esrar et al. (2022), Managing inventory continues to be a growing area of concern for many retailers due to the multitude of issues that arise from either an excess or shortage of inventory. This study aims to understand how a large-scale retail chain can improve its handling of excess seasonal inventory using three common strategies: information sharing, visibility, and collaboration. This study has been designed utilizing a case study method focusing on one retail chain at three key levels: strategic (head office), warehouses, and retail stores. The data have been collected by

conducting semi-structured interviews with senior-level employees at each of the three levels and employing a thematic analysis to examine the major themes. The results show how three common strategies are being practiced by this retailer and how utilizing these strategies aids the retailer in improving its performance in regard to seasonal inventory. Among their research findings, some challenges were discovered in implementing the strategies, most notably: human errors, advanced forecasting deficiencies, and the handling of return merchandise authorizations. This research takes a case study approach and focuses on one big-box retailer. The authors chose to study three levels (head office, warehouses, and retail stores) to gain a deeper understanding of the functions and processes of each level, and to understand the working relationships between them. Through the collection of primary data in a Canadian context, this study contributes to the literature by investigating supply chain strategies for managing inventory. The Canadian context is especially interesting due to the multi-cultural demographics of the country.

Becerra et al. (2022), This article presents an overview of the models applied to sustainable inventory management in supply chains and a roadmap for new research. It aims to address the lack of understanding of how sustainability is being incorporated into quantitative inventory management models in the supply chain context. The study is based on a classification of the reviewed literature according to the following criteria: supply chain structure, environmental approach, problem type, modeling, and solution approach. As a result, 36 articles were analyzed and classified. The main findings show that studies that incorporate social sustainability into inventory management along supply chains are lacking, while environmental studies are a growing research area. Uncertainty issues also need to be incorporated into sustainable inventory management models. Another important result of this study is the definition of a roadmap with trends and future research guidelines. The identified future research guidelines include incorporating decisions that can help to improve economic, environmental, and social sustainability. Thus, future studies should focus on both following quantitative models that incorporate inventory decisions integrally with

transportation and location decisions, and more complex models, and employing new algorithms and heuristics to solve them.

Wang et al. (2021), The purpose of this study is to demonstrate the nonlinear relationship between inventory stickiness and productivity, with investment efficiency being a mediator and environmental dynamism being a moderator. Using a large panel data collected from 1,479 Chinese listed manufacturing enterprises over the period from 2010 to 2020, this research employs the instrumental variable method combined with two-stage least squares estimators to explore the inverted-U-shaped relationship between inventory stickiness and productivity. Furthermore, the mediating role of investment efficiency and the moderating role of environmental dynamism are demonstrated via two three-model systems. As its core, productivity initially increases with inventory stickiness until a turning point at the end of the sample, beyond which the incremental effect of inventory stickiness on productivity become negative. That is, an inverted U-shaped relationship between inventory stickiness and productivity is found to exist. Moreover, further mediated moderation analysis highlights that investment efficiency is a key mediator of this relationship, whereas environmental dynamism is a key moderator. Managers ought to gauge carefully against the tradeoffs between inventory stickiness and productivity. In general, over 90% of manufacturing enterprises have great potential to increase productivity by implementing sticky inventory management. In addition, managers are suggested to place emphasis on investment management and environmental strategy. This paper contributes to the current understanding about productivity by illustrating and verifying the nonlinear effect of sticky inventory management. It may be the first study to empirically demonstrate the mediating effect of investment efficiency and the moderating effect of environmental dynamism on the relationship between inventory stickiness and productivity.

Perez et al. (2) multi-stage stochastic linear programming, and (3) reinforcement learning. The performance of the three methods is compared and contrasted in terms of profit (reward), service level, and inventory profiles throughout the supply chain. The proposed optimization strategies are tested in a stochastic simulation environment that was built upon the open-source OR-Gym Python package.

The results indicate that, of the three approaches, stochastic modeling yields the largest increase in profit, whereas reinforcement learning creates more balanced inventory policies that would potentially respond well to network disruptions. Furthermore, deterministic models perform well in determining dynamic reorder policies that are comparable to reinforcement learning in terms of their profitability.

Mohammadnazari et al. (2021), In this research, a supply chain network has been designed for inventory management using not only the project site storage facility but also an ancillary warehouse to keep materials. In order to make decision about the appropriate place for building the warehouse, multi-criteria decision-making techniques have been applied. Since the transportation sector, as the most important energy-consuming part, plays a significant role in global warming after power stations and the delivery of materials will have environmental impacts, this research tried to minimize the external cost of global warming caused by transportation. In this study, a mathematical formulation is presented to solve the problem of ordering the required amount to project site, while taking into account an ancillary warehouse. To quell the discussion, a numerical example has been demonstrated. The findings show that uncertainty considerations fortify the strict decision making and can increase the confidence level.

Li et al. (2021), Inventory management not only determines the health of the real estate market development, but also affects the regional economy and the capacity of sustainable social development. In this paper they use the DPSIR framework to integrate multi-dimensional influence factors, such as economic, social, and environmental factors, to construct a real estate inventory management performance evaluation and obstacle diagnosis model, and conduct an empirical study on 31 Chinese provinces and cities. The results show that: first, China's real estate inventory is huge in size, with significant spatial heterogeneity and agglomeration; second, China's real estate inventory management performance is unsatisfactory and still shows no improvement despite the strong policy intervention of the central and local governments; third, the obstacle factors of real estate inventory management are becoming increasingly diversified and complicated, with great differences among provinces—significantly, Profits of Real Estate

Enterprises, Disposable Income of Urban Residents, Financial Revenue, Per Capital GDP, Resident Population, Gross Domestic Product, Total Retail Sales of Social Consumer Goods, Financial Expense, and Loans Balance of Financial Institutes are critical obstacle factors; and fourth, it is suggested that, on the basis of mastering the actual conditions of supply and demand in the real estate market, differentiated and precise response strategies should be formulated by integrating near-term and long-term goals, direct and indirect forces, and administrative and market instruments.

Kalar et al. (2021), Attempts to understand how firms view environmentally-friendly operations and conscious consumerism are easy to find in the resource efficiency literature. Although scholars consider various resource efficiency business models, opportunities to seize the benefits of the organizational life cycle theory remain under-researched. In the current study, they analyze resource efficiency actions undertaken by close to 1,200 firms in the innovative and conservative stages of a firm's evolution from four European Union member states: Lithuania, Portugal, Slovenia, and Spain. Logistic regression results show that firms in the conservative stage are more likely to undertake resource efficiency actions related to the saving of water, energy, and materials than firms in the innovative stage which are expected to be implementing actions associated with the design of sustainable product. Surprisingly, their findings also suggest that firms in the conservative stage perform more resource efficiency actions than firms in the innovative one. Various actions are applied by firms in different stages among member states that share similar economic conditions. Moreover, support mechanisms are also considered in this study. The findings allow them to contribute by expanding how the resource efficiency field is conceived in the terms of firm-specific characteristics, their needs and limitations while providing insights and recommendations for researchers and policymakers to accelerate the transition to a sustainable society.

Ivanov et al. (2021), In this chapter, inventory management principles are discussed. It starts with an introductory case study considering different inventory management principles in the automotive, electronics, and e-commerce sectors. In the beginning, the trade-off between ‒service levels‖ and ‒costs‖ in

inventory management is highlighted. Next, the role of inventory in the supply chain is analyzed. Therefore, the ABC and XYZ analysis is introduced and the use of the EOQ/EPQ models for independent inventory demand is explained. Subsequently, how to compute a reorder point and how to calculate service levels and probabilistic inventory models is shown. Then, the applicability of dynamic lot-sizing models is elaborated. A discussion and computation of the effects of inventory aggregation takes place leading to an explanation of the ATP/CTP concept. Finally, they explain the principles and performance indicators to measure the inventory management efficiency and responsiveness. The chapter is accompanied by an E-Supplement providing additional case studies, Excel templates, tasks, and video streams.

Czerwinska-Kayzer et al. (2021), Financial liquidity and profitability are two critical phenomena present in the financial economy of a company, whose relations depend on each other and may course in different directions. At the same time, they are an example of the complexity of the problem, which demands a proper approach, allowing one to reconcile two opposing objectives of any enterprise, i.e., maximizing the benefits for the owners and minimizing the risk of losing financial liquidity. Until now, the relationship between liquidity and profitability has not been examined explicitly, using multidimensional methods in particular. Nevertheless, the links between profitability and financial liquidity maintenance ensure the sustainable development of enterprises in different branches. This paper formulates two aims: scientific and practical. The scientific one concerns adopting the canonical variate analysis method to visualize the differences and relationships between food industry companies regarding financial liquidity and profitability. The practical one relates to indicating the relationship between financial liquidity and profitability in different groups of food industry companies. To study the relationships between the selected groups of enterprises and describe them, the liquidity and profitability ratios were utilized, involving canonical variate analysis based on transformation by linear combination and singular value decomposition. The analysis found that the most important feature highlighting the group of the examined entities regarding financial liquidity was the cash conversion cycle. The research

results showed the existence of multi directional relationships between liquidity and profitability. The research indicates that they depend on indicators describing financial dependencies and the industries in which they operate. This led to a much deeper and broader interpretation of the assessment of the financial situation of companies to support their sustainable development.

Becerra et al. (2021), To systematically review 91 articles on sustainable inventory management. To analyze analytical and simulation sustainable inventory management models. To identify quantitative methods that contribute with the environmental impact. To identify heuristic solution algorithms for sustainable inventory management. This paper provides a systematic and up-to-date review and classification of 91 studies on quantitative methods of green supply chains for sustainable inventory management. It particularly identifies the main study areas, findings and quantitative models by setting a point for future research opportunities in sustainable inventory management. It seeks to review the quantitative methods that can better contribute to deal with the environmental impact challenge. More specifically, it focuses on different supply chain designs (green supply chain, sustainable supply chain, reverse logistics, closed-loop supply chain) in a broader application context. It also identifies the most important variables and parameters in inventory modelling from a sustainable perspective. The paper also includes a comparative analysis of the different mathematical programming, simulation and statistical models, and their solution approach, with exact methods, simulation, heuristic or meta-heuristic solution algorithms, the last of which indicate the increasing attention paid by researchers in recent years. The main findings recognize mixed integer linear programming models supported by heuristic and metaheuristic algorithms as the most widely used modelling approach. Minimization of costs and greenhouse gas emissions are the main objectives of the reviewed approaches, while social aspects are hardly addressed. The main contemplated inventory management parameters are holding costs, quantity to order, safety stock and backorders. Demand is the most frequently shared information. Finally, tactical decisions, as opposed to strategical and operational decisions, are the main ones.

Yang et al. (2020), Effective inventory management is fundamental to order fulfillment excellence and supply chain success. In this paper, they develop a strategic inventory management decision tool that integrates inventory classification and inventory control policy decisions for maximizing order fulfilment performance, while accounting for a constraint on inventory budget and the profit expectation of a firm. This inventory solution tool provides critical enhancements to current inventory planning software, which is developed upon the traditional inventory classification scheme and where practitioners have to balance service levels and safety stock decisions through trial-and-error. The model allows firms to assess whether the current inventory performance is Pareto optimal, quantify the trade-offs between various performance measures, and identify the right inventory level according to the firms' strategic goals. In computational results, they demonstrate the trade-off and positive relationships between key item- and order-based inventory performance measures and short-term profitability under different levels of inventory budget in a multi-item finished goods inventory system.

Wang et al. (2020), From the intra- and inter-regional dimensions, this paper investigates the linkage between industrial agglomeration and inventory performance, and further demonstrates the moderating role of firm size and enterprise status in the supply chain on this linkage. Using a large panel dataset of Chinese manufacturers in the Yangtze River Delta for the period from 2008 to 2013, this study employs the method of spatial econometric analysis via a spatial Durbin model (SDM) to examine the effects of industrial agglomeration on inventory performance. Meanwhile, the moderation model is applied to examine the moderating role of two firm-level heterogeneity factors. At its core, this research demonstrates that industrial agglomeration is associated with the positive change of inventory performance in the adjacent regions, whereas that in the host region as well as in general does not significantly increase. Additionally, both firm size and enterprise status in the supply chain can positively moderate these effects, except for the moderating role of firm size on the positive spillovers. In view of firm heterogeneity, managers should take special care when matching their abilities of inventory management with the agglomeration effects. Firms with a high level of inventory management are suited to stay in an industrial cluster, while others

would be better in the adjacent regions to enhance inventory performance. This paper is the first to systematically analyze the effects of industrial agglomeration on inventory performance within and across clusters, and confirm that these effects are contingent upon firm size and enterprise status in the supply chain. It adds to the existing literature by highlighting the spatial spillovers from industrial clusters and enriching the antecedents of inventory leanness.

Vamsi et al. (2020),They all know that in today's highly competitive world, everything has been developed by some technologies like IOT, digital, cloud, sensors, etc. Nowadays warehouses and inventories are facing so many problems like huge amount of human's involvement in work and manual errors (or) human errors, and lot of workers are required for controlling or managing the process. May be sometimes human could make errors, but machines never could make errors. So that they are presenting a new idea which is movable bar code scanner using IOT (industry automation and smart glasses) for reducing the problems in warehouses and inventories. It can make the industry foster (advance), quick, efficient, and better digitalized.

Motevalli-Taher et al. (2020), Designing a sustainable wheat network considering water consumption. Tackling the demand uncertainty with the simulation method. Establishment new silos according to safety stock and imports. Applying meta-goal programming to solve the multi-objective mathematical model. Considering a case study in Iran to verify the model and provide managerial insights. One of the most important challenges in any society is the issue of food and water supply. Undoubtedly, agriculture has a major role in water consumption, and grains have the largest use in the food of people. Bread is also an essential commodity in households and constitutes the staple food of many people. Proper investigation and management of its various stages, from production to distribution, can solve many problems. This research optimizes the sustainable supply chain network of wheat and its products. A multi-objective mathematical model is proposed to minimize network costs and water consumption and maximize job opportunities. Then, the multi-objective problem is transformed into a single-objective problem using the meta-goal programming method. Also, the uncertainty of the demand for wheat flour is addressed through simulation. A case study is considered to evaluate the proposed model, and the results, sensitivity

analyses, managerial insights, and suggestions for future research are reported.

Villafuerte et al. (2019), Planning of resources is a powerful tool in the field of supply chain management and control and in general. Global large-scale companies and enterprises have this implemented in their planning processes. Today, experts in the subject have found issues regarding the implementation of such tools in small- and medium-sized enterprises (SMEs). Therefore, this paper aims to develop an application for the methodology of continual improvement of processes, referred to as the Deming cycle or Plan–Do–Check–Act (PDCA), which adapts to continuous improvements of processes and products in SMEs. The methodology was modeled in a SME dedicated to manufacture and distribution of wine and products (wine and Pisco). The model was simulated through a simulation software, obtaining results of improvement regarding problems like break of stock, taking into account the satisfaction of the client, productivity in the delivery, and shipment time.

Turrini et al. (2019), Poisson-based distributions provide best fit for spare parts. A modified K–S test which puts more emphasis on the tails is developed. Using the right distribution is critical for inventory performance. An appropriate goodness-of-fit test is critical for inventory performance. Spare parts are necessary for ensuring the functioning of the critical equipment of many companies, and as such, they play a central role in these companies' operations. Inventory control of spare parts is particularly challenging due to the nature of their demand, which is usually slow-moving, erratic and lumpy. As inventory policies rely on the forecasted lead-time demand distribution and this choice impacts the performance of the system, an ill-suited hypothesized distribution may result in high preventable costs. In this study, they contribute to the empirical literature by analyzing what distributions best fit spare parts demand. They use the Kolmogorov Smirnov (K–S) goodness-of-fit test to find the best-fitting distributions to their data and compare their results to those in the literature. Furthermore, they implement a slightly modified K–S test that places greater emphasis on differences in the right tail of the distribution,

mirroring real-world inventory applications, and less emphasis on the left tail. Finally, they link the goodness-of-fit of the distributions to their inventory performance. Our first dataset comes from the German renewable energy industry and is composed of the weekly demand for more than 4000 items over the period 2011–2013. The second dataset comes from the Royal Air Force. It is composed of monthly demand for 5000 items over the period 1996–2002.

Stopkovß et al. (2019), The aim of this article is to modify the parameters and thus the objective function of the deterministic model of inventory theory so that other important aspects, which influence inventory management, can be taken into consideration. These aspects include the nature of inventory consumption, the share of inventories in sales, the capacity of means of transport and, above all, the reliability of suppliers. This goal is achieved by performing sophisticated and specific calculations for the individual parameters in the modified model. The modification of the objective function of the deterministic model has created a new multi-criteria model. The outcome of this model sought to optimize the supply process in a way that minimizes the risks associated with a lack of inventories while maintaining the economic effectiveness thereof. The model effectiveness is examined by comparing the application of the deterministic model and the proposed model with modified objective function. The results of applying these individual models have been produced based on calculations of indicators showing inventory management effectiveness—the speed of inventory turnover and the average number of inventories in storage.

Paam et al. (2019), Proposing policies on the configuration of storage rooms in apple supply chains. Contributing to the environmental and economic sustainability in apple industry. Minimizing fruit loss and total costs by 7.7% and 1.5%, respectively. Drawing insights to improve inventory operations via sensitivity analyses. This paper investigates the impact of inventory management optimization on fruit loss, and inventory and processing costs in apple supply chains. It proposes new inventory policies regarding the configuration of high-tech storage rooms, where apples are stored to meet the annual demand. Each configuration gives rise to a different set of storage room, which will preserve the apples for a specified period of time. To quantify the impact of these policies, they apply a mathematical

programming model to the Australian apple industry and analyze the results for two different configurations of storage rooms: (1) a fixed number of each type of storage room and (2) a flexible arrangement in which different numbers of storage rooms of each type are active during different time periods. The comparative effectiveness of the two scenarios is investigated through a case study. The flexible configuration is found to be superior as it reduces fruit loss and total storage and processing costs by 7.7% and 1.5%, respectively, over the fixed configuration. Finally, a comprehensive sensitivity analysis of some of the parameters of the model is performed. This allows the provision of valuable insights and recommendations which empower apple industry stakeholders to improve their inventory performance.

Muchaendepi et al. (2019), The study assessed the inventory management (IM) strategies that are used by SME's in the manufacturing sector of Harare, Zimbabwe. The study comprised of the population from Gleview complex, Siya So Mbare, Kuwadzana, Gazaland and Magaba industrial sites. Respondents were selected from the each of the companies which the researchers selected purposively. The study used qualitative research design which was descriptive in nature. The study also used purposive sampling technique. A sample used a sample size of 244 respondents. Data was collected from the questionnaires which were completed and received back. The research established that most SME's use the Just-In-Time method of inventory management and do not have knowledge on the other computerized systems and methods. Since companies use JIT method, SME's face challenges in the supply chain as they always have to make sure they have constant communication with their suppliers and also to reduce the time in which they receive materials. However, due to lack of computerized communication, they have to make orders when they are needed which would make delays to the customer. Due to the finding, the researchers concluded and also made request for further studies on specific areas which needed more time and clarity.

Agrawal et al. (2019), Many types of retail items are shipped through the supply chain from the manufacturer to the stores in ‖prepacks,‖ which may consist of multiple units of the same stock keeping unit (SKU) or combinations of related SKUs packaged together. Prepacks reduce shipping and handling costs in the supply

chain, but they can also increase supply - demand imbalances. This paper is the first to develop a general methodology that determines optimal replenishment policies for combinations of different prepacks. The model uses stochastic dynamic programming, and can be solved by a linear program in the steady state case. They formulate the general multi-SKU prepack case and develop specific solutions for the one-SKU and two-SKU prepack cases. A numerical analysis of various one-SKU and two-SKU prepack choices leads to some interesting insights about the optimal design of prepacks from the retailer's standpoint. Single unit shipments are cost effective only for very low demand rates. Having multiple prepack sizes leads to significant cost savings, relative to a single prepack size. However, the incremental benefits of including larger numbers of different prepacks appear to diminish rapidly. Unless item demands are perfectly correlated, multi-SKU prepacks appear to have only a limited expected cost advantage over optimally chosen single-SKU prepacks. But multi-SKU prepacks can reduce the expected number of prepacks handled per period, which can be an important consideration for distribution centers. The best choices for multi-SKU prepacks can be counterintuitive, and some apparently attractive choices for two-SKU prepacks perform worse than one-SKU prepacks.

Singh et al. (2018), The Purpose of this paper is to overview the Inventory management in supply chain and their current Inventory related issue in a present day business and present a conceptual methodology for related issue. The methodology based on the inventory, which are inputs for the methodology and benefits which are output of methodology. A literature review is conducted on management or control of inventory and also issues related to inventory in industry, and its various parameters. A conceptual methodology for inventory issues in present business.

Panahifar et al. (2018), The purpose of this paper is to identify and assess the interrelationships between various characteristics of information sharing and trust and their criticality for effective information-centred supply chain collaboration initiatives and, in turn, its criticality to overall firm's performance. A survey of 189 executives from different firms was conducted and the resulting data were analyzed to investigate how collaboration enablers affect effective collaboration and

to determine its impacts on organizational performance. Structural equation modelling through partial least squares is used to study the relationships between four enablers (trust, information readiness, information accuracy and information security), perceived collaboration success, and two outcomes (sales growth and overall operational performance).The empirical results indicate that three collaboration enablers including trust, information readiness and secure sharing of information improve supply chain collaboration. The present study finds that ‒secure sharing of information‖ was the most important factor in fostering information sharing-centred collaboration. The present study also demonstrates that effective collaboration positively and significantly influences on firm's performance. This study provides researchers and practitioners with a more comprehensive understanding about the information sharing-centred collaboration, its enablers and effects on firms' performance in a supply chain context. Future research should focus on developing additional constructs that may capture other drivers of effective collaboration. The present study makes an empirical contribution to the body of knowledge by investigating an integrated framework focussing on the enablers of collaboration through information sharing and its impact on firms' performance.

Maestre et al. (2018), In this paper, they present experimental results from the application of model predictive control (MPC) to inventory management in a real hospital. In particular, the stock levels of ten different drugs that belong to the same laboratory have been controlled by using an MPC policy. The results obtained after four months show that the adopted approach outperforms the method employed by the hospital and reduces both the average stock levels and the work burden of the pharmacy department. This paper also paper presents some practical insights regarding the application of advanced control methods in this context.

Hill et al. (2018), The Collaborative Planning, Forecasting, and Replenishment (CPFR) initiative is an increasingly popular paradigm that helps the supply chain better coordinate activities to serve customers with improved demand forecasting and production scheduling. CPFR provides a framework that covers a broad range of issues including demand forecasting, inventory management, production and replenishment planning, and order fulfillment. This research provides empirical evidence of the effect of CPFR adoption on a firm's financial

and operational performance as compared to similar firms who have not indicated that they were implementing CPFR. Using the event study method and a COMPUSTAT database, they find significant improvements in several performance measures for firms that have adopted CPFR.

Guo et al. (2018), Mass customization (MC), as an operations program to satisfy target consumers by offering personalized products or services, has attracted substantial attention from both the industry and academia. Under this program, one of the most important issues is an efficient management of the related inventories, including the work-in-process inventories, standard items, and the customized items, which can ultimately contribute to a profitable business for the companies who have launched MC. This paper, therefore, focuses on reviewing the mass customization based literature and identifying various methods to effectively manage inventory for MC schemes. In addition to regular inventory management, with the increasing emphasis on corporate social responsibility, MC companies are required to devote more effort to the proper management of leftover and returned inventories under MC. This paper, hence, examines MC inventory management in both forward and reverse logistics. Findings from this review provide a guideline to operations managers on inventory management improvement in their MC operations. Future research opportunities related to MC inventory management, such as supply chain coordination and risk management, are discussed.

Cherrafi et al. (2018), GSC performance, lean, green and process innovation have only been studied separately. A framework to model and establish the relationships of these subjects is proposed. Research is based on 347 manufacturing companies from 13 countries. Results suggest that lean and green positively affect GSC performance while process innovation does not. Results indicate that process innovation magnifies the positive effect of lean and green on GSC performance. This paper investigates the relationship between lean, green and process innovation practices and green supply chain (GSC) performance. Data were collected from 374 manufacturing firms and results analyzed using Structural Equation Modeling (SEM). The findings revealed a synergetic effect between process innovations, green and lean practices, which play a crucial role towards the improvement of GSC performance. In particular, the results suggested that: (1) lean practices such as

JIT, set-up time reduction, cellular manufacturing, and waste elimination can significantly contribute to improve GSC performance; (2) green practices including eco-design, life cycle assessment, green manufacturing, reverse logistics, and waste management significantly and positively affect GSC performance; (3) process innovation practices such as fast response to new processes introduced by other companies within the same sector, pioneering disposition to introduced new processes, and number of changes in the process introduced in one year, do not have a direct contribution to improving GSC performance; finally that (4) process innovation amplifies the effect which contributes for lean and green practices to offer a higher payoff rate in terms of GSC performance when these are coupled with process innovation activities. This paper presents an innovative approach since it studies simultaneously the three dimensions of sustainability (environmental, social and economic), the lean, the innovation process and green paradigms, which are considered strategic for supply chain competitiveness. Investigating the relationships between the four strategies is a contribution that the authors hope will become a forward step for promoting sustainability in manufacturing supply chains.

Akkawuttiwanich et al. (2018), A Fuzzy QFD approach for managing SCOR KPIs is proposed, which is new and original. The proposed approach is capable of prioritizing technical improvement actions. A case study shows that the Fuzzy QFD approach is effective to manage SCOR KPIs. The Supply Chain Operations Reference (SCOR) KPIs are widely used to measure supply chain performances by industrial practitioners. However, it is still difficult to determine what actions should be carried out to improve the KPIs. This paper proposes a new fuzzy QFD approach to manage the SCOR KPIs. The SCOR KPIs are specified as ‒Whats‖ and the technical improvement actions (TIs) are specified as ‒Hows‖. The proposed fuzzy QFD approach will prioritize the TIs to be implemented to achieve the target SCOR KPIs. A case study of bottled water manufacturing is used to demonstrate the application of the proposed approach. This paper is the first attempt to develop the fuzzy QFD approach to manage SCOR KPIs with a real industrial case study.

Abd Karim et al. (2018), The purposes of this study are to examine the standard operating procedure (SOP) on inventory management practices, identify any

weaknesses in inventory management and examine its impact on the performance of the company. Inventory management is important because it ensures smooth production and prevents loss of sales because of stockout and/or customer dissatisfaction. This study selects one manufacturing company as a case study and uses the mixed data collection method of document analysis and observation. The research analysis was conducted by using COSO Internal Control – Integrated Frame work 2013 as guidance. It is revealed that a company practices risky inventory management in keeping stock, as it relies heavily on third-party warehousing services beyond the control of the company. This study also reveals that the SOPs are too general and lack specificity. However, poor inventory management has a modest influence on the financial performance of the company. In completing this study, some limitations are experienced such as changes on the management structure of the company as well as the department itself. Frequent changes on several procedures also may influence this study to obtain accurate information. In addition, some highly confidential documents such as detailed information and minutes from management meeting were not permitted to be examined. This study provides recommendations to improve weak internal controls particularly on SOPs, so that fraud and mismanagement opportunities can be reduced. This study makes an original contribution, as it enhances the theoretical and practical understanding on inventory control and management systems, particularly for a manufacturing company in the emerging market environment. In addition, it examines various internal financial reports and directly observes the process in supply change management, which are generally difficult to be accessed by academic researchers.

Transchel et al. (2017),They examine a stochastic inventory and pricing problem for a firm that sells two vertically differentiated products. The demands for the two products are determined by total (random) market size and the customers' net utility from buying the two products, which is determined by the products' quality attributes, the individual quality valuation (unknown to the firm), and the selling prices. In case the preferred product is out of stock, customers may be willing to buy a substitute instead, if their net utility is non-negative. Therefore, they analyze an inventory and pricing model, considering price-based and stockout-based substitution. We show that the demand function is not continuous in price. By

decomposing the profit function into different price regimes, they are able to derive closed-form expressions for the stockout-based substitution rates (upward and downward substitution) and the optimal inventory levels under exogenous pricing. Under endogenous pricing, they find that the profit function is not necessarily unimodal. However, they show that a unique solution exists for the integrated price and inventory problem under price-based substitution only. Numerical results reveal that not considering stockout-based substitution (i) leads to lower profit margins for high-quality products and (ii) may cause severe supply-demand mismatches throughout the entire assortment. Finally, they show the performance of two approximated pricing policies.

Ochoa et al. (2017), The purpose of this paper is to examine the mechanisms through which the use of enterprise systems (ESs) enhances buyer-supplier integration (BSI). More specifically, the authors explain a model where ES enhances BSI indirectly, mediated by inventory management capabilities (IMCs), as the way ES enhances BSI remains under-explored in the literature. Application of the resource orchestration framework to explain how capabilities and mechanisms interplay to enhance BSI. Data were collected by means of a survey instrument. Data collection took place as part of a larger project, sponsored by the Spanish Government, to evaluate logistics competitiveness in Spain.ES enhances BSI by serving as a coordinating mechanism that maintains capability configurations in a value-creating alignment. IMC plays a key, yet under-explored role as a mediating mechanism that supports ES-enabled BSI. First, this research does not fully capture the multi-party nature of the supply chain context. Second, data collection was limited to companies that were more likely to have a systematic approach to logistics issues (i.e. large- and medium-sized companies) and companies based in Spain. This paper enhances both scholarly and practitioner understanding of the mechanisms through which the implementation and use of ES contributes to BSI. In addition, this paper integrates literature from different fields (e.g. strategy, information systems, and operations) to gain a better understanding of how the implementation and use of ES affects BSI.

Gandhi et al. (2017), The purpose of this paper is to investigate the adoption and implementation of supply chain management practices (SCMPs) on supply chain

performance (SCP) and firm performance (FP) in the organized retail industry in a developing country like India. An empirical study was conducted on a sample size of 125 responses collected from the supply chain heads of organized retail firms in India. A theoretical model was developed depicting the relationship between SCMPs, SCP and FP. The theoretical model was tested using mediating multiple regression analysis. This research suggests that the SCMPs are positively related to SCP and FP. Customer relationship management and supplier relationship management are reported as the most important SCMPs, which had the maximum impact on the FP in the organized retailing context in India.The research employed perceptual performance measures. Future studies can use actual performance parameters like profit and sales growth to better quantify the benefits of SCM in this context. This research is an attempt to empirically test the impact of SCMPs on FP in organized retailing context in an emerging market, India.

Elking et al. (2017),They conduct an empirical investigation of the impact of focal firm and supplier financial dependence on focal firm financial performance using the lens of resource dependence theory. They further investigate the moderating impact of dependence asymmetry on the relationship between lean inventory strategy and focal firm financial performance. They use an innovative supply chain structure data set provided by Bloomberg, which allows implementation of unique measures for focal firm and supplier financial dependence within a supply chain. The results of an analysis of 3,638 buyer–supplier relationships provide support for the hypothesized direct effects of focal firm financial dependence and supplier financial dependence on firm financial performance. Our results also support their hypothesis regarding the moderating effect of dependence asymmetry on the relationship between lean inventory strategies on financial performance. These findings both improve their understanding of the impact of dependence on focal firm performance and shed light on the heretofore unstudied impact of dependence asymmetry's effect on the efficacy of lean inventory strategies.

Das et al. (2017), The present study is an attempt to conceptualize, develop and validate a scale for the purpose of measuring Sustainable Supply Chain Management (SSCM) practices adopted by an organization and also evaluating its performance on different dimensions of SSCM. Based on extensive review of literature, the study has

identified five constructs of SSCM practices, namely Environmental Management Practices, Operations practices, Supply Chain Integration, Socially Inclusive Practices for Employees, and Socially Inclusive Practices for Community and another five constructs of SSCM performance namely Environmental Performance, Operations Performance, Competitiveness, Employee-centred Social Performance, and Community-centred Social Performance. A survey instrument was designed based on the extant literature and relevant data was collected on this instrument from 255 organizations. The data analysis primarily involves application of confirmatory factor analysis for validating the instrument in respect of unidimensionality, reliability, convergent validity, discriminant validity, nomological validity and criterion-related validity. The outcome of the analysis gives rise to a parsimonious instrument which makes a significant contribution to SCM literature. The instrument would enable an organization to implement different elements of SSCM practices, monitor the status of its implementation and finally assess organizational performance on the dimensions of SSCM.

Dai et al. (2017), This article starts with the reasons to bullwhip effect phenomenon, analyzes how to enhance inventory management strategy to reduce the bullwhip effect in supply chain management. And then, they study the case of McDonald's and its third-party logistics system HAVI cooperation to explore the cooperation mode between the two companies. Assuming that McDonald's stores as a logistics activities supply chain leader adopts the upper and lower inventory management strategy, according to the HAVI's distribution for McDonald's stores, they develop a one-multi distribution model, and build a mathematical model for reducing inventory and improve service level.

Caridade et al. (2017), The automotive industry is one of the most competitive sectors, in which rigour, flexibility, quality and agility constitute the critical factors of success. Warehouse activities and their associated costs play a vital role in logistic functions. Their optimization and performance assessment may result in substantial value gains for the company. This study was developed at Continental Mabor, with the purpose of developing a proposal to restructure and optimize the company's warehouse. An analysis of the existing warehouse was carried out and the respective proposals were subsequently presented. The main goal of these

proposals was to improve the efficiency of warehouse functions, reduce stock quantities and enhance the capacity to meet customer's demand. A warehouse management system (WMS) was installed and a suitable bin management solution was defined. This system consisted of a basic WMS to support stock inventory and its location. In addition, this system envisaged warehouse performance and included elements such as the inventory management Key Performance Indicator (KPI) and warehouse productivity.

Banerjee et al. (2017), The study surveyed executives of a major food retailer in India and explored their perspectives on supply chain management practices, competitive advantage and firm performance; to assess the importance accorded to application of business intelligence (BI) in their operations. Nine dimensions for SCM practices and four dimensions for competitive advantage are identified which are found to strongly relate to each other. The dimensions of SCM also strongly relate to firm performance. Though information sharing with suppliers and their inclusion in strategic decision-making emerge as key dimensions of SCM, their impact on competitive advantage is perceived to be insignificant by retailers.

Zhang et al. (2016), Growing items need to be fed among the process from purchase to sale, in which the weight of inventory changes over time, as well as the inventory behavior. Nowadays, since the consumers prefer to low carbon goods and the government require low carbon operation, so the retailers have to make efforts to reduce the carbon emissions in operation, which also may affect the inventory behavior. This paper discusses the inventory management problems of growing items under carbon-constrained, proposes a new inventory model, and discusses the influence of the carbon-constrained on the total cost, carbon emissions, optimal order quantity and the optimal slaughter time. The results suggest that the retailer usually reduce the emissions by changing the order quantity rather than feeding time, the optimal feeding time decreases with the increasing of initial order weight, and the carbon emissions reductions offset the associated increase in total cost caused by adjusting the order quantity. Meanwhile, a modest punishment can induce retailers to reduce its carbon emissions, but it may add the total cost.

Younis et al. (2016), The purpose of this research is to investigate the implementation of green supply chain management (GSCM) practices and its impact on corporate performance (CP). The research in particular examines the results of implementing a set of GSCM practices on different dimensions of the CP. This study, being the first of its kind in the Middle East, developed a research model to test the relationship between four main GSCM practices namely, eco-design, green purchasing, environmental cooperation and reverse logistics, and four dimensions of CP: operational performance, environmental performance, economic performance and social performance, while controlling three main variables (firm size, firm age and environment management system certification). Statistical analyses were based on the data collected, through survey questionnaires, from 117 firms in the manufacturing industry in the UAE. Reliability and validity of the research model were tested by the commonly accepted statistical tools. To test the hypotheses relating implementation of GSCM practice and CP, multiple regression analysis was used. The finding of the study was that GSCM practices impact the CP dimensions differently. While none of the four GSCM practices were found to have any impact on the environmental performance, green purchasing and environmental cooperation were found to have a significant impact on the operational performance. The study found that only green purchasing plays a role in improving the economic performance, while only reverse logistics practices were found to impact the social performance of the firm positively. Research on GSCM is still in the nascent stage. Further refinement of the survey to differentiate between different manufacturing industries might be needed. Generalizability of the findings is also limited because of data collected from manufacturing firms in the UAE. This research provides important insights. The findings of this research are generally consistent with those of prior studies in other parts of the world. Firms in manufacturing industry in the UAE believe that GSCM practices help the company design and develop better products which, in turn, increase the company chances in selling its products in the international markets while, at same time, improving the average profit and market share. It was also found that the UAE firms believe that implementation of GSCM practices help improve the corporate image, enhance employees' job satisfaction and improve employees' health

and safety. Implementation of GSCM practices improves CP in different ways. Supply chain managers are required to decide on the CP dimension they want to improve and accordingly select the appropriate GSCM practices mix that leads to the desired level of improvement. Although few earlier researches studied the impact of GSCM on CP, this study is different and makes a unique contribution by offering a holistic view of the impact of implementing four main GSCM practices on all dimensions of CP. The study offers some insights on the type of GSCM practices the firm needs to adopt to improve the targeted performance dimension.

Mezouar et al. (2016), The hospital is a complex system where many actors are involved; The challenges that this environment is facing justify the focus on this research subject. The contribution of the paper includes a proposition of a four-level model, that describes the hospital drug supply chain, based on the combination of the Supply Chain Operation Reference (SCOR) and Business Process Modelling Notation (BPMN), and the identification of a set of key performance indicators (KPI) that assess how well the drugs management process within the hospital are effective and efficient and how to improve them.

Lii et al. (2016), This study examined the combined impact of an innovation orientation, supply chain integration (customer integration, supplier integration, and internal integration), and combinative competitive capabilities on firm performance. A total of 480 questionnaires were collected from companies in the Taiwanese electronics industry. Structural equation modeling (SEM) was employed to analyze the collected data. An innovation orientation was shown to positively affect supply chain integration, combinative competitive capabilities, and firm performance. Supply chain integration (in particular, supplier integration and internal integration) had a mediation effect on innovation orientation and business performance, whereas combinative competitive capabilities had a mediation effect on supply chain integration and firm performance. The results provide empirical support for the notion that an innovation orientation affects supply chain integration and firm performance. Drawing from previous studies on resource dependence theory, this study indicates how innovation orientation assists firms in integrating their supply chains and realizing the potential of the supply chain management mechanism.

This paper presents the interrelatedness of innovation orientation, supply chain integration, combinative competitive capabilities, and firm performance.

Katehakis et al. (2016), Small-to-medium-sized enterprises (SMEs), including many startup firms, need to manage interrelated flows of cash and inventories of goods. In this study, they model a firm that can finance its inventory (ordered or manufactured) with loans in order to meet random demand which in general may not be time stationary. The firm earns interest on its cash on hand and pays interest on its debt. The objective is to maximize the expected value of the firm's capital at the end of a finite planning horizon. The firm's state at the beginning of each period is characterized by the inventory level and the capital level measured in units of the product, whose sum represents the –net worth‖ of the firm. Our study shows that the optimal ordering policy is characterized by a pair of threshold parameters as follows. (i) If the net worth is less than the lower threshold, then the firm employs a base stock order up to the lower threshold. (ii) If the net worth is between the two thresholds, then the firm orders exactly as many units as it can afford, without borrowing. (iii) If the net worth is above the upper threshold, then the firm employs a base stock order up to the upper threshold. Further, upper and lower bounds for the threshold values are developed using two simple-to-compute myopic ordering policies which yield lower bounds for the value function. They also derive an upper bound for the value function by considering a sell-back policy. Subsequently, it is shown that policies of similar structure are optimal when the loan and deposit interest rates are piecewise linear functions, when there is a maximal loan limit and when unsatisfied demand is backordered. Finally, further managerial insights are provided with extensive numerical studies.

Elsayed et al. (2016), Existing evidence regarding inventory-performance relationship is inconclusive. A perspective that this paper stresses in considering this relationship is that it might depend on organizational life cycle stage. The underlying assumptions of this argument are that organization‘s strategies and relationships vary with its life cycle stage, organizations develop their own strategies to fit between inventory system and organizational settings, and design of inventory system is not a linear process, rather it is a dynamic process that emerges and evolves in response to the power and interests of the stakeholders.

Econometric analysis provides support for this argument. Specifically, the results show that while inventory to sales ratio affects organization performance negatively in the initial growth stage and the maturity stage, it exerts a positive and significant coefficient on performance in either the rapid growth stage or the revival stage. An implication of these findings is that existing perspectives might need to be treated as complementary viewpoints, each of which comprises a part of the whole picture because depending on just one single perspective is likely to result in misleading conclusions about the whole structure.

Balcik et al. (2016), In this paper, they present a review and analysis of studies that focus on humanitarian inventory planning and management. Specifically, they focus on papers which develop policies and models to determine how much to stock, where to stock, and when to stock throughout the humanitarian supply chain. They categorize papers according to the disaster management cycle addressed; specifically, they focus on pre-disaster and post-disaster inventory management. They evaluate existing literature in terms of problem aspects addressed such as decision makers, stakeholders, disaster types, commodities, facility types, performance measures as well as methodological aspects (i.e., types of policies, models, and solution approaches). They identify current gaps in the literature and propose directions for future research.

Alisir et al. (2016), Managing inventories is at the core of operational performance in fashion industries. Due to its importance in practice, inventory management has been a well-studied area of research in operations management. The purpose of this study is to examine the relationship between inventory management performance including inventory efficiency, productivity and responsive, and firm operational performance. They present and empirically test a performance model which integrates the various dimensions of a fashion industry's inventory management execution. The regression analysis is used to study the effect of various measures on inventory performance. They use financial data for 40 publicly listed U.S. fashion apparel and accessory industries for the 6-year period, 2010–2015, from ―Compustat North America Annually Updated‖ available at Standard and Poor's Compustat database using Wharton Research Data Services (WRDS). They discuss the implications of these empirical results on the study of inventory policyi

execution, and propose some guidance for further research. Keywords Inventory management Fashion apparel industry Operations management Operational performance Inventory efficiency Inventory productivity Inventory iresponsiveness.

Hoeur et al.i(2015), Performance measurement benchmarking in healthcare logistics requires right components and meaningful key performance indicators (KPIs), but having them is very challenging since it involves factors both outer and inner dependence among those factors. This chapter presents a model, based on analytic network process (ANP) model, for sorting and prioritizing the meaningful and a sufficient number of components with individually unique KPIs in healthcare logistics. They are used to benchmark the healthcare logistics performance in different countries in ASEAN such as Singapore, Malaysia, Thailand, Myanmar, and Lao. Those components and their KPIs are identified based on the literature review, and checked and weighted by experts. ANP model is used to prioritize each logistics component and its KPIs. Super Decisions software is used to do all related computations in ANP model such as supermatrix (limit matrix) to get synthesized priorities. The research result offers a good and implementable healthcare logistics performance measurement framework from which managers or researchers in healthcare industry can use to carry out the health care logistics performance benchmarking within particular organizations in the same or different countries.

Hill et al. (2015), This research develops and empirically tests a model for estimating the economic advantage of using a time phased order point system (TPOP) with time series forecasting rather than a simple reorder point system in an independent demand inventory management context. They define the forecast ability quotient (Q) to support this economic analysis. They implement TPOP in their empirical analysis via double exponential smoothing with a damped trend, and implement ROP through a simple moving average. Our empirical study of a large dataset of time series from a Fortune 100 firm found that Q in the holdout sample can be predicted using just three variables from the estimation sample. Surprisingly, many highly touted time series metrics (e.g., the coefficient of variation and approximate entropy) and forecast accuracy metrics (e.g., the mean absolute percentage error) were not good predictors

of Q. They then validated this model on four additional datasets. This research contributes both to the research literature and to managers who need to decide whether an independent demand item should be managed with a TPOP or reorder point system.

Duong et al. (2015), Perishable products represent a vital area in the retail industry and their daily lives. However, when considered with product substitution (which provides more choices) the short lifetime of perishable products creates significant challenges for the inventory management (e.g., one-third of food products are wasted). The main question is: what is the suitable _inventory policy' when they have products that are both perishable and substitutable? Appropriate performance metrics are proposed to evaluate the whole system and provide a robust solution while also being easy for professionals to understand and adopt. Therefore, this paper proposes to use multi-metric approach, including Order Rate Variance Ratio, Average Inventory, and Fill Rate. The paper extends inventory theory to consider inventory management of products where they possess multi-period lifetime, positive lead time, required customer service level, and each item is treated separately. Under these circumstances, as the first research adopting these easily captured and analysed performance metrics, the proposed model will enable management of realistic scenarios by incorporating multiple inventory characteristics that support cross-functional continuous improvement.

Buxey et al. (2006), – This paper sets out to discuss practical inventory control systems. Orthodox theory revolves around the purchaser and balances ordering costs against charges for carrying goods in stock. However, for any company holding thousands of different items the directives for constructing the best system(s) are confusing and the logic seems inconsistent. The research objective is to clarify this hitherto unsatisfactory situation and to provide robust guidelines for managing such inventories. – A small number of published examples are described in sufficient detail to reveal what these firms actually do. Each case is dissected to uncover management's motives, since the original reports were not embellished with useful analytical comments. The aim is to reconstruct the overall design process. – The myopic standpoint of established models neglects the impact of various ordering policies at the supplier's end, where the promotion

of cost-effective and responsive warehouse and transport operations is paramount. As a rule, both areas benefit from stable resources planning, based on cyclic orders and delivery schedules along fixed vehicle routes. – An alternative ‒top down‖ approach is proposed. The main thrust is the efficient deployment of a designated transport fleet. Also, some salient points are made concerning the relative merits of P- and Q-type stock replenishment modes. – The paper provides a new perspective on stock control that brings theory into line with modern supply chain management concepts.

Caridi et al. (2002), This research provides a literature review in the field of uncertainty dampening methods for manufacturing systems, and proposes a new model to improve materials management effectiveness in materials requirements planning environments. The literature review gives rise to a classification framework of the models along nine structural dimensions that refer to the safety buffer treatment, the environmental characteristics and the type of approach. On the basis of the classification framework, the proposed model provides guidelines for approaching the problem of dimensioning, positioning and managing safety stocks against demand uncertainty. The effectiveness of the proposed model has been tested by comparing it to the traditional approach, through a computer-based simulation.

2.5 Objective 3: Financial Performance

Shen et al. (2020), Supply chain finance is a crucial topic. In this paper, they consider that a capital-constrained manufacturer can borrow money from either a bank (bank credit financing) or a retailer (trade credit financing). Our analysis compares supply chain performance under these two financing schemes. Furthermore, they extend their model to evaluate the impacts of retail competition and supply chain member's risk aversion on supply chains, which consist of one capital-constrained manufacturer and two competing retailers. They consider three financing schemes: only bank credit financing, dual trade credit financing, and bank and trade credit mix financing. They find that without retail competition, the retailer is always willing to use the trade credit financing; whereas with retail competition, if one

retailer provides the trade credit but the other does not, the credit provider could receive the superior profit. Thus, providing an appropriate trade credit financing scheme is critically important for retailers. Moreover, they find that without retail competition, when a trade interest rate is relatively low, both the retailer and manufacturer could reach a win-win situation in the trade credit financing. However, with retail competition, supply chain members (i.e., two retailers and one manufacturer) will not have an all-win situation no matter which specific financing scheme is adopted and only a win-win-lose situation exists when using the credit mix financing scheme or the dual trade credit financing in supply chains. Last but not least, regardless of risk neutrality or aversion of supply chain members, their pricing decisions among three financing schemes are similar. This implies that the impacts of supply chain members' risk aversion are limited in supply chain financing scheme selection. More managerial insights are discussed.

Shekarian et al. (2020), This is the first review that analyzes factors influencing closed-loop supply chains. It concerns the investigation of those models which are designed based on the game theory. In order to an in-depth analysis, a content-based method is carried for 215 papers. The identified characteristics of the models are classified into twelve main categories. An important finding proves that sharing mechanism has got the priority by the researchers. Closed-loop supply chain (CLSC) as one of the important configurations of the circular economy (CE) has received considerable attention in sustainability matters. It is composed of characteristics that, when identified, studied, and categorized, help not only to a better understanding of the current contributions in the literature but also lead to formulating new models. This research presents one of the first in-depth studies to investigate factors influencing CLSCs. It concerns the investigation of the models which are designed based on the game theory (GT). Therefore, the reviewed works focused on cooperation and competition among the game participants. A systematic literature review is implemented as a four-step process consisting of material collection, a descriptive analysis, category selection, and evaluation stage to review and discuss the works that focus on CLSC and use GT simultaneously. A content-based analysis is carried for the final works, which include 215 papers. The identified characteristics of these papers are classified into 12 main categories.

Moreover, they are divided into subcategories to highlight the contribution of each paper. Accordingly, results are derived, and gaps are explained.

Munir et al. (2020), The academic community and practitioners widely recognize the significance of risk management and integrative practices in supply chains to deal with complexity and uncertainties faced. Firms strive to manage risk, handle unexpected disruptions and improve performance in ever changing uncertain business environments. This paper builds upon the information processing view of risk management and explores the association between supply chain integration (SCI) and supply chain risk management (SCRM) to improve operational performance. Subsequently, the mediating role played by SCRM between SCI and firms' operational performance is examined. In this paper, covariance-based structural equation modeling is applied to test the developed hypotheses using data of 931 manufacturing companies obtained from the sixth version of International Manufacturing Strategy Survey (IMSS VI). The findings of the study suggest that internal, supplier and customer integration positively effects SCRM whereas the impact of internal integration is also partially mediated by supplier and customer integration. Additionally, the results present that SCRM partially mediates the relationship between internal integration and operational performance and fully mediates the association between supplier and customer integration and operational performance. This paper contributes to research by proposing and empirically testing a holistic framework demonstrating the effects of SCI on SCRM, and consequently on performance outcomes to develop theoretical and managerial implications.

Dumitrascu et al. (2020), Increasing the sustainability of a system can be achieved by evaluating the system, identifying the issues and their root cause and solving them. Performance evaluation translates into key performance indicators (KPIs) with a high impact on increasing overall efficacy and efficiency. As the pool of KPIs has increased over time in the context of evaluating the supply chain management (SCM) system's performance and assessing, communicating and managing its risks, a mathematical model based on neural networks has been developed. The SCM system has been structured into subsystems with the most relevant KPIs for set subsystems and their most

important contributions on the increase in the overall SCM system performance and sustainability. As a result of the performed research based on the interview method, the five most relevant KPIs of each SCM subsystem and the most relevant problems are underlined. The main goal of this paper is to develop a performance evaluation model that links specific problems with the most relevant KPIs for every subsystem of the supply chain management. This paper demonstrates that by using data mining, the relationship between certain problems that appear in the supply chain management of every company and specific KPIs can be identified. The paper concludes with a graphical user interface (GUI) based on neural networks using the multilayer perceptron artificial intelligence algorithm where the most trustworthy KPIs for each selected problem can be predicted. This aspect provides a highly innovative contribution in solving supply chain management problems provided by organizations by allowing them to holistically track, communicate, analyze and improve the SCM system and ensure overall system sustainability.

Zhu et al. (2019), In recent years, financial institutions (FIs) have tentatively utilized supply chain finance (SCF) as a means of solving the financing issues of small and medium-sized enterprises (SMEs). Thus, forecasting SMEs' credit risk in SCF has become one of the most critical issues in financing decision-making. Nevertheless, traditional credit risk forecasting models cannot meet the needs of such forecasting. Many researchers argue that machine learning (ML) approaches are good tools. Here they propose an enhanced hybrid ensemble ML approach called RS-MultiBoosting by incorporating two classic ensemble ML approaches, random subspace (RS) and MultiBoosting, to improve the accuracy of forecasting SMEs' credit risk. The experimental samples, originating from data on forty-six quoted SMEs and seven quoted core enterprises (CEs) in the Chinese securities market between 31 March 2014 and 31 December 2015, are collected to test the feasibility and effectiveness of the RS-MultiBoosting approach. The forecasting result shows that RS-MultiBoosting has good performance in dealing with a small sample size. From the SCF perspective, the results suggest that to enhance SMEs' financing ability, ‚traditional' factors, such as the current and quick

ratio of SMEs, remain critical. Other SCF-specific factors, for instance, the features of trade goods and the CE's profit margin, play a significant role.

Yu et al. (2019), Supply chains are becoming increasingly dynamic in response to changing business environments and technology. This has created challenges in managing the flow of materials and created greater risk of disruption. As such this study investigates the impact of such dynamism on disruption orientations, resilience, and financial performance. Herein an integrated conceptual framework is developed and then tested using survey data from a cross section of 241 Chinese companies and structural equation modelling. The results of the study reveal that supply chain dynamism has a significant positive effect on supply chain disruption orientation and supply chain resilience. Supply chain resilience is also affected by supply chain disruption orientation. However, the financial performance impacts of supply chain disruption orientation are strictly through supply chain resilience.

Wuttke et al. (2019), Supply chain finance (SCF) makes the funding of the supply chain more efficient because it extends the financial strengths of buyers to their suppliers. Nevertheless, buyers sometimes struggle to persuade suppliers to adopt SCF quickly. To craft more effective supplier onboarding strategies, buyers need to know which suppliers are likely to adopt SCF faster. Drawing on the theoretical perspective on organizational motivation, they develop a research framework that uncovers the key drivers of supplier adoption speed. Our framework combines efficiency motive drivers, identified by recent analytical studies on SCF, with legitimacy motive drivers, which stem from a supplier's institutional environment and are new to the SCF literature. They test their hypotheses using a unique data set from a leading financial technology platform provider. They find that suppliers with more limited access to financing tend to adopt SCF faster. In addition, suppliers adopt SCF faster if such adoption is associated with more pronounced reductions in their financing costs. Legitimacy motive drivers also impact supplier adoption speed. Specifically, their results suggest that mimetic and normative pressures accelerate the speed at which suppliers adopt SCF, while coercive pressures seem to have such an effect only when the buyer's stakes are high.

Wiengarten et al. (2019), This paper aims to explore the performance implications of supply chain integration (SCI) taking a strategic perspective. Thus, this paper is set to provide answers to the following research questions: Does a higher degree of SCI always lead to greater firm performance improvements? As the answer to this question is likely to be no, the authors explore the performance implications from a strategic perspective: Is the SCI–performance relationship contingent on a company's competitive priorities (i.e. operations strategy). The authors explore their questions through multiple quasi-independent data sets to test the impact of SCI on firm performance. Furthermore, the authors provide a more nuanced conceptual and empirical view to explore the previously uncovered contradictory results and contingent relationship challenging the ‖more integration equals higher firm performance‖ proposition. The results only provide partial support for the proposition that more integration is always beneficial in the supply chain context. The authors also identified that the impact of SCI on financial performance is contingent on a company's competitive priorities. This study provides a much-needed comprehensive assessment of the SCI–performance relationship through critically re-evaluating one of the most popular propositions in the field of supply chain management. The results can be extrapolated beyond the dyad, as the authors conceptualize integration simultaneously from an upstream and downstream perspective.

Martin et al. (2019), Buyers increasingly offer financing alternatives to their suppliers – so called supply chain finance (SCF) practices for the supply side. Expected benefits however do not always materialize for involved actors. Guidance is needed when to provide these SCF practices to suppliers and why to select different types of practices. To provide this guidance, the paper involves an exploratory multiple-case study design including data within eight buyer-supplier-financial service provider triads. The findings explain contextual situations for the provision of SCF practices based on the contingency approach. They distinguish endogenous, relationship-related and exogenous contingencies within the aforementioned triads. Differentiation criteria are determined for the selection of SCF practices along the dimensions ‚time of financing' (pre- versus post-shipment) and ‚source of funds' (supply chain internal and external). Testable propositions and

key learnings summarize the derived findings and form the basis to develop a contingency framework on SCF practices for the supply side.

Giannakis et al. (2019), Despite the ongoing calls for the incorporation of the cloud utility model, the effect of the cloud on elements of supply chain performance is still an evolving area of research. The purpose of this paper is to develop the architecture of a cloud-based supply chain management (C-SCM) ecosystem and explore how it enhances supply chain responsiveness (SCR).First, the authors discuss the potential benefits that cloud computing can yield, compared to existing mature SCM information systems and solutions through a comprehensive literature review. The authors conceptualise SCR in terms of the level of visibility in the supply chain, supply chain flexibility and rapid detection and reaction to changes, and then the authors build the detailed architecture of a C-SCM system. The proposed ecosystem introduces a view of SCM and the associated practices when transferred to cloud environments. The potential to enhance SCR through the cloud is explored with scenarios on a case of supply chain operations in fashion retail industry. The findings show that the proposed system can enhance all three dimensions of SCR. Implications for supply chain practice and how companies can migrate to a cloud supply chain are drawn. Given that the development, creation and delivery of goods and services are increasingly becoming a joint effort of several parties in a supply chain, the authors contribute to the existing literature by introducing a comprehensive C-SCM system and show how companies can enhance their SCR.

Gelsomino et al. (2019), The uncertainty and financial instability that has plagued companies and industries in the last decade is one of the root causes behind the development of Supply Chain Finance (SCF), a set of schemes aiming to optimize the management of financial flows at the supply chain level. Recent years have seen a proliferation of different SCF schemes, with different impacts on working capital costs and requirements throughout the supply chain. The practicality of SCF usage indicates that the concurrent adoption of multiple schemes is not only possible, but even likely. However, literature on SCF still focuses on individual SCF schemes, while the concurrent adoption of multiple SCF schemes remains largely unaddressed. Thus, the objective of this paper is to assess the tangible benefits deriving from a

multi-scheme SCF strategy. Based on the analytical formulation of the benefits of three relevant SCF schemes (Reverse Factoring, Inventory Financing and Dynamic Discounting), the paper formalizes a model that investigates the benefits that a buyer can achieve by onboarding suppliers onto these three schemes. The results show how working capital requirements and the cost of finance represent the key parameters to assessing the benefits of the concurrent adoption of multiple SCF schemes. Moreover, the funding limits of the SCF schemes themselves strongly affect the relevance of such strategies; strict limits will increase the relevance of having _alternative' schemes available to onboard suppliers. To highlight the managerial relevance of the model, the article provides a numerical example based on a real-world application.

Gardas et al. (2019), The issue of food security is one of the critical global challenges. The Government and the industries have begun apprehending the importance of green supply chain management (GSCM) implementation in their supply chains. There are various drivers or performance indicators (PIs) of GSCM in the agro-sector. This paper aims to analyze 14 PIs using an interpretive structural modelling (ISM) approach. In this study, the PIs of GSCM were identified through a literature survey and opinions of field experts. The identified 14 PIs were modelled by applying an ISM methodology for establishing the interrelationship between the PIs and to identify the PIs having high influential power. The result of the investigation underlined that three PIs, namely, environmental management (PI 1), regulatory pressure (PI 3) and competitive pressure (PI 2) are the significant PIs having high driving power. The experts' judgments were used for the development of the structural model, which could be biased influencing the reliability of the model. Also, only 14 significant PIs were considered for the analysis. This research is intended to help the policymakers, managers and supply chain designers in the food industry and in agribusiness in formulating the policies and strategies for achieving food security, conservation of the environmental resources and for improving the financial performance of the industry. It is pioneering research focusing on the analysis of the PIs towards the implementation of GSCM in the Indian agro-industries context using an ISM approach. This research adds value to the existing knowledge base by identifying the crucial PIs, exploring their mutual relationship and highlighting their level

of influence in the case sector.

Dev et al. (2019), Proposed big data architecture (BDA) for key performance indicators (KPI).The conceptual framework is proposed under RFID integrated with cloud ERP system. Predictive and prescritive analytics is explored in the manufacturing operations. Explore synergies of offline simulation, fuzzy-ANP, and TOPSIS in BDA. Proposed BDA attempts to handle real-time interrelated KPI problem of supply chain. One of the major issues a designer of Big Data Architecture has to trade with is incorporating real-time predictive analytics capability using offline synergistic approaches like simulation, fuzzy analytic network process, and Technique for Order Preference. Further, under this setting, which involves re-engineering of operational units, the present study proposes a simple, yet practical heuristic to quickly handle the unstructured relational key-performance-indicators (KPIs) data of a supply chain that are obtained from the results of the simulation. Within the big data framework, the proposed model can be used as a decision support tool by the companies to evaluate their KPIs in a real-time dynamic system.

Bals et al. (2019), While supply chain finance (SCF) is receiving growing attention in research, it remains limited in reach and fragmented in its implementation. At the same time, technological advances are changing the shape of the overall business ecosystem in which SCF is embedded. Therefore, the aim of this research is to conduct a systematic review of the SCF literature and develop a framework of analysis to support further exploration of the SCF ecosystem. This research expands on other recent systematic reviews of SCF literature and introduces the business ecosystem concept to the SCF domain. Based on the presented SCF framework, an agenda for future SCF ecosystem research is proposed.

Zhan et al. (2018), With the growing importance of sustainability for firms to gain a competitive advantage, an increasing number of companies have adopted various mechanisms to achieve their sustainability goals. Some firms have begun to adopt financing mechanisms to encourage the sustainability practice of their suppliers and to improve their supply chain efficiency with a different payment term. They consider

two financing mechanisms based on practice, namely, the retailer's advanced payment (AP) model in which the downstream retailer makes an early payment to the upstream supplier within a certain payment term, and the reverse factoring (RF) model in which the downstream retailer cooperates with and encourages a bank to offer a loan to the upstream supplier. To illustrate how these mechanisms improve sustainable development and supply chain efficiency, they develop a model that explicitly captures the impact of payment on the sustainability efforts of suppliers in a supply chain and explores the conditions under which each financing mechanism benefits the players. They describe the equilibrium strategies between the supplier and retailer in each financing mechanism, compare the preferences of each player between the AF and RF models, and find a Pareto zone of a reverse factoring financing plan in which all players prefer model RF over model AP. They also conduct some numerical experiments to show how the payment ratio and payment term of model RF affect supply chain sustainability and efficiency.

Xu et al. (2018), A bibliometric analysis of SCF literature was conducted and key papers and evolution of SCF research were identified. Four clusters were identified and content analysis was carried out to obtain additional insights. Seven future research directions were advanced based on the bibliometric and content analysis. Supply Chain Finance (SCF) is an effective method to lower financing costs and improve financing efficiency and effectiveness, and it has gained research momentum in recent years. This paper adopts a systematic literature review methodology combined with bibliometric, network and content analysis based on 348 papers identified from mainstream academic databases. This review provides insights not previously fully captured or evaluated by other reviews on this topic, including key authors, key journals and the prestige of the reviewed papers. Using rigorous bibliometric and visualisation tools, they identified four research clusters, including deteriorating inventory models under trade credit policy based on the EOQ/EPQ model; inventory decisions with trade credit policy under more complex situations; interaction between replenishment decisions and delay payment strategies in the supply chain and roles of financing service in the supply chain. Based on the clusters identified, they carried out a further content analysis of 112 papers, identifying research gaps and proposing seven actionable directions for

future research. The findings provide a robust roadmap for further investigation in this field.

Tseng et al. (2018), Supply chain finance has received increasing attention. The combination of sustainable development and supply chain finance requires a deeper discussion to address the theoretical and managerial gaps. Thus, this study adopts the fuzzy Technique for Order of Preference by Similarity to Ideal Solution (fuzzy TOPSIS) to develop a sustainable supply chain finance model under uncertainty to identify the existing problems and deficiencies of financing patterns. Expert assessments were performed, and the results indicate that economic factors have a significant effect on other aspects and that delivery management policies are the most effective tools for reinforcing sustainable supply chain finance practices. Moreover, the findings provide a theoretical foundation that can reinforce the understanding of sustainable supply chain finance, and the managerial implications provide a precise guideline for firms to improve their performance.

Song et al. (2018), Despite their crucial role in sustaining national economies, small and medium enterprises (SMEs) are beset by the constraint of financing at better conditions. The purpose of this paper is to compare supply chain finance (SCF) solutions provided by commercial banks and financial service providers (FSPs) that help SMEs access financing. This study looks at multiple case studies using in-depth interviews with focal firms (lenders) to answer the research questions. In-depth interviews were conducted with three Chinese FSPs and three commercial banks providing working capital to the same SMEs. The unit of analysis is SCF solutions that have made the companies competitive in the industry. The case studies show that the acquisition of transaction information and business credit in SCF can reduce ex ante information asymmetry. SCF utilizing receivable transfers, closed-loop business, relational embeddedness, and a combination of outcome control and behavioral control can also reduce ex post information asymmetry. For these reasons, compared with commercial bank-dominated SCF, SCF adopted by FSPs in the supply chain can better reduce information asymmetry. This study contributes to the emerging literature exploring the impact of SCF on SMEs accessing financing. In particular, this study provides supply chain management and operations insights on SCF and their consequent influence. Previous research has focused on the

direct dyadic relationship between lenders and borrowers while neglecting supply chain effects. Uniquely, this study explores the different ways commercial banks and FSPs implement SCF solutions.

Pinna et al. (2018), Even if sustainability is a relatively new research area, it has already shown an interesting number of measures and metrics mainly de-structured and at very different levels. Furthermore, a specific framework of Key Performance Indicators (KPIs) has not yet been developed for soft drink supply chains (SDSC). This variety is creating confusion among industries when they attempt to select a set of indicators for assessing sustainability in manufacturing in practical terms. A company should be able to analyze each element of its strategy and business model in order to understand which factors influence sustainability. Therefore, to address this challenge, Authors have collected sustainability KPIs SDSCs. KPIs helps soft drinks companies to have a more complete vision concerning their sustainability impact and to point out potential best practices. Finally, in order to provide a practical view of the methodology, a sample is presented and discussed.

Lu et al. (2018), This research examines the moderating effect of market uncertainty on the causal effects from supply chain integration to operational performance of a typical supply chain. Based on an extensive and critical literature review, two exploratory conceptual hypotheses have been developed for the nonlinear relationship between the supply chain integration and operational performance of the original equipment manufacturer, and how may that relationship be moderated by a specific construct of market uncertainty. Empirical survey instrument has been designed and applied to gather the data from a wide spectrum of automotive industry in China. Confirmative factor analysis and threshold regression analysis were used as the primary research methodology to test the hypotheses. They find strong support to the hypotheses from the empirical evidence, which leads to the finding that the relationship between the supply chain integration and operational performance is ‗nonlinear‘, and the ‗nonlinearity‘ can be significantly moderated by the market uncertainty as one of the key environmental factors for the supply chain. This study extends the current literature by contributing for the first time the discussion of an analytical model that represents the causal effects from supply chain

integration to its operational performance with respect to the market uncertainty as a moderating factor.

Larsen et al. (2018), Although manufacturers have traditionally viewed reverse supply chain (RSC) activities as a costly nuisance, more recent research has found that the RSC can contribute to the firm's financial performance. The purpose of this paper is to identify how the RSC can contribute to the firm's financial performance and examine the exogenous contingency factors decisive for the contribution's size. Because the exogenous factors are outside the control of the firm's operations and supply chain management, the factors influence the RSC's financial contribution irrespective of managerial policies and design decisions. The paper applies a systematic literature review using the sequence of planning the review, searching and screening literature, extracting information from the selected literature, and synthesizing and analyzing findings. In total, 112 papers were included. The study has identified 15 distinct opportunities for RSC- contribution to the firm's financial performance. The study has identified 56 contingency factors. These are related to market segmentation, customer behavior, product design, and the firm's distributor network. The study includes an interrelationship network between factors and the RSC's contribution. For managers, the paper shows how the RSC can increase the firm's financial performance and which contingency factors determine whether operating a RSC will be financially viable if implemented. While extant literature includes several reviews about RSC-related managerial policies and design decisions, this paper contains the very first collection of RSC-contribution opportunities available to manufacturers as well as the first review of exogenous contingency factors.

Laari et al. (2018), Despite the critical role of logistics service providers (LSPs) in improving the environmental sustainability of supply chains, there is still uncertainty about how LSPs can turn environmental management into competitive advantage. Based on a Finnish national logistics survey and financial reporting data from 266 LSPs, this article examines their competitive strategies and green supply chain management (GSCM), and tests their respective relationships with environmental and financial performance. Financial data are used to measure financial performance in a novel way. The findings indicate that leading LSPs with

operational excellence and strong brands are more advanced in terms of GSCM than LSPs that do not excel in any competitive priority. GSCM practices are positively related to environmental performance, but not to financial performance. However, managers should not be discouraged by the apparent absence of short-term financial benefits of GSCM practices, which in any case could enhance future differentiation opportunities.

Kumar et al. (2018), Formulation of right strategies is believed to be able to bring sustainable performance across triple bottom line (TBL), i.e., economic, environmental and social aspects within and across organizations. The purpose of this research is to investigate the role of misaligned collaboration and dynamic capabilities on TBL performance. Misaligned collaboration signifies those configurations of collaboration that deviate from ideal profile of collaboration. The ideal profile of collaboration corresponds to superior performance. Collaboration has been operationalized through joint planning and resource sharing (JPRS) and collaborative culture (CC) which brings relational aspects into collaboration. Specifically, this research provides important extensions to the theory of profile deviation and dynamic capabilities (DC) perspective in the context of sustainable supply chain performance and misaligned collaboration utilizing the empirical evidence. Uniqueness of the proposed model is established by comparing with four other alternate models. They find both JPRS misalign (misalignment of JPRS from the ideal profile) and CC misalign (misalignment of CC from the ideal profile) influence all dimensions of TBL through DCs. Only direct influence of CC misalign on operational and social performance is significant. Results convey the need of building DCs when collaboration is misaligned with its ideal profile, and this misalignment produces detrimental effects on DCs and TBL performance. This research contributes significantly by building unique model to develop and maintain sustainability. Further, theoretical and managerial contributions are highlighted and contested with existing knowledge.

Kot et al. (2018), The sector of small and medium-sized enterprises (SMEs) plays a key role in the economies of all of the countries in the world. These entities constitute the basis for the development of the national and global

economies. In a contemporary complex and competitive business environment, the adaptation of appropriate strategies is a particularly important effort to furthering the development of companies from the SMEs sector. In this context, the application of the concept of sustainable supply chain management (SCM) in the operation strategy of SMEs seems to be a very important function. This supply chain also covers all three aspects of sustainable development: business, environmental, and social. The purpose of this article is to present the current state of the research in sustainable development in relation to managing the supply chain of SMEs, as well as the empirical findings in this area. The results found that all of the sustainability areas were very important in the supply chain management practices of the studied SMEs, despite the imbalance described in the literature. The study also presents the most important elements in the particular sustainability areas of SCM and SMEs.

Fang et al. (2018), Environmental sustainability is nowadays driving firms to not only develop internal green activities, but also extend toward green supply chain management (GSCM). The extensive application of external GSCM by firms can be partially justified from perspective of transaction costs. GSCM practices are often considered to be prudent because studies suggested that such practices have a positive impact on firm performance according to the resource-based view. However, crucial questions still surround the practice-performance relationship. First, what is the overall relationship between GSCM practice and firm performance? Second, under what situations is the relationship stronger or weaker? To answer these questions, this paper focuses on quantitatively analyzing extant literature published in the field of GSCM. A random-effects meta-analysis is used to synthesize the empirical results of 54 selected literature with 245 effect sizes. Besides, subgroup analysis and meta-regression are applied to test potential moderators that may influence the strength of practice-performance relationship. They find that, internal and external GSCM practices are positively related, and they are both positively related to firm performance. Particularly, their relationship with environmental ($r = 0.518$) performance is the largest, followed by operational ($r = 0.481$) and economic ($r = 0.464$) performance. In addition, test of moderators discovers that industry type, ISO certification, export orientation and the cultural

dimension of uncertainty avoidance all have moderating effect on the practice-performance relationship. Discussions and limitations are further addressed.

Fancello et al. (2018), Over the last twenty years, the intensification of trade flows and the rapid growth of demand for goods and services from new emerging countries have led to a deep change in global transport and a dramatic increase in the level of competitiveness among transportation and logistics service providers. To remain competitive, transport and logistics operators are required to carry out operations with maximum efficiency to meet the requirements of a continually growing and diversified demand. Supply Chain Management is one of the areas that have recently attracted much attention in logistics. The proposed study aims to provide simple quantitative tools based on Key Performance Indicators (KPIs) to support the evaluation process of intermodal supply chains. A sample of 44 real-world Mediterranean supply chains has been collected and analyzed. Four quantitative KPIs describing the relationship time-cost and the ratio cost/kilometer have been derived from empirical cost functions and used to characterize the various elements of the analyzed transport chains, and of the chains as a whole, from a cost perspective.

Chen et al. (2018), Researchers have long sought to understand how risks in supply chains (SCs) affect firm performance. Yet, they have not fully subjected claims of how SC risks affect firm financial performance to theoretical and empirical scrutiny. The purpose of this paper is to investigate the links between SC risks and firm financial performance. The author analyzes how SC risks affect firm financial performance from the perspective of marginal financial performance (MFP) using survey and financial statement data. The author employs structural equation modeling to examine the hypotheses using 106 Taiwanese listed companies across 20 industries. The findings regarding the importance of industry-specific risk, organizational risk, internal business process risk, and demand risk are consistent with prior studies. The author finds that demand risk has an MFP of -0.20, the highest negative effect among the risk variables. The findings also show that industry-specific risk possesses an MFP of -0.16, the second-highest negative effect, despite having no direct effect on financial performance. This paper examines how SC risks affect MFP via combining survey and financial statement data. It does not

assume the reported MFP estimates apply to all businesses in other countries. However, future research could triangulate their findings. This study combines survey and financial data to analyze how SC risks affect firm financial performance. Specifically, it provides a methodology for estimating quantitative cause-effect relationships between SC risk and firm financial performance, an important topic that receives less research interest in the field of supply chain management.

Castillo et al. (2018), As stakeholders continue to increasingly hold firms accountable for environmental and social performance in their supply chains, the importance of understanding how firms can be more sustainable becomes more prescient. Based on the underlying premise of stakeholder theory that business and ethics decisions are intertwined, the current research introduces the concept of supply chain integrity (SCI) to explore how the interdependence of business and ethics decisions can lead to improvements in sustainable supply chain management (SSCM) practices. Exploratory analysis employing secondary data sources in an elastic net (EN) logistic regression provides support for the proposed construct, by providing preliminary empirical evidence that SCI, measured through two subdimensions of structural and moral SCI, can be linked to firm sustainability. The research contributes to the supply chain management literature by: (1) introducing the concept of SCI; (2) performing an exploratory econometric analysis to provide initial validity of the SCI construct; and (3) providing a research agenda to guide further research on the concept of SCI and its role in SSCM.

Bastas et al. (2018), Maintaining profitability measures while conducting business through environmentally and socially sustainable operations is an optimization challenge for organizations globally and for their society. Aiming to contribute to the research streams on this global challenge, this paper studies the state of the art literature on two management methodologies along with sustainability management from an integration perspective: quality management with its intraorganizational focus and supply chain management with its interorganizational view. The paper establishes key themes, trends and new avenues for research through a structured systematic review. The systematic review undertaken includes both descriptive

analysis and thematic synthesis of state of the art quality management, sustainability and supply chain management integration literature. Integration synergies of quality and supply chain management were established including performance improvements and integration increasing the effect of both methodologies. Incorporation of sustainability into quality and supply chain management was identified to be a highly emerging area with multi-dimensional (financial, ecologic and social) approaches highly in need for more sustainable supply chains. Ultimately, a new, emerging research area was revealed: sustainable supply chain quality management. Although, several reviews were conducted on the quality, supply chain and sustainability management practices, this study is one of the very few, undertaken from the perspective of all three approaches and cumulative integration. This contribution provides an initial theoretical framework to guide future theory building on a fruitful research avenue.

Alshehhi et al. (2018), This paper presents an analysis of the literature concerning the impact of corporate sustainability on corporate financial performance. The relationship between corporate sustainable practices and financial performance has received growing attention in research, yet a consensus remains elusive. This paper identifies developing trends and the issues that hinder conclusive consensus on that relationship. They used content analysis to examine the literature and establish the current state of research. A total of 132 papers from top-tier journals are shortlisted. They find that 78% of publications report a positive relationship between corporate sustainability and financial performance. Variations in research methodology and measurement of variables lead to the divergent views on the relationship. Furthermore, literature is slowly replacing total sustainability with narrower corporate social responsibility (CSR), which is dominated by the social dimension of sustainability, while encompassing little to nothing of environmental and economic dimensions. Studies from developing countries remain scarce. More research is needed to facilitate convergence in the understanding of the relationship between corporate sustainable practices and financial performance.

Truong et al. (2017), The purpose of this paper is to provide an empirical evidence about the relationship between practices of supply chain management (SCM) and operational performance (OP).Based on a comprehensive literature review, a set

of SCM practices has been identified and selected to develop a conceptual model as well as to establish their relationship to companies' OP. The measurement scales of the practices were developed in four steps: identification and development of initial instrument; personal interviews and Q-sort; large-scale data collection; and large-scale analysis in order to ensure unidimensionality, reliability and validity. Structural equation modeling was used to validate the model with the data were collected in Vietnamese garment enterprises. The study consolidated relationships between the SCM practices and OP. According to the research results, these practices have a ‒resonant‖ influence on OP that can explain 52.6 percent variance of this output concept. In particular, customer focus and supplier management both direct and indirect impact on OP while top management support and process control/improvement only have indirect and direct influences on OP, respectively. There are some limitations that can guide academics to new lines of future research: to extend the scope of the survey to include different countries and new situations, so results can be generalized; to consider the impacts of the SCM practices on the entire supply chain performance; and to explore additional factors that can further explain OP, such as operational environment, capital, technology, human resource, etc. The authors suggest that the SCM practices should be implemented as an integrated system rather than independent practices, in which they interact with each other and improve OP.The empirical results of this study provide an evidence to consider the SCM practices as reliable predictors for OP. According to the research, these practices interact with each other and have both direct and indirect effects on OP. In other words, through the mutual interaction among the SCM practices, they have the ‒resonant‖ influence on improving OP. Moreover, the proposed research model analyzing the relationship among SCM practices and OP and its validation using the Vietnam garment industry provided valuable insights both from theoretical and practical perspectives.

Song et al. (2017), This study investigates the impacts of three dimensions of green supply chain integration (GSCI) on operational and financial performance, from both a contingency and a configuration perspective. From the contingency perspective, they used hierarchical regression to determine the impacts of individual GSCI dimensions (green internal, customer and

supplier integration) and their interactions on firm performance. From the configuration perspective, they used cluster analysis to develop patterns of GSCI, which were analyzed in terms of GSCI strength and balance. Analysis of variance was used to examine the relationship between GSCI pattern and firm performance. They used data collected from manufacturing firms in Shanxi, Shandong, Beijing, Guangdong and Jiangsu to test hypotheses. The findings from both the contingency and configuration perspective indicate that GSCI was related to both operational and financial performance. Furthermore, the interaction between green internal integration and green customer integration was positively related to both operational and financial performance, while the interaction between green internal integration and green supplier integration was negatively related to financial performance. The interaction between green customer integration and green supplier integration was positively related to financial performance.

Schmidt et al. (2017), Engagement in corporate environmentalism has become increasingly important across all tiers of the supply chain, from upstream raw material suppliers to downstream retailers. However, the contextual role of a firm's supply chain position (SCP) on the adoption of green supply chain management (GSCM) practices and their performance implications has not been empirically explored. They derive a conceptual model combining the contingent natural resource-based view (NRBV) with stakeholder theory. The resulting hypotheses are tested using cross-industry data of 284 firms utilizing primary and secondary data. Findings reveal a phenomenon they term the Supply Chain Position Paradox: The closer a company is located toward the end consumer, the higher its GSCM practice levels. Conversely, performance gains decrease with company proximity to the end consumer. This paradox is grounded in a mismatch between the level of five specific GSCM practice categories and their respective performance implications. The introduction of SCP as an overlooked contextual factor adds new insights into the ―GSCM practice–performance link‖ and extends current GSCM research. Moreover, their results yield insights to supply chain management executives in optimizing their GSCM practice portfolios.

Qi et al. (2017), This study aims to develop a comprehensive model that facilitates an understanding of relationships among operations strategies (OSs), supply chain strategies (SCSs), supply chain integration (SCI), and firm performance. It is a start to understand the role of operations strategies in supply chain design. They adopt structural equation modelling to test the relationships based on data collected from 604 Chinese manufacturers. The results show that a lean supply chain is appropriate for firms placing higher priorities on cost, quality and delivery strategies, while an agile supply chain is appropriate for firms competing on the flexibility strategy. Furthermore, both lean and agile SCSs require higher levels of SCI in terms of internal and external integration, but lean SCSs have a significantly higher impact on external integration than agile SCSs. The study refreshes the links between order winner/qualifier and supply chain strategies. Clear-cut differences exist concerning the role of operations strategy in supply chain management, indicating that appropriate supply chain design is very important for firms to achieve their operations objectives. This study contributes to a better understanding of the match between operations strategies and supply chain strategies, and offer a practical insights on investments in the development of supply chain integration.

Protopappa-Sieke et al. (2017), Supply chain finance and working capital management are important avenues to reduce supply chain costs. Small suppliers may not have sufficient working capital to finance their operations and efficiently supply their customers. They develop a model that captures the fundamental aspects of financial and operational planning in a two-stage supply chain, with both strong and weak members. A strong member can negotiate for more favorable financing rates, more advantageous payment terms, and shorter lead times than a weaker member. They investigate two working capital allocation scenarios. In the dedicated working capital allocation scenario, the members of the supply chain each have their own working capital. In the joint working capital allocation scenario, the members of the supply chain have a joint pool of working capital. Our results demonstrate significant benefits when the members of the supply chain share the working capital. They also show that extending payment delays to a supplier upstream results in higher overall supply chain costs.

Paulraj et al. (2017), Many researchers believe the tremendous industrial development over the past two centuries is unsustainable because it has led to unintended ecological deterioration. Despite the ever-growing attention sustainable supply-chain management (SSCM) has received, most SSCM research and models look at the consequences, rather than the antecedents or motives of such responsible practices. The few studies that explore corporate motives have remained largely qualitative, and large-scale empirical analyses are scarce. Drawing on multiple theories and combining supply-chain and business ethics literature, they purport that instrumental, relational, and moral motives are behind a firm's engagement in SSCM practices. Specifically, they examine the links between corporate motives, SSCM practices, and firm performance. Using a sample of 259 supply-chain firms in Germany, they empirically test five hypothesized relationships. Our results reveal that relational and moral motives are key drivers, and that firms exhibiting high levels of moral obligations tend to outperform those primarily driven by amoral considerations. Findings of this study contribute to multiple literatures espousing sustainability management and can help policy makers, stakeholder groups, and scholars develop more robust strategies for encouraging firms to practice SSCM.

Li et al. (2017), This paper aims to investigate the impact of three critical dimensions of supply chain resilience, supply chain preparedness, supply chain alertness and supply chain agility, all aimed at increasing a firm's financial outcomes. In a turbulent environment, firms require resilience in their supply chains to prepare for potential changes, detect changes and respond to actual changes, thus providing superior value. Using survey data from 77 firms, this study develops scales for preparedness, alertness and agility. It then tests their hypothesized relationships with a firm's financial performance. The results reveal that the three dimensions of supply chain resilience (i.e. preparedness, alertness and agility) significantly impact a firm's financial performance. It is also found that supply chain preparedness, as a proactive resilience capability, has a greater influence on a firm's financial performance than the reactive capabilities including alertness and agility, suggesting that firms should pay more attention to proactive approaches for building supply chain resilience. First, this study develops a comparatively

comprehensive definition for supply chain resilience and explores its dimensionality. Second, this study provides empirically validated instruments for the dimensions of supply chain resilience. Third, this study is one of the first to provide empirical evidence for direct impact of supply chain resilience dimensions on a firm's financial performance.

Lambert et al. (2017), Corporate success requires a change from managing individual functions to integrating activities into supply chain management processes. Supply chain management is about relationship management and the supply chain is managed link by link, relationship by relationship. Management should implement processes that increase the profitability of the supply chain, not just the profitability of a single firm. While transaction efficiency is important, failure to recognize the value of a relationship orientation will limit supply chain profitability Academics can benefit from the description of the 25-year evolution of the SCM framework and the research methods used to develop it. In a 2000 article in Industrial Marketing Management, –Issues in Supply Chain Management,‖ Lambert and Cooper presented a framework for Supply Chain Management (SCM) as well as issues related to how it should be implemented and directions for future research. The framework was comprised of eight cross-functional, cross-firm business processes that could be used as a new way to manage relationships with suppliers and customers. It was based on research conducted by a team of academic researchers working with a group of executives from non-competing firms that had been meeting regularly since 1992 with the objective of improving SCM theory and practice. The research has continued for the past 16 years and now covers a total of 25 years. In this paper, they review the progress that has been made in the development and implementation of the proposed SCM framework since 2000 and identify opportunities for further research.

Khan et al. (2017), This article investigates the impact of five determinants of the green supply chain practices on organizational performance in the context of Pakistan manufacturing firms. A sample of 218 firms was collected from the manufacturing industry. The green supply chain practices were measured through five independent variables including green manufacturing, green purchasing, green information systems, cooperation with customers, and eco-design. By using

exploratory factor and simultaneous regression analysis, the results indicate that except green purchasing, rests of the four independent variables have been found statistically significant to predict organizational performance. However, the eco-design of green practices followed by green information systems has revealed the greatest impact on organizational performance. Therefore, the managers of the manufacturing firms should not only implement eco-design in their supply chain but also concentrate on proper monitoring and implementation of green information systems to increase their firms' performance. A main contribution of this research from theoretical side is that it is possible to notice a negative effect of ‖green purchasing‖ towards organizational performance particularly in the scenario of Pakistan manufacturing industry. Another valuable result is that green purchasing is an important antecedent of firms economic performance in the US manufacturing firms (Green et al. 2012), although not significantly related to organizational performance in their study. In addition, they also discussed research limitations, areas for future research, and implications for practitioners.

Jin et al. (2017), Although several studies have explored the relationship between the operation and performance of a supply chain (SC), a general SC model cannot deliver the expected financial results at a company-wide level. In this paper, they argue that this cannot guarantee the maximization of a firm's overall value because short-term financial performance metrics do not reflect the risk to businesses and the invested capital. Owing to the varying natures of risk and the capital invested, firms with multiple divisions should assess each division separately, and the results can be compared for decisions concerning the allocation of the firm's capital and resources to maximize the overall value of its businesses. They propose a linkage model to consider operational activities and financial performance simultaneously in a firm's supply chain model. To exhibit the superiority of the proposed model that connects SC operation and financial indicators, they first compare the differences between models for maximizing profit and enterprise-wise economic value added (EVA) as objective functions. To examine uncertainty in the operational and financial parameters of the SC, the results of sensitivity analyses are then reported. Experimental results showed that their model, using the EVA approach, is more effective and superior in terms of maximizing the

firm's overall value from the long-term perspective while satisfying the target values for financial ratios set by the firm's executives and shareholders for all periods, unlike the results of the general model.

Dubey et al. (2017), Green or sustainable supply chain management (GSCM/SSCM) has in recent years attracted much attention from academia and practitioners in all part of the world. In recent years, all humanity has experienced severe climate change which is widely attributed to human activity. Harmful emissions have made a major contribution to recent climate change which presents major challenges and threats to the entire human race in form of global warming, earthquakes, hurricanes, tsunami and floods. The purpose of this paper is to propose a conceptual GSCM/SSCM framework contributing to knowledge-based view theory and systems theory (ST) and provide an exhaustive list of further research directions. In this paper the authors have used a systematic literature review to identify building blocks of the conceptual framework, which is the principal contribution of the present paper. In this paper the authors have proposed a conceptual framework for sustainable supply chain network and at the end the authors have outlined further research directions. The current paper is an attempt to develop a conceptual framework which is grounded in knowledge-based theory. The study helps to extent the prior works which lacks theory focused approach. The present work has immense theoretical value and can be useful to the policy makers or practitioners engaged in GSCM practices.

Chu et al. (2017), This study investigates the impact of three institutional pressures, namely government, customer, and competitor pressures, on the environmental and operational performance of firms. These three institutional pressures are examined by implementing green supply chain management, considering the role of top management and studying social capital between buyers and suppliers in the supply chain. Data were collected through an electronic mail survey from buyer firms in the manufacturing industry in Korea. With 241 complete and usable responses, they used structural equation modeling to test their hypotheses. Our findings revealed that the majority of their hypotheses were supported, which is in line with the existing literature. However, the impact of coercive pressure on top management support and the impact of structural social capital on performance were found to be

insignificant. The major contribution of their study is that it broadens the framework of green supply chain management (GSCM) by integrating major and recent constructs in the GSCM theory, while also providing instructive managerial implications through empirical evidence.

Barber et al. (2017), The purpose of this paper is to theorize and develop seven dimensions (strategic supplier partnership, level of information sharing, quality of information sharing, customer service management, internal lean practices, postponement and total quality management) into a supply chain management (SCM) practices (SCMPs) construct and studies its causal relationship with the conceptualized constructs of supply chain performance (SCP) and manufacturing firms' performance (MFP). The study also explores the causal relationship between SCP and MFP. Data were collected through a survey questionnaire responded by 249 Jordanian manufacturing firms. The relationships proposed in the developed theoretical framework were represented through three hypotheses: H1 – there is a significant relationship between SCMPs and SCP; H2 – there is a significant relationship between SCMPs and MFP; and H3 – there is a significant relationship between SCP and MFP. Linear regression, ANOVA and Pearson correlation were used to test the hypotheses. The results were further validated using structural equation modelling. The results indicate that SCMPs have a positive effect on SCP (H1), which in turn also positively affect MFP (H3). Despite this intermediary positive effect of SCMP on MFP through SCP, the study also suggests that SCMPs have a direct and positive effect on MFP (H2). This study provides hard evidence indicating that higher levels of SCMPs can lead to enhanced supply chain and firms' performance. It also provides SC managers of manufacturing firms with a multi-dimensional operational measure of the construct of SCMPs for assessing the comprehensiveness of the SCMPs of their firms. This study is among the very first SCM researches conducted on the Jordanian manufacturing sector, particularly, in relation to the practices that manufacturing firms in this country need to adopt to make their supply chains a solid competitive vehicle for their development. The results have broader implications for all manufacturing companies, particularly in developing

economies where the growth of manufacturing and the development of integrated supply chains are key stages in economic development.

Sundram et al. (2016), The purpose of this paper is to employ a newly developed framework to examine the complex relationship between different components of supply chain practices, supply chain integration (SCI) and supply chain performance (SCP) in the Malaysian electronics sector. This study utilizes survey data of 156 electronics firms in Malaysia and tested the research framework and hypotheses. In addition to the traditional approach of Barron and Kenny (1986), the Sobel test as well as a bootstrapping approach, which is deemed for small sample size, is used to formally test the indirect effects of SCI in the model. SCI has fully and partially mediated the relationship between supply chain management practices (SCMPs) and SCP. SCI fully mediates the relationship between SCP and three of the SCMPs, namely, information quality, agreed vision and goals and postponement strategies. The relationship of supply strategic partnership, customer relation management, information sharing with SCP were partially mediated by SCI. Risk and reward sharing is found to be non-significant. These insights allow managers to effectively utilize the different components of SCMPs for SCI and performance. For supply chain practitioners, the results of the study can be useful in integrating SCMPs and SCI on improving SCP. Practitioners should take into account the mediating effect of SCI in designing their supply chain management approach to production. To the authors' best knowledge, this paper is one of the first to address the mediating effect of SCI between SCMPs and overall performance of the supply chain.

Stevens et al. (2016), Twenty-five years ago IJPDLM published ‖Integrating the Supply Chain‖ (Stevens, 1989). The purpose of that original work was to examine the state-of-the-art in supply chain management (SCM). There have been substantial changes to the landscape within which supply chains function and changes to supply chains themselves. Given these changes it is appropriate to re-visit what is the new state-of-the art and determine whether the 1989 conceptualization requires extending. The authors also attempt to assess whether the evolution of SCM is associated with improved financial performance. The paper aims to discuss these issues. The authors take a conceptual approach to suggest that SCM is undergoing a

transition to devolved, collaborative supply chain clusters. In addition, the authors consider imperatives and models for supply chain change and development. In line with the 1989 work, many of the observations in this invited paper are based on the primary author's experience. The authors use a selection of financial data from leading firms to assess whether benefits attributed to SCM and changes in supply chain operating models have affected financial performance. The authors formalize a model for the dynamics of SCM change. The authors also synthesize a number of models of SCM that extend the original, highly cited work. These include goal-oriented networks and devolved, collaborative supply chain clusters. The authors also find the associations between the evolution of SCM and measures of firm financial performance over time to be equivocal. This work proposes two additional operating models that firms can implement in order to improve the efficacy of their supply chains. The authors extend Stevens (1989) original work by synthesizing a number of additional models for SCI.

Mezouar et al. (2016), The hospital is a complex system where many actors are involved; The challenges that this environment is facing justify the focus on this research subject. The contribution of the paper includes a proposition of a four-level model, that describes the hospital drug supply chain, based on the combination of the Supply Chain Operation Reference (SCOR) and Business Process Modelling Notation (BPMN), and the identification of a set of key performance indicators (KPI) that assess how well the drugs management process within the hospital are effective and efficient and how to improve them.

Laari et al. (2016), The aim of this study is to identify the direct and indirect relationships between customer-driven green supply chain management (GSCM) practices and environmental and financial performance in manufacturing. Partial least squares methodology is used to test the hypotheses on a sample of 119 Finnish manufacturing firms. Contrary to the predominant view of internal GSCM practices being a precursor of all external activities, this article suggests that customer requirements are an important driver to implement internal GSCM practices. The findings confirm that manufacturers can respond to customer pressure by transferring environmental requirements upstream in the supply chain, either by collaborating or monitoring the suppliers' environmental

performance. Environmental monitoring is found to be an enabler of environmental collaboration. Furthermore, performance outcomes of GSCM appear to depend on the type of practice. The results indicate that manufacturers with strong internal GSCM practices combined with arm's length environmental monitoring of suppliers are likely to perform well in environmental issues. If a firm seeks to improve financial performance, it needs to form more collaborative relationships with customers to achieve environmental goals.

Kirchoff et al. (2016), Empirical research provides evidence that green supply chain management (SCM) practices positively impact firm performance. Yet, questions remain regarding how firms configure their organizations and design green practices to achieve improved performance, especially in light of a constantly changing business environment. This research uses the resource-based and strategic choice theories to better understand the antecedent roles of two strategic orientations, supply chain orientation (SCO) and environmental orientation (EO), on both the implementation and outcomes of green SCM practices. The paper aims to discuss these issues. Survey responses from 367 supply chain managers are tested through structural equation modeling. Findings suggest that a combination of SCO and EO capabilities positively influence the implementation of green SCM practices, and positively impact firm performance. Results also suggest that the capability bundle of SCO, EO, and green SCM should be adaptable to the changing business environment. This research contributes through the combination of the resource-based theory, supported by strategic choice theory, to better understand how managers configure and re-configure valuable green-related capabilities to adapt to the constantly changing business environment.

Gelsomino et al. (2016), The purpose of this paper is twofold: to classify the research to-date on Supply Chain Finance (SCF) according to the main themes and methods, and to propose directions for future research. The review is based on 119 papers mainly published from 2000 to 2014 in international peer-reviewed journals and in the proceedings of international conferences. The articles that provide a definition of SCF reflect two major perspectives: the _finance oriented' perspective - focused on short-term solutions provided by financial institutions, addressing accounts payable and receivable - and the supply chain oriented' perspective -which might not involve a financial institution, and is focused on

working capital optimization in terms of accounts payable, receivable, inventories, and sometimes even on fixed asset financing. While efforts were made to be all- inclusive, significant research efforts may have been inadvertently omitted. However, the authors believe that this review is an accurate representation of the body of research on SCF published during the specified timeframe, and feel that confidence may be placed on the resulting assessments. The paper presents a comprehensive summary of previous research on this topic and identifies the most important issues that need to be addressed in future research. On the basis of the identified gaps in the literature, four key issues have been highlighted which should be addressed in future research.

Chang et al. (2016), Supply chain integration (SCI) is recognized as strategic process management that can be instrumental for creating positional advantages associated with improved firm performance. However, despite rigorous execution, recent meta-analyses derive different conclusions about the benefits of SCI. They propose that these inconsistencies may be associated with selection bias, failure to consider the mediating routes by which SCI affects financial performance, and lack of investigation of moderators. To address these issues, they apply positional advantage theory and the resource-based view, and focus on mitigating the potential selection bias by aggregating findings from 170 previous investigations in a comprehensive meta-analysis, to examine how discrete dimensions of SCI enhance firm financial performance through three types of intermediate firm performance. The moderating effects of time, relationship quality, and national culture are also assessed. The findings confirm that each dimension of SCI indeed improves financial performance. However, contrary to expectations, relational and strategic types of intermediate performance associated with superior customer value positional advantage have stronger mediating effects than operational performance associated with lower cost positional advantage. In addition, time, relationship quality, and collectivist national culture strengthen the associations between some dimensions of SCI and firm performance. Our study findings are reconciled with those from recent meta-

analytic studies, and implications arising from their conclusions that may inform practice about how to effectively leverage SCI are presented.

Caniato et al. (2016), Recently, in response to the credit crunch and the increased costs of financing, new solutions for supporting the financial management of supply chains, known as supply chain finance (SCF), have been developed. They exploit the strengths of supply chain links to optimize working capital. The purpose of this paper is to provide a reference framework that links together the objectives leading to the adoption of SCF solutions and several moderating variables. This paper adopts a multiple case study methodology, analyzing 14 cases of the application of SCF solutions among Italian companies. The main findings are the identification of the different objectives leading to the adoption of SCF; the analysis of the impact of moderating variables (the level of inter- and intra-firm collaboration, the level of the trade process digitalization and the bargaining power and financial strength of the leading firm) on SCF adoption; and the formulation of a reference framework supporting the effective adoption of SCF solutions. This contribution is exploratory in nature; theory-testing contributions should be the focus of further research. Also, the sample is limited to Italian companies. Finally, the service provider's point of view has been marginally taken into consideration in this study. The article addresses the need for more empirical research on SCF. It provides a reference framework focused on the objectives and moderating variables leading to effective SCF adoption, providing a theory-building contribution on the general topic of SCF and on the specific topic of the adoption process of different SCF solutions.

Zhao et al. (2015), This study investigates both the favorable and adverse effects of SCI. There is an inverted U-shaped relationship between supplier integration and financial performance. Internal integration has a positive and significant effect on financial performance. There is an inverted U-shaped relationship between customer integration and financial performance. Top management support plays complementary roles to supplier integration, internal integration and customer integration. While most studies argue that supply chain integration (SCI) has positive effect on financial performance, some literature cautions that SCI may impair financial performance under certain conditions. Our research extends this research stream by

considering the adverse effect of SCI. In this study, they examine how supplier integration, internal integration and customer integration contribute to or impede firms' financial performance and investigate the complementary roles of top management support in this process combining the resource-based view and transaction cost economics. Our findings from a survey of 195 firms in China indicate both favorable and adverse effects of SCI by showing an inverted U-shaped relationship between SCI and financial performance. Thus, either too little or too much SCI can impair financial performance. In addition, top management support can be considered as a complementary asset to SCI. This finding suggests that firms should focus on the important roles of top management support so as to improve financial performance through SCI more effectively. This study opens up new research avenues for SCI and suggests directions for future research and practice by exploring under what conditions SCI can help to improve financial performance.

Chorfi et al. (2015), Key Performance Indicators (KPIs) are very important for monitoring Supply Chains. The problem of selecting KPIs is considered as a multi-objective problem. This paper presents a framework for the ranking and the selection of KPIs using a Multi-Criteria Decision Analysis (MCDA). The research was carried out using Analytical Hierarchy Process (AHP) to make pairwise comparison of KPIs in terms of several criteria. The suggested framework is used for selecting relevant KPIs for monitoring a public sector pharmaceutical products supply chain in a developing country.

Choi et al. (2015), This study attempts to contribute to the growing research on green supply chain management (GSCM) strategies by relying on the Natural Resource Based View (NRBV) and relational view. Specifically, this study investigates the role of collaborative capability in moderating the effects of GSCM practices on firm performance. Using hierarchical regression, this study analyzes data from a survey of 230 South Korean manufacturers. The results show that the implementation of GSCM practices can improve both environmental and financial performance of the firm. Also, the findings indicate that firms can expect improved financial performance when they seek a synergistic effect by involving their partners in the GSCM implementation process.

Anand et al. (2015), A growing body of literature has begun in the direction of supply chain performance measurement. However, selecting the appropriate set of key performance indicators (KPIs) for measuring supply chain performance have always remained a challenge. The purpose of this paper is to identify the KPIs and categorize them specifically for measuring retail supply chain performance. A qualitative approach, based on literature has been adopted. Published literature from refereed journals on supply chain performance measurement has been considered and various approaches for developing KPIs have been studied to develop a theoretical framework for performance measurement in retail supply chain. The paper identifies key indicators for performance measurement and classifies them into four major categories: transport optimization, information technology optimization, inventory optimization and resource optimization. These key indicators are arranged precisely for retail industry. A theoretical framework is proposed to link the performance of these constructs on financial performance of the firm. Future research can be carried out to validate the relevance and applicability of identified indicators. The study can be further conducted to measure the interrelationships between the KPIs and their impact on financial performance of the firm. This study proposes a list of indicators for retail industry, which are presented in appropriate categories so that it can be used by the focussed teams for further improvement. To the best of authors' knowledge, no other study has categorized the KPIs into groups, specifically for measuring retail supply chain performance. The researcher also intends to carry out further empirical study to test the proposed theoretical framework.

2.6 Research Gaps

It is evident from the above review of literature that there are only a few studies or researches that have been undertaken in the field of supply chain management and its impact on financial performance of the company, The Supply chain management and its impact on financial performance of the company comes out as a major gap in the history of research studies. Earlier, supply chain management was deemed just as logistics operations, but in fact it has good impact on the financial performance and equity prospects of the company (Ramezani, Kimiagari, Karimi, 2014).

Even though a limited numbers of studies taken on financial integration of supply chain, they were majorly focussed on few financial aspects and ignored other aspects like operating expenses, operating profit, leverage, solvency and working capital. Most of the studies focussed only on reduction of logistics and other fixed costs as the means to achieve financial strength which could be very wide (Amr Youssef & Islam El- Nakib 2015).Demand and supply management could also form the basis of supply chain management and coordinating financial performance (Abbas, Nobanee, Khan, Varas, 2017).Cash and bank balances as linked to the good credit and collection policies in supply chain also affects the financial performance, which has not been researched upon significantly hence, it forms another gap.

Supply chain management   **Inventory Management**

Financial Performance
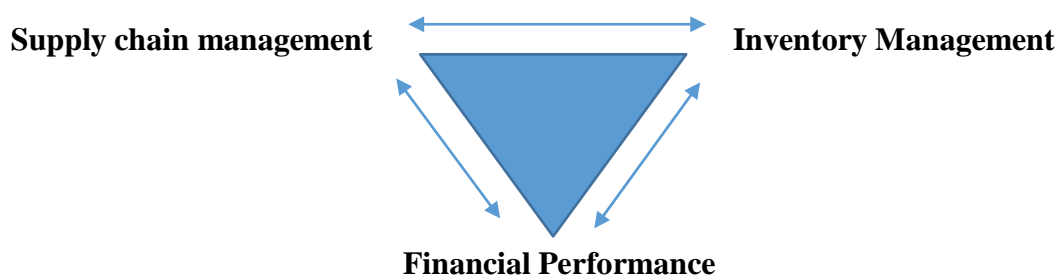
Comparative analysis and research studies among various firms are lagging in context to supply chain and financial performance. Such comparative analysis shall give an analysis to the degrees of impact from one firm to another firm. The inline and common supply chain measurement tools and techniques are yet to be discovered fully in order to measure the impact of supply chain on financial performance of the companies (Mkumbo et al. 2019). Moreover the comparative study that establishes the triangular relationship between inventory management, supply chain management and financial performance of the companies has not yet conducted by many researchers so it states as a major research gap.

2.7 Summary

This review bordered essential literature areas that could increase comprehension of supply chain management, Inventory management and financial management systems views and performance assessment variables. It concentrated on the performance evaluation of supply chain management, Inventory management and financial

management and the performance of the firms. The literature defined a range of systems and performance assessment considerations for the measurement of SCM, IM and Financial management. There are some research gaps which are highlighted in this review. To address these research gaps, this review guides to pursue a more systematic approach for identifying the firms Performance using various KPIs centred on SCM, IM and Financial management.

Chapter 3

Research Methodology

This chapter discusses essential methodological parts guiding the study. Section 3.2 outlines the Problem Statement and the section three provides Aim of the Study, Objectives of the work are explained in the next section. Proposed Work, followed by discussion of the Scope of the Study is discussed in the section 3.6. Section 3.7 explains the research methodology with subsection data collection, hypothesis, and identification of variables. The methodology section also discusses sampling procedures, sample and sample size. Section 3.8 covers the data collection method followed by the statistical methods and measurement of variables used in the study in section 3.9. This section also outlines and explains the techniques for data analysis followed by statistical analysis for testing the research model. Section 3.10 discusses the expected findings in from the study followed by the limitations of the study in research. Finally, section 3.12draws conclusions from this chapter.

3.1 Problem Statement

Supply chain management and inventory management are an integral part of any organization and most of the manufacturing firm's working depends upon effective supply chain and inventory management. Thus, it also has a significant impact on the financial performance of the firm with respect to many financial parameters and Key Performance Indicators (KPIs). This research study while addressing the above mentioned research gaps, will tend to analyze strategically the impact of supply chain and inventory management on the financial performance of the manufacturing firms, taking all the possible parameters and KPIs into consideration, which will further help scholars and researchers to develop modelling on such parameters through the gained results.

3.2 Aim of the Study

The study basically aims to develop an understanding about the mutual relationship between:

a) Supply chain management and Inventory management.
b) Supply chain management and financial performance of the organization.
c) Inventory management and financial performance of the organization.

Further the study aims to understand an associated interdependent relationship between supply chain management, inventory management and the financial performance of the company.

3.3 Objectives of the Study

✓ To study the direction and magnitude of the impact of inventory management and supply chain management on the financial performance of the companies considered in the study.

✓ To evaluate the impact of financial performance of companies considered on their supply chain management and inventory management.

✓ To develop a triangular relationship between inventory management, supply chain management and financial performance of companies.

3.4 Proposed Work

Supply chain management is the crucial aspect of any company which is directly or indirectly deals with manufacturing and production line of products. One of the important factors of supply chain management is inventory management. Supply chain and inventory management have a prolonged effect on the working of the production plant and running the business effectively. The researcher in this study will tend to find out the impact of supply chain factors and inventory management on the financial performance of the companies.

The researcher will perform its study on five companies that belong to automobile sector of India. The automobile sector of India is one of the largest in the world and accounts for over 7.1% of India's gross domestic product (GDP). It also contributes to nearly 22% of the country's manufacturing GDP. The companies will be selected based on highest market capitalization of the sector. The financial health of these companies can be regarded as to be very strong that makes them close to each

other when talking about revenue, sales and profits. The little difference in the financials will help to mark out the directives and management of supply chain in these companies.

The researcher hence proposes to study the various strategies of supply chain and inventory control of these companies in order to find out the effect on cost, sales, profits, inventory, and revenues. On the above stated basis the following sectors and companies have been identified.

Table 3-1: Top 5 Selected Automobile companies for the study

Automobile companies:	Tata Motors Ltd.
	Maruti Suzuki India Ltd.
	Mahindra & Mahindra Ltd.
	Hero MotoCorp Ltd.
	Bajaj Auto Ltd.

3.5 Scope of the Study

This research is a case study to investigate the triangular relationship between the supply chain management and inventory management on the financial performance of the selected Automobile components in India. Table 3.1 shows the companies which are selected; these companies are selected based on Market capitalization under the automobile sector. The need of Market capitalization based selection is that we need to identify top companies under the automobile sector, for that the only public secondary data available is the total market capitalization. As Market cap is used to describe company's number outstanding shares in relation to its market net-worth. It is one of the most significant qualities of a firm and aids potential investors in recognizing the dangers of purchasing the company's stock. Not only can that capitalization be used to filter the firms directly using simple searches on the online. The present research focused on assessing the triangular impacts of Supply Chain Management (SCM) practices, Inventory management practices and financial performance of these companies. The Study uses Key performance indicators to analyze strategies adopted by above firms to explain and identify the effectiveness,

barriers as well as benefits of an effective supply chain management, Inventory management practices and financial management. Scope of this study is limited to 5 Automobile companies and some of the locations present in northern India only of these companies. Given the relevance of the topic of Supply Chain Management (SCM) practices, Inventory management practices and financial performance practices in the automobile sector, the beneficiaries of this study will be corporate, practitioners and academicians who are interested in exploring these fields of management.

3.6 Methodology

In this research study, the researcher will use quantitative methods to conduct its study as the variables used in the study are quantitative.

3.6.1 Data Collection

Data for case studies can come from many sources of evidence. Not every sources is essential in every research case, however multiple sources of data adds to the reliability of the study is well established. The major sources of data collection can be:

1. Interviews,
2. Physical Artefacts,
3. Direct Observation,
4. Archival Records,
5. Documentation,
6. Online Sources.
7. Participant Observation

No single source has a complete advantage over the others; rather, they might be complementary and could be used in tandem. Thus a case study should use a many sources as are relevant to the study. For present study, the problems and experiences concerning the identification of key factors affecting financial performance of the company, three types of data collection method were chosen; direct interviews through outlets visits and interviews, retrieving external online information and

historical data. The primary data consisting of various variables is collected using these sources and for quantitative study, secondary data is collected through already published studies, annual reports and published financial data to conduct the research.

3.6.2 Hypothesis

The following null hypotheses are framed for the proposed study:

$H_0{}^1$: No statistical significance exists between Supply Chain Performance and the financial performance of the companies.

$H_0{}^2$: No statistical significance exists between Inventory management Performance and the financial performance of the companies.

$H_0{}^3$: No statistical significance exists between Financial Performance and the Supply Chain and Inventory performance of the companies.

3.6.3 Identification of Variables

Based on the gap analysis, the following variables and KPIs have been identified for the analysis. The variables are studied to measure firm's Supply chain, Inventory management and firm's financial performance. The Independent KPIs are for the null hypothesis $H_0{}^1$are Perfect Order Index, Cycle Time, Fill Rate, Service Rate, Supply chain Costs And the dependent variable for testing $H_0{}^1$isgross sales of the firm. The Independent KPIs are for $H_0{}^2$ are: Inventory turnover ratio, Turn Earn Index, Inventory Conversion Period, Inventory-to-sales ratio and the dependent variable for testing $H_0{}^2$ is gross sales of the firm and finally for $H_0{}^3$ independent variable are Gross Sales and the dependent variables are SCM Costs and Inventory turnover ratio

3.6.3.1 $H_0{}^1$: SCM and Financial Performance

These hypotheses constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis $H_0{}^1$forstudding the impact of SCM on financial performance can be sub divided into:

$H_0{}^{1.1}$: No statistical significance exists between Perfect Order Index and the gross sales of the companies.

H$_0^{1.2}$: No statistical significance exists between Cycle Time and the gross sales of the companies.

H$_0^{1.3}$: No statistical significance exists between Fill Rate and the gross sales of the companies.

H$_0^{1.4}$: No statistical significance exists between Service Rate and the gross sales of the companies.

H$_0^{1.5}$: No statistical significance exists between supply chain management costs and the gross sales of the companies.

Figure 3-1: Sub Hypothesis for impact Supply Chain performance on financial performance of the automobile companies

3.6.3.2 $H_0{}^2$: Inventory Management and Financial Performance

$H_0{}^2$ hypothesis constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis $H_0{}^2$ forstudding the impact of Inventory Management on financial performance can be sub divided into:
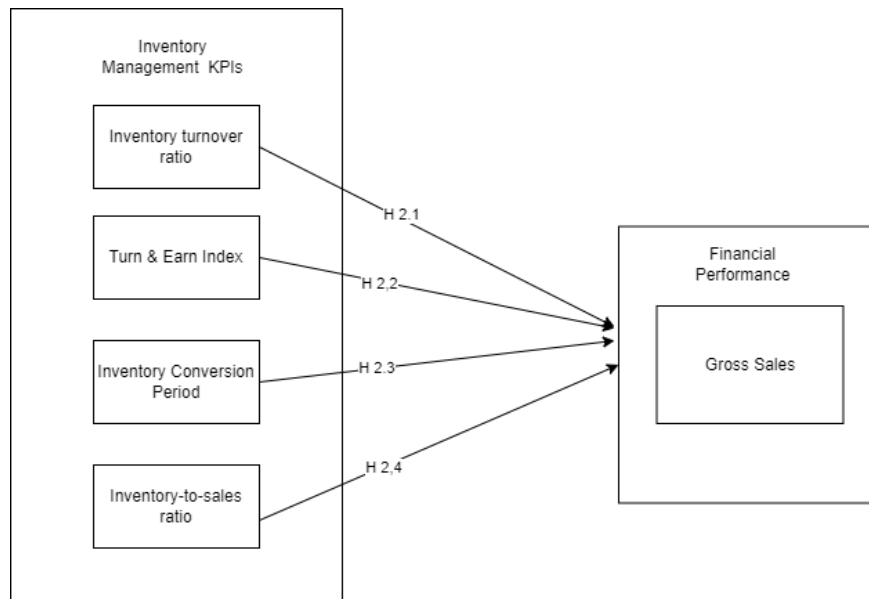
Figure 3-2: Sub Hypothesis for impact Inventory Management performance on financial performance of the automobile companies

$H_0{}^{2.1}$: No statistical significance exists between Inventory turnover ratio and the gross sales of the companies.

$H_0{}^{2.2}$: No statistical significance exists between Turn Earn Index and the gross sales of the companies.

$H_0{}^{2.3}$: No statistical significance exists between Inventory Conversion Period and the gross sales of the companies.

$H_0{}^{2.4}$: No statistical significance exists between Inventory-to-sales ratio and the gross sales of the companies.

3.6.3.3 $H_0{}^3$: Inventory Management and Financial Performance

$H_0{}^3$ hypothesis constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis $H_0{}^3$ forstudding the impact of financial performance on SCM and IM performance can be sub divided into:
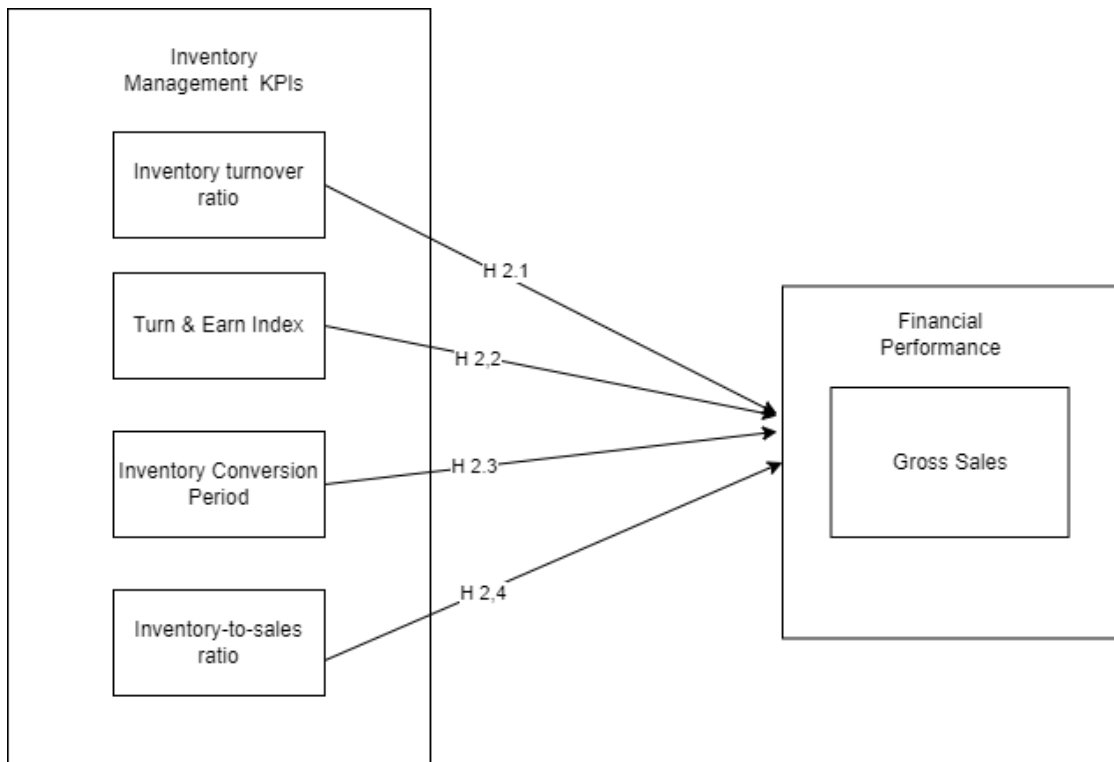
Figure 3-3: Sub Hypothesis for impact Financial Management performance on SCM and IM performance of the automobile companies

$H_0^{3.1}$: No statistical significance exists between gross sales and Inventory turnover ratio of the companies.

$H_0^{3.2}$: No statistical significance exists between gross sales and the overall supply chain costs of the companies.

3.6.4 Sample Size

Total 5 companies are be selected from the well diversified automobile sector subject to their contribution in the Indian GDP. In particular automobile sector's top 5 companies will be selected on the basis of their market capitalization for primary and secondary data collection. As the sample size is recognized as a key parameter for the planning of studies. The conditions required in ascertaining the appropriateness of a sample size were adhered, the population of the study was heterogeneous, and therefore a census survey and purposive sampling was applied in the selection of locations of the companies, Purposive sampling technique was applied for the selection locations in northern India. Purposive sampling allowed to choose locations based on specific features and process which justified on the study to be made.

Consequently, the selection of a sample population is more warranted based on specific set of criteria than can be critically analyzed. Also purposive sampling technique offers the researcher the chance of choosing cases that have sufficient information to help achieve the aims and objectives of the research Neuman (2005). This present study sample of 5 automobile companies. The sample size is done using Yamane (Yamane, 1973) technique because of small population size was applied in determining the sample size of survey.

$$Sample\ Size\ (n) = \frac{N}{1 + N \times (e)^2}$$

Where n is the sample size and N is the underlying population size and e is determined from the error confidence. For this study to be 95% accurate about the outcome $e = 0.05$ is selected.

Table 3-2: No of locations of the companies

Company	Outlets
Tata Motors Ltd.	1426
Maruti Suzuki Ltd.	2793
Hero MotoCorp Ltd.	1500
Mahindra & Mahindra Ltd.	903
Bajaj Auto Ltd.	2080
Total (N)	**8702**

Considering table 3.2 above the sample size is **N =8702**, thus

$$Sample\ Size\ (n) = \frac{8702}{1 + 8702 \times (0.05)^2} = 382.4$$

So at least 382 survey data must be collected to be 95% sure about the outcome, during the survey about 410 samples, which is sufficient as a sample size, are collected from several locations of selected firms in northern India.
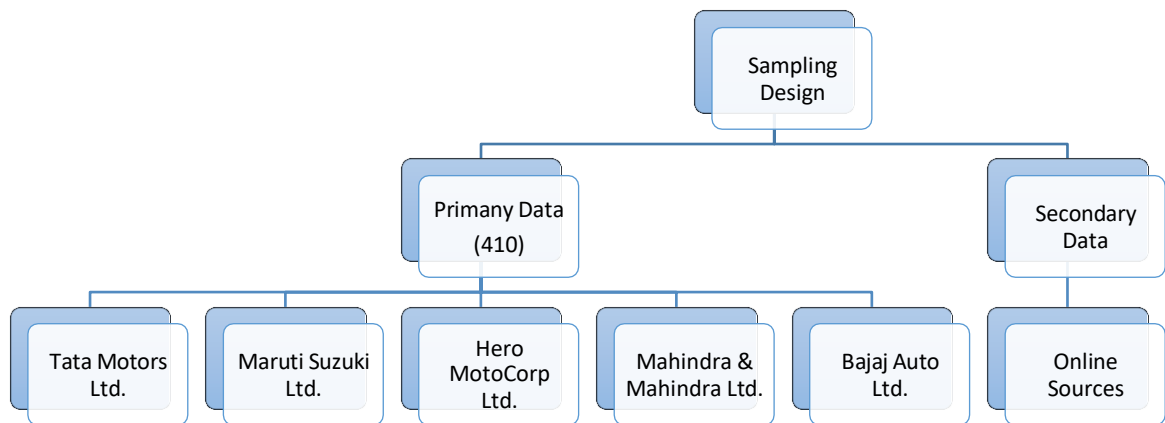
Figure 3-4: Study design and the sample size

3.7 Data collection method

This section talks about the type of data needed in this study and how this data was collected.

1) **Secondary data**: Secondary data includes data collected from various sources Table 3.3, published as well as unpublished research work, books, magazines, government reports, brochures, journals, periodicals, research papers presented in various conferences, internet websites, informal personal interactions etc. So, extensive Literature Survey was conducted to collect secondary data for the identification of different variables, probable contemporary issues and to achieve clarity of concept. Financial Performance indicators such as Gross Sales is taken from the screener.in Analytics, M.A (2022)

2) **Primary data**: In this study, primary data is collected through questionnaires to investigate the research questions. Questionnaires are the main means of collecting quantitative primary data in marketing research. The present research includes the questions focusing on measurement of SCM, IM and FM KPIs like Perfect Order Index, Cycle Time, Fill Rate, Service Rate, inventory turnover ratio/ Primary data was collected using the random sampling of select locations of top 5 automobile companies in northern India.

Table 3-3: Secondary data collected from various sources

Company	CMP (Cr.)	Inventory	Inventory Turnover Ratio	Sales
Maruti Suzuki India Ltd.	2,70,200	3,532	20.3	26,512
Tata Motors Ltd.	1,73,151	35,240	5.13	71,935
Mahindra & Mahindra Ltd.	1,56,748	11,596	4.94	28,412
Bajaj Auto Ltd.	1,17,531	1,231	17.9	8,005
Hero MotoCorp Ltd.	58,101	1,472	12.9	8,448

3.8 Statistical Methods

The researcher will use regression analysis and correlation along with various statistical charts like pie charts and histograms.

In order to analyze the impact of supply chain and inventory management on financial performance of the companies, some analytical tools will be used such as:

3.8.1 Correlation Analysis

Correlation implies there is a calculation of how strongly two factors are connected. A co relational analysis has three potential outcomes: *a strong correlation, a negative association, and no correlation*. A good correlation is a relation between two variables, both of which move in the same direction. So, whether one variable rise or one reduces, then the other variable improves. A negative correlation is a connection between the two variables that implies a decrease of one variable.

3.8.2 Cronbach alpha

Cronbach's Alpha is designed as a measure of internal consistency of items in the questionnaire. It varies between zero and one. The closer is the value of alpha to one, the greater the internal consistency of the items in the questionnaire. Although, a value of 0.70 was recommended to demonstrate internal consistency (Ponterotto, 2007), a value of 0.60 is often used as the practical bound (Malhotra and Grover, 1998). On the basis of coefficient values we deemed all items are reliable (alphas from 0.85).

Validity is the degree to which a study accurately reflects the specific concept that it attempts to measure. The type of validity will be addressed here is construct validity.

The sub-dimensions of construct validity include: content validity and convergent validity. Content validity does not have a formal statistical test. However, content validity in this research is promoted by the through literature review to reflect the range of meanings included within the concepts. Convergent validity is tested by determining whether item in a scale converge or load together in a single construct.

Table 3-4 Cronbach's alpha (internal consistency) of the range based questions

For Supply Chain Management

Reliability Statistics	
Cronbach's Alpha	N of Items
.722	4

For Inventory Management:

Reliability Statistics	
Cronbach's Alpha	N of Items
.746	5

3.8.3 Statistics about the survey
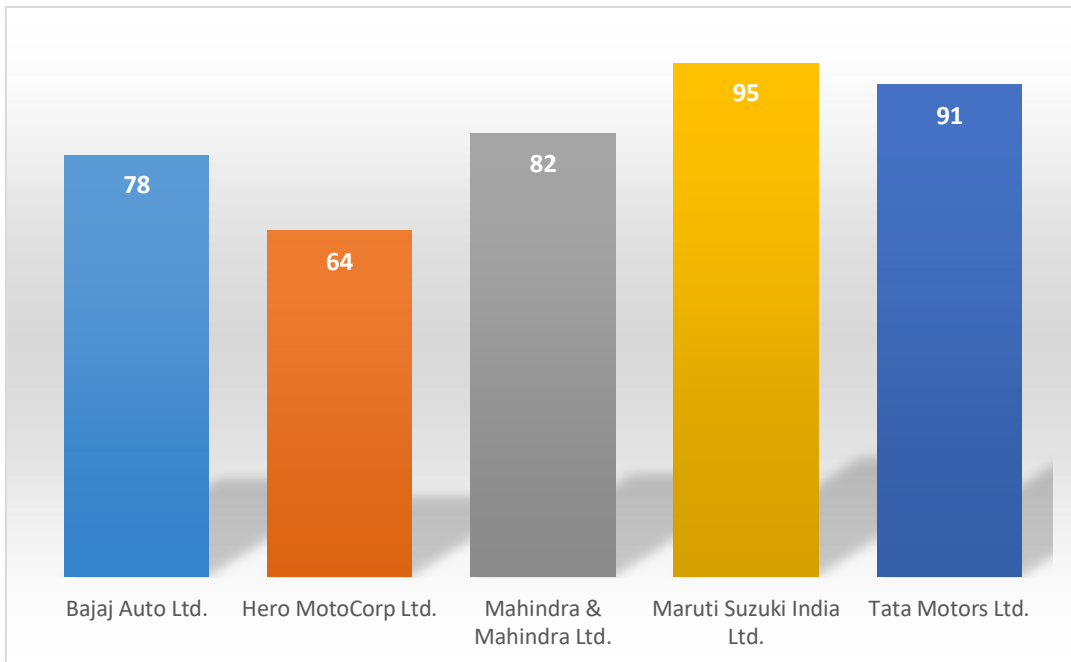
Figure 3.5: no of survey data collected from each automobile company.

By keeping the objective in mind five different automobiles companies were considered for our survey - Bajaj Auto Ltd., Hero Moto Corp Ltd., Mahindra and Mahindra Ltd., Maruti Suzuki India Ltd., and Tata Motors Ltd. The total of 410 responses were collected – 78 responses from Bajaj Auto Ltd., 64 responses from Hero Moto Corp Ltd., 82 responses from Mahindra and Mahindra Ltd., and 91 responses from Tata Motors Ltd. Maximum responses were collected from Maruti Suzuki with total of 95 responses.
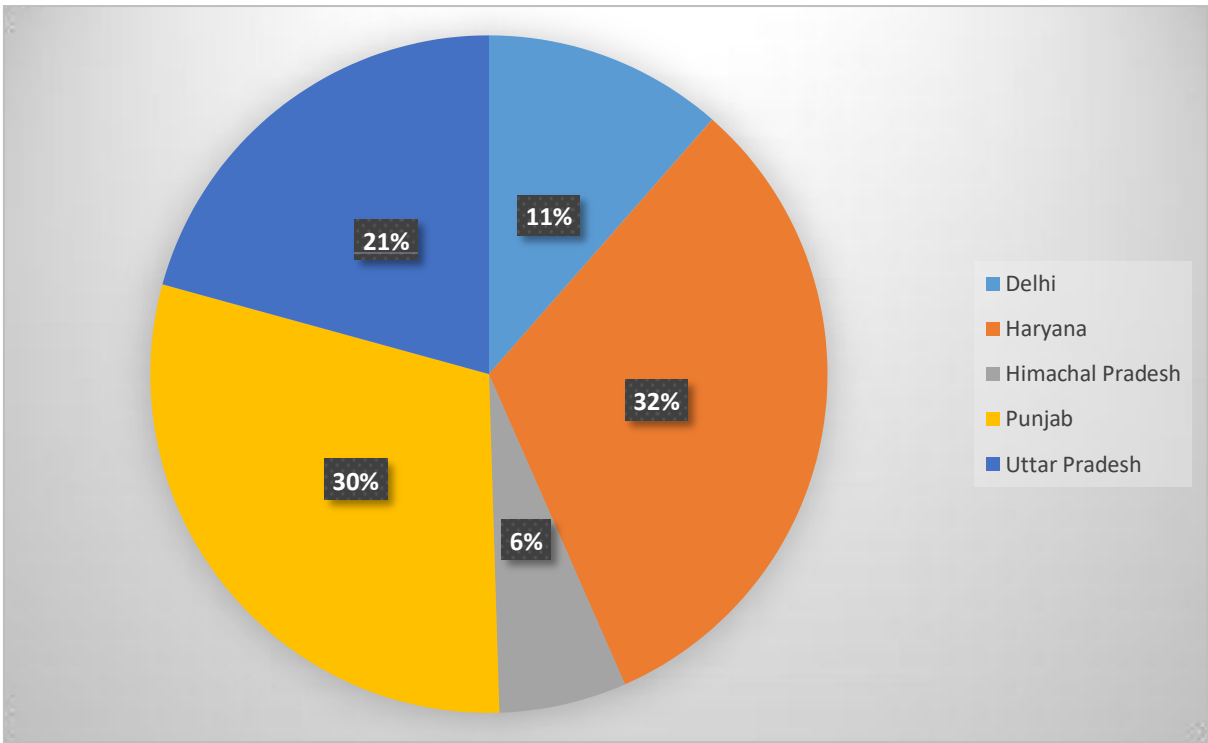
Figure 3.6: State wise ratio of collected Data.

These responses were recorded Dec-2019 to Jume-2022, from 5 different states-Haryana, Himachal Pradesh, Punjab, Uttar Pradesh, and Delhi. Maximum responses were collected from state Haryana with 32% of the responses, following Punjab 30% responses. Then 21% of the responses from Uttar Pradesh. 11% from Delhi and lastly 6% from Himachal Pradesh.
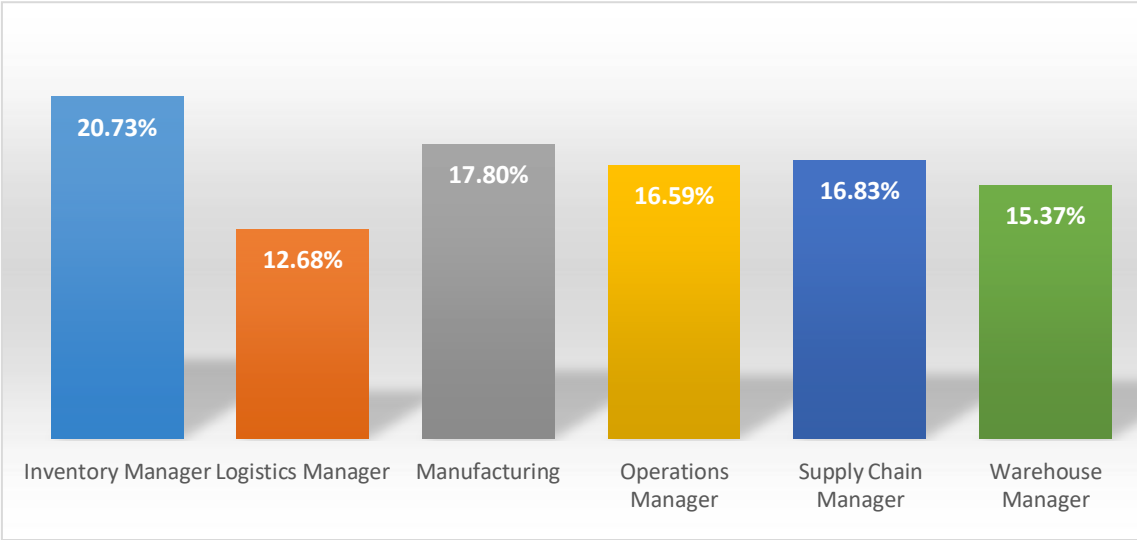
Figure 3.7: Respondent's designations in the survey

The responses were collected from persons with various designations including managers of both Inventory as well as Supply Chain managers. Highest number of records was recorded from Inventory Manager with 20.73% of records. Later is manufacturing branch with 17.80 % of the records. Next is Supply chain manager with 16.83%. Then Operation manager with 16.59%. Lastly with Warehouse and logistic manager with 15.37% and 12.68% respectively. Out of which there were 86.34% of males and 13.66% of females.
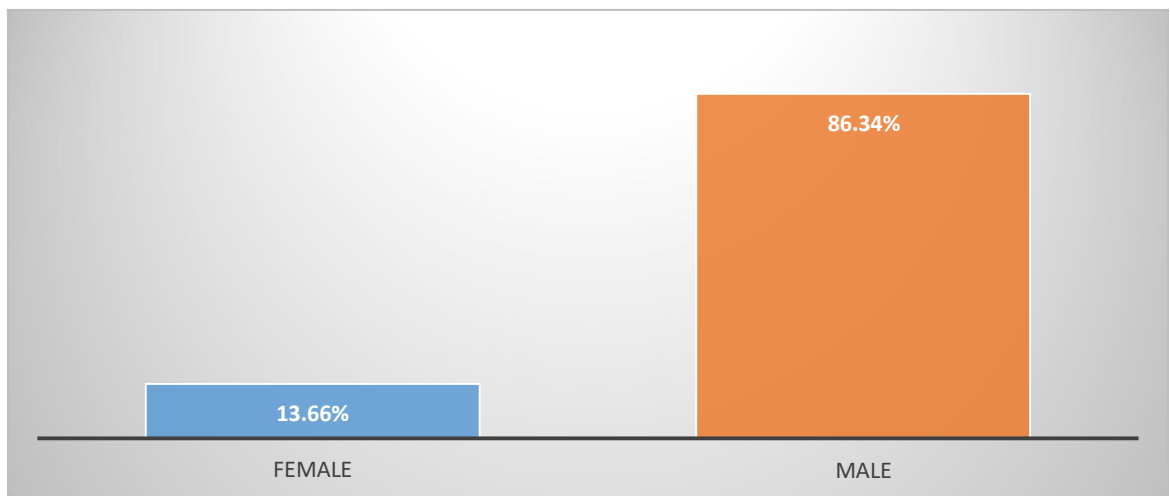
Figure 3.8: Gender Demographics of the survey.
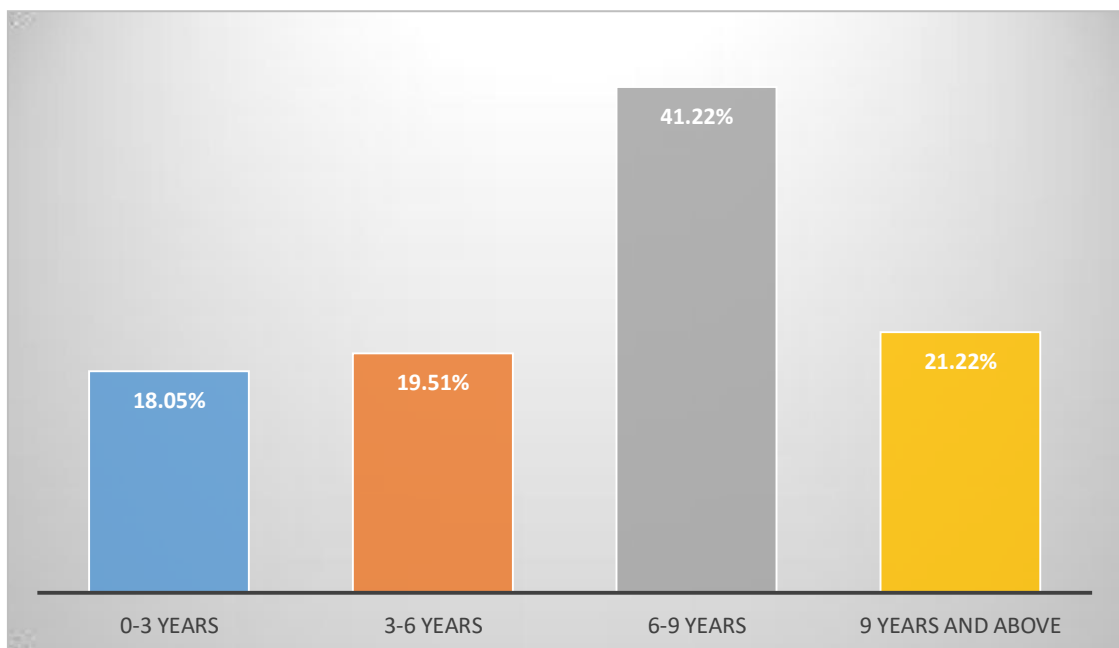
Figure 3.9: Most of the records were collected from 6-9 years of experienced employees.

Among all these designations from which the data was recorded, most of the employees were having 6-9 years of experience which counted to 41.22% of the data. Then there were 21.22% of employees with 9 years and above experience. Next is employees with 3-6 years of experience and data recorded from them is 19.51%. In the end data recorded from employees 0-3 years is 18.05%

3.8.4 Regression Analysis

The research methodology used in this thesis is based on statistical analysis, which includes the Linear and multiple regression analysis. This type of analysis is used for modelling and analysing cases having variables. The multiple regression analysis extends regression analysis by describing the relationship between a dependent variable and several independent variables. It studies the simultaneous influences that some independent variables have over one dependent variable and it can be used for predicting and forecasting. The multiple regression models can be much more realistic than the uni-factorial regression model. All of these variables were collected from primary and secondary data selected automobile companies.

In the first step all the necessary data for the analysis are presented, after which the regression equation are presented. In the second step the coefficient of determination R^2 is computed, which is an indicator to determine what percentage of the total variance is explained by the independent variables. Statistical and data analysis software SPSSis used for analysis. The software SPSS also provides F test and p-values.

3.9 Proposed Findings

Supply chain and inventory management are the integral part of any manufacturing firm which involves a whole lot of processes and procedures of getting raw materials from the vendor, storing it at the factory site, producing goods in plant and machinery, storing finished goods at warehouse located at different market places and distributing goods to the end users.

Each part of the supply chain and inventory management requires good financial propositions and commitments. Thus, supply chain and inventory management have

some crucial impact on the financial performance of the companies indicated by its net sales and profits majorly.

Through the intense literature review of the previous studies and the objectives with respect to variables of the current study, it is proposed that the supply chain and inventory management will have a positive impact on the financial performance of the company, but the degree of impact and differentiation will be evaluated after the proper research.

It is also proposed that the impact of financial performance on the inventory management and supply chain management will be studied and the study would be able to give a methodological analysis of the measurement tools and methods in order to help the future scholars to frame an in line common measurement tool to measure the impact of supply chain and inventory management directly on the financial performance of the companies and vice versa.

3.10 Limitations of the Study

In spite of all the efforts above stated research proposal has been carried out under certain constraints which ultimately became the limitations of the study:

a) Time frame of the study.
b) Numbers of companies are limited.

3.11 Summary

This chapter discussed some methodological steps required for conducting this study. At the beginning of this chapter, after displaying the research objectives, possible and potential research methodologies are discussed agreeing to the research aim and objectives. Afterward, the appropriate research design for this research was selected after discussion of different options and alternatives. This study selected descriptive research rather than other designs introduced in the related literature. Therefore, the chapter identified what sources would be used for the research, i.e. questionnaires. In addition, this chapter explained the measurements to be used for all variables in the study. Moreover, the methodology chapter highlighted sampling issues. Hence, this

study targeted 410 samples from several locations of automobile outlets. Finally, this chapter outlined what statistical techniques would be used. Hypotheses and objectives were tested using correlation analysis, regression analysis, etc.

Chapter 4

Relationship between Supply Chain Performance and Financial Outcomes

Supply chain looks after the material, goods and services movement, transportation, delivery and availability, whereas finance deals with the monetary flow among all the functions of a firm. The objective of this research is to find the relation between both SCM and FM (if exists). To carry out the research we will state a hypothesis and on the basis of outcomes of the hypothesis testing we will look whether there is a relation among between SCM and FM or not.

4.1 H_0 : ^{1} No statistical significance exists between supply chain performance and the financial performance of the companies.

These hypotheses constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis H_0^1 forstudding the impact of SCM on financial performance can be sub divided into:

$H_0^{1.1}$: No statistical significance exists between Perfect Order Index and the gross sales of the companies.

$H_0^{1.2}$: No statistical significance exists between Cycle Time and the gross sales of the companies.

$H_0^{1.3}$: No statistical significance exists between Service Rate and the gross sales of the companies.

$H_0^{1.4}$: No statistical significance exists between Fill Rate and the gross sales of the companies.

$H_0^{1.5}$: No statistical significance exists between supply chain management costs and the gross sales of the companies.

4.2 Hypothesis testing

For best results, before performing hypothesis testing we need to analyse KPIs data for accuracy, validation, missing data, skewness and anomalies. This will make sure

that the outcome of our test is correct and are based on valid and true dataset because inaccurate data may cause wrong results. Later the dataset is tested on Correlation and General Linear Models (ANOVA and Linear Regression) to test the hypothesis.

4.3 $H_0^{1.1}$: No statistical significance exists between Perfect Order Index and the gross sales of the companies.

The proportion of client deliveries that were made on time and in full. The perfect order index is a total score that evaluates the results of delivered on time, shipped completed, damage free delivery and correct documentation. This calculated POI column is analysed through SPSS and a case processing summary (Table 4.1) is evaluated on number of values for POI to make sure there are no missing values and no anomalies. The descriptives (Table 4.2) of POI are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted for POI to evaluate the frequency of value along with the mean and standard deviation of .61 and .028 respectively

Table 4-1: Perfect Order Index.

	Cases					
	Valid		Missing		Total	
	#	%	0	%	#	%
Perfect order Index	410	100.0%	0	0.0%	410	100.0%

Table 4-2: Descriptives of Perfect Order Index.

			Statistic	Std. Error
Perfect order Index	Mean		.6107	.00138
	95% Confidence Interval(C.I.) for Mean	Lower Bound	.6080	
		Upper Bound	.6134	
	5% Trimmed Mean		.6109	
	Median		.6100	
	Variance		.001	
	Std. Deviation		.02791	
	Min		.55	
	Max		.66	
	Range		.11	
	Interquartile Range		.04	
	Skewness		-.039	.121
	Kurtosis		-1.122	.240
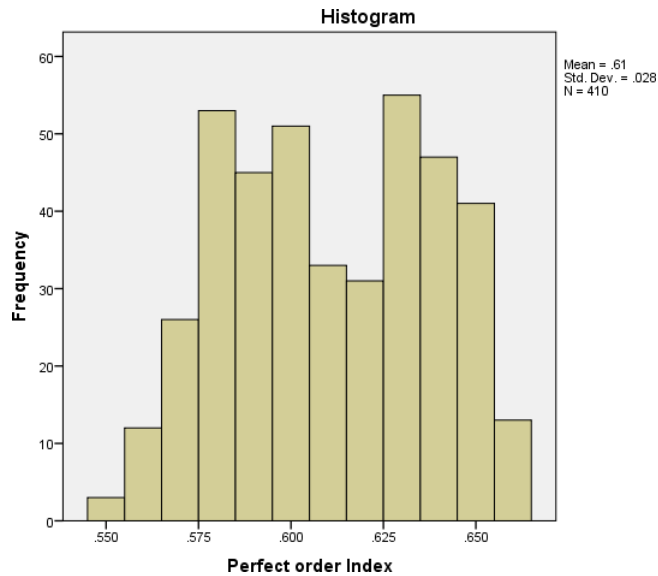
Figure 4.1: Frequency Plot of Perfect Order Index.

A gross sale is a measure of a company's overall sales that is not cost-adjusted for those sales' production. Totalling all sale invoices or related revenue transactions yields the gross sales calculation. The gross sale is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 4.3 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 4.4) of POI are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted for gross sales to evaluate the frequency of value along with the mean and standard deviation of .635 and 262.619 respectively.

Table 4-3: Gross Sales data.

	Cases					
	Valid		Missing		Total	
	#	Percent	0	Percent	#	Percent
Gross Sales (Cr.)	410	100.0%	0	0.0%	410	100.0%

Table 4-4 : Descriptives of Gross Sales.

			Statistic	Std. Error
Gross Sales (Cr.)	Mean		635.13	12.970
	95% C.I for Mean	Lower Bound	609.63	
		Upper Bound	660.63	
	5% Trimmed Mean		624.92	
	Median		549.50	
	Variance		68968.646	
	Std. Deviation		262.619	
	Min		246	
	Max		1246	
	Range		1000	
	Interquartile Range		435	
	Skewness		.502	.121
	Kurtosis		-.992	.240
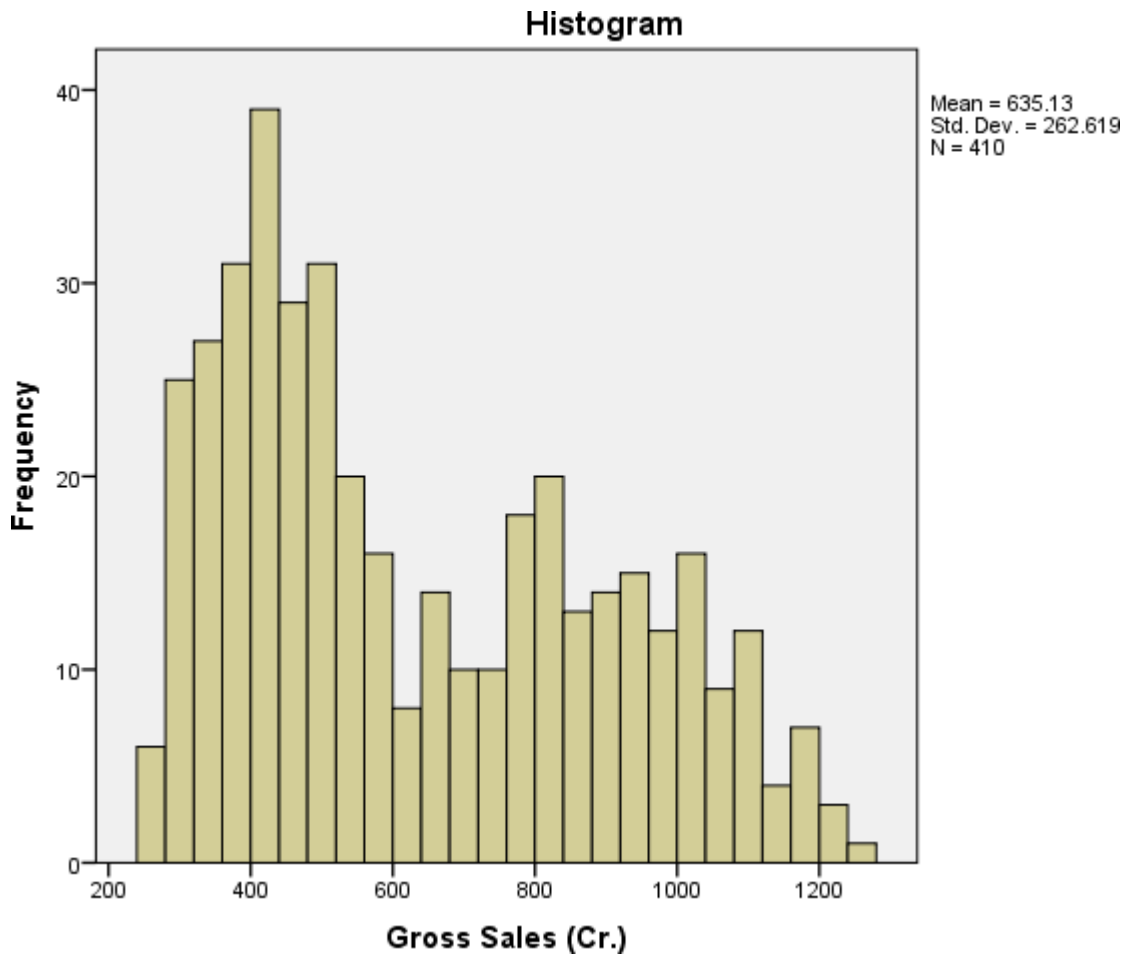
Figure 4.2: Frequency plot of Gross Sales.

Table 4-5: Correlation (R) between Perfect Order Index and Gross Sales.

Correlation

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.769[a]	.591	.590	168.124

Pearson's Correlation was used to access the relationship between Perfect Order Index and Gross Sales. The Independent variable Perfect Order Index and Dependent variable Gross Sales are found to be strongly correlated, $r(410) = .76$, $p < .05$. This statistics test suggests that Null Hypothesis is rejected and there is a relation between

Perfect Order Index and Gross Sales. Also the model depicts the 59% variance in gross sales due to Perfect order Index (Table 4.5).

Table 4-6: ANOVAs between Perfect Order Index and Gross Sales

ANOVA[s]

Model	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1 Regression	16675767.848	1	16675767.848	589.965	.000[b]
Residual	11532408.300	408	28265.707		
Total	28208176.149	409			

Table 4-7 : Perfect Order Index and Gross sales.

Model	Unstandardized Coefficients		Std. Coefficients	T	Sig.	95.0% C.I for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	-3783.879	182.123		-20.777	.000	-4141.895	-3425.863
Perfect order Index	7235.886	297.906	.769	24.289	.000	6650.264	7821.507

a. Dependent Variable: Gross Sales (Cr.)

Simple Linear Regression was used to assess whether both Perfect Order Index and Gross Sales have a relation. The results of regression (Table 4.7) suggests that Perfect Order Index explained 59% of the variance, $R^2 = .59$, F (1, 408) = 589.96, p < .001.

Perfect Order Index predicted Gross Sales, $b = .769$, $t = 24.28$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{1.1,}$and indicated Perfect Order Index and Gross Sales have a statistically significant relation with each other.
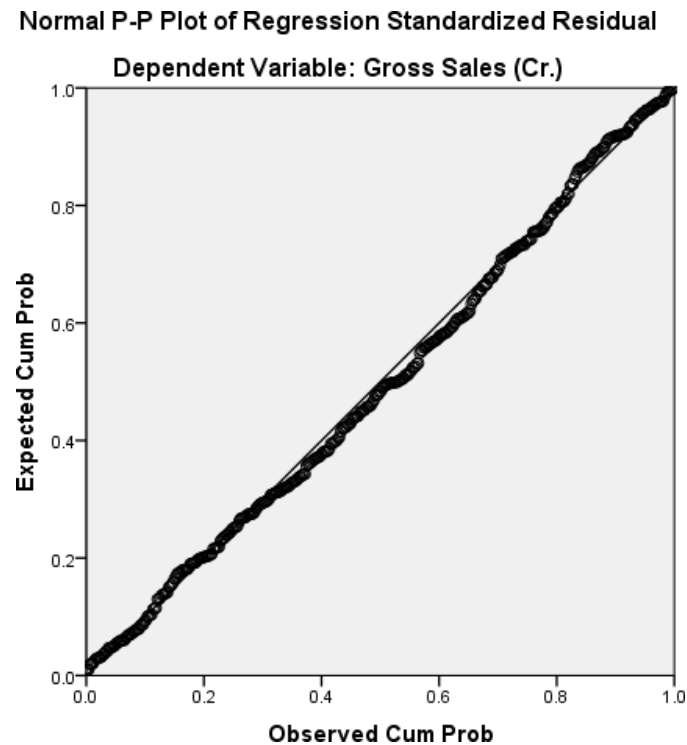
Figure 4.3: Clear linear relation between actual and predicted values

4.4 $H_0^{1.2}$: No statistical significance exists between Cycle Time and the gross sales of the companies.

Table 4-8: No missing values in Cycle time Data.

	Cases					
	Valid		Missing		Total	
	#	%	#	%	#	%
Cycle Time	410	100.0%	0	0.0%	410	100.0%

Cycle time: It calculates how much time it would take to complete an order in its entirety if all upstream and internal inventory levels were zero. It shows the

responsiveness and effectiveness of suppliers is to know how soon one can organise the initial shipment of items and restock the inventory. The Cycle time is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 4.8 tells there are 100% valid cases and no missing values with total of N = 410. The descriptive (Table 4.9) of Cycle Time are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 4.4) for gross sales to evaluate the frequency of value along with the mean and standard deviation of 32.6035and 4.36 respectively.

Table 4-9: Descriptive of Cycle Time.

			Statistic	Std. Error
Cycle Time	Mean		32.6035	.21546
	95% C.I for Mean	Lower Bound	32.1799	
		Upper Bound	33.0270	
	5% Trimmed Mean		32.5561	
	Median		31.6800	
	Variance		19.033	
	Std. Deviation		4.36266	
	Minimum		24.33	
	Maximum		41.72	
	Range		17.39	
	Interquartile Range		7.52	
	Skewness		.200	.121
	Kurtosis		-1.174	.240

Pearson's Correlation was used to access the relationship between Cycle Time and Gross Sales. The Independent variable Cycle Time and Dependent variable Gross Sales are found to be statistically negatively correlated, $r(408) = -.75$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{1.2}$ is rejected and there is a negative relation between Perfect Order Index and Gross Sales. Also the model depicts the 57% variance in gross sales due to Cycle Time.
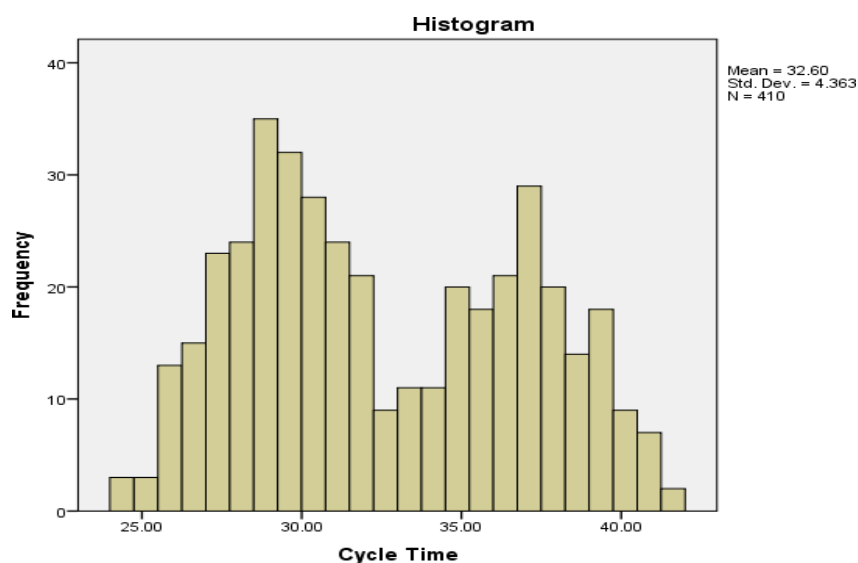
Figure 4.4: Frequency plot for cycle time Values.

Table 4-10: Correlation between Cycle time and Gross Sales.

Correlation

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	-.758[a]	.574	.573	171.587

Table 4-11: ANOVA between Cycle time and Gross Sales

Model	Sum of Squares	Degree of freedom	Mean Square	F	Sig.

1	Regression	16195845.954	1	16195845.954	550.094	.000[b]
	Residual	12012330.195	408	29441.986		
	Total	28208176.149	409			

Table 4-12: Regression between Cycle time and Gross Sales

Model	Unstandardized Coefficients		Std Coefficients	T	Sig.	95.0% C.l for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	2122.273	63.970		33.176	.000	1996.520	2248.025
Cycle Time	-45.613	1.945	-.758	-23.454	.000	-49.436	-41.790

a. Dependent Variable: Gross Sales (Cr.)

Both General Linear Models ANOVA (Table 4.11) and Simple Linear Regression (Table 4.12) were used to assess whether both Cycle Time and Gross Sales have a relation. The results of regression suggests that Cycle Time explained 59% of the variance (same in Pearson model), $R^2 = .59$, $F(1, 408) = 550.09$, $p < .001$. Cycle Time predicted Gross Sales, $b = -.758$, $t = -23.45$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{1.2}$, and indicated Cycle Time and Gross Sales have a statistically significant negative relation with each other. More the cycle time indicates slow gross sales. For every one unit increase in Cycle Time, Gross sales would decrease by 0.758 points
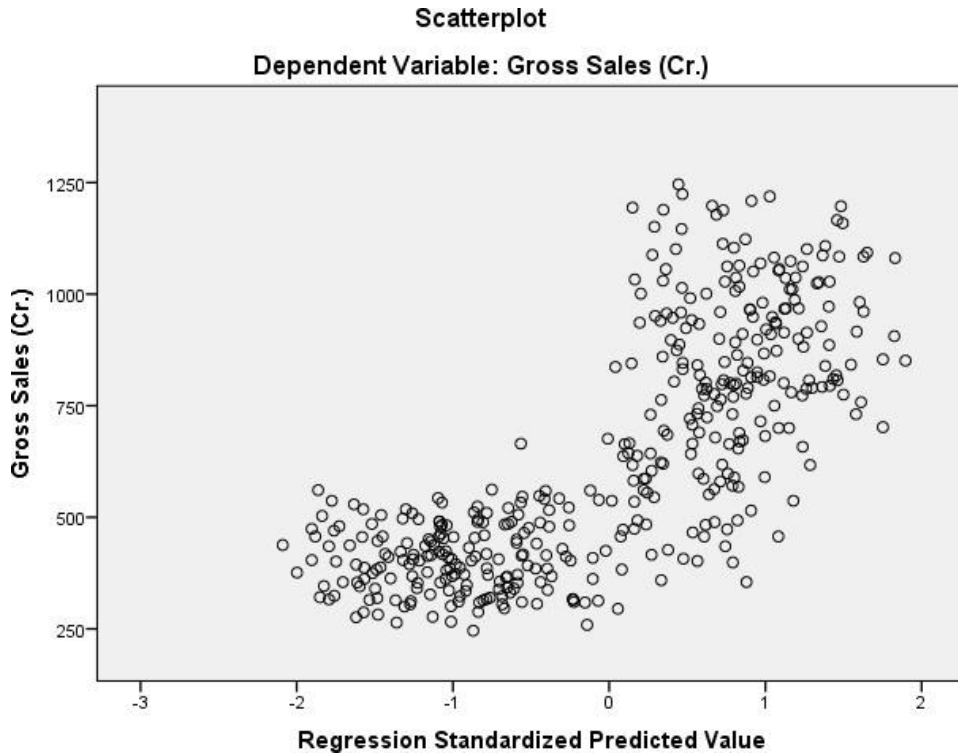
Figure 4.5: More the cycle time indicates low gross sales.

4.5 $H_0^{1.3}$: No statistical significance exists between Service Rate and the gross sales of the companies.

Service rate is a KPI used to estimate the customer service in a supply organization. Service level plays two important roles in inventory management: first is evaluating how a firm is doing and second are supply chain planning decisions, such as setting safety stock levels.

Table 4-13: No missing values for Service Rate.

	Cases					
	Valid		Missing		Total	
	#	%	#	%	#	%
Service rate	410	100.0%	0	0.0%	410	100.0%

The Service Rate is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 4.8 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 4.9) of service rate are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 4.6) for service rate to evaluate the frequency of value along with the mean and standard deviation of 12.32and 2.23 respectively.

Table 4-14: Descriptives of Service Rate

			Statistic	Std. Error
Service rate	Mean		12.3289	.11022
	95% C.I for Mean	Lower Bound	12.1122	
		Upper Bound	12.5456	
	5% Trimmed Mean		12.3017	
	Median		12.2300	
	Variance		4.981	
	Std. Deviation		2.23176	
	Min		8.04	
	Max		18.27	
	Range		10.23	
	Interquartile Range		3.03	
	Skewness		.073	.121
	Kurtosis		-.675	.240
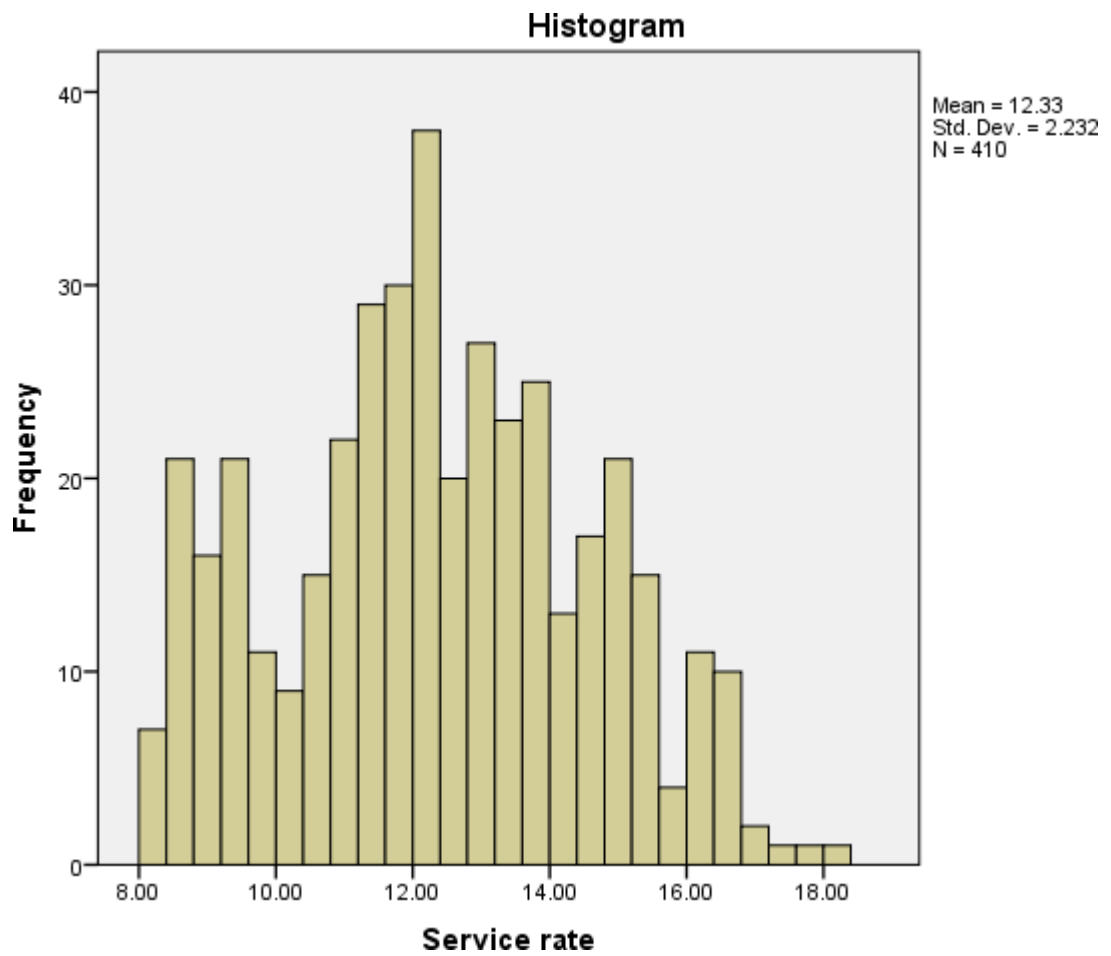
Figure 4.6: Frequency plot for service rate.

Table 4-15: Correlation(R) between Service Rate and Gross Sales.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.447[a]	.200	.198	235.156

Here Correlation was used to access the relationship between Service Rate and Gross Sales. The Independent variable Service Rate and Dependent variable Gross Sales are found to be statistically moderately correlated, $r(408) = .44$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{1.3}$ is rejected and there is a moderately positive relation between Service Rate and Gross Sales. Also the model depicts the 20% variance in gross sales due to Service Rate (Table 4.15).

Table 4-16: Regression of Service Rate

Model	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1 Regression	5646444.418	1	5646444.418	102.109	.000[b]
Residual	22561731.731	408	55298.362		
Total	28208176.149	409			

Table 4-17: Service Rate and Gross sales

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.	95.0% C.I for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	-13.959	65.276		-.214	.831	-142.279	114.361
Service rate	52.648	5.210	.447	10.105	.000	42.406	62.890

a. Dependent Variable: Gross Sales (Cr.)
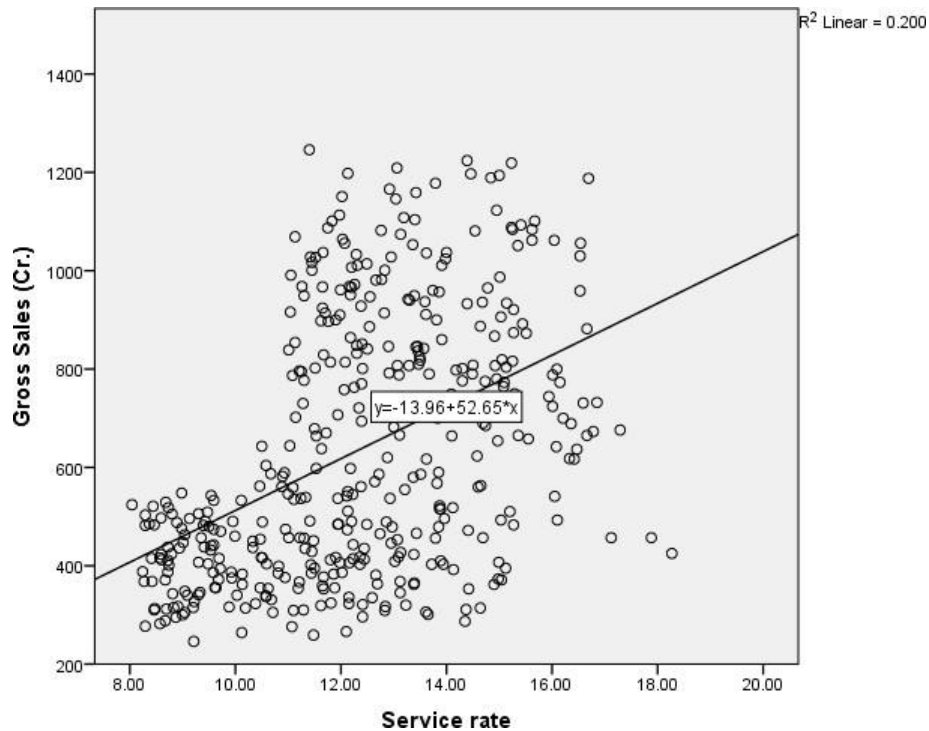
Figure 4.7: Service Rate and Gross Sales have a statistically moderate relation with each other**.**

Simple Linear Regression (Table 4.17) and ANOVA (Table 4.16) were used to assess whether both Service Rate and Gross Sales have a relation. The results of regression suggests that Service Rate explained 20% of the variance, $R^2 = .20$, F (1, 408) = 102.10, p < .001. Service Rate predicted Gross Sales, $b = 0.447$, $t = 10.10$, $p< .001$. Hence our test suggests that we reject our null hypothesis $H_0^{1.3}$ and indicated Service Rate and Gross Sales have a positive statistically moderate relation with each other**.**

4.6 $H_0^{1.4}$: No statistical significance exists between Fill Rate and the gross sales of the companies.

Fill Rate is the percentage of customer demand that is satisfied by stock availability within a given time frame without the need for backorders or missed sales. It shows how successfully businesses are able to meet client expectations.

Table 4-18: No missing value in Fill Rate Data

	Cases					
	Valid		Missing		Total	
	#	%	#	%	#	%
Fill rate	410	100.0%	0	0.0%	410	100.0%

Table 4-19: Descriptives of Fill Rate

			Statistic	Std. Error
Fill rate	Mean		10.9065	.10084
	95% C.I for Mean	Lower Bound	10.7083	
		Upper Bound	11.1048	
	5% Trimmed Mean		10.8826	
	Median		10.8600	
	Variance		4.169	
	Std. Deviation		2.04182	
	Min		6.92	
	Max		16.18	
	Range		9.26	
	Interquartile Range		2.78	
	Skewness		.072	.121
	Kurtosis		-.690	.240

The Fill Rate is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 4.18 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 4.19) of Fill rate are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 4.8) for Fill rate to evaluate the frequency of value along with the mean and standard deviation of 12.32and 2.23 respectively.
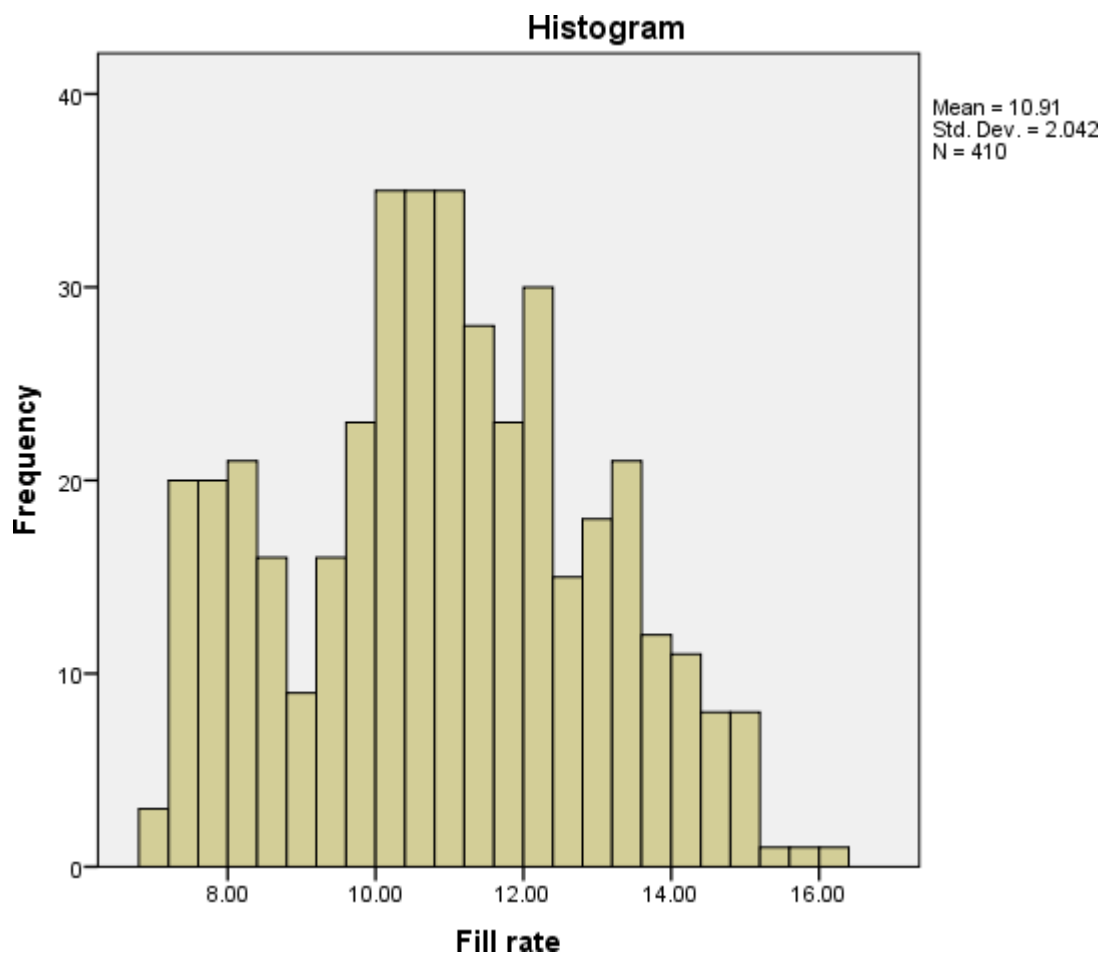
Figure 4.8: Frequency Plot for Fill Rate.

Table 4-20: Correlation between Fill Rate and Gross Sales

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.478[a]	.228	.226	231.011

Pearson's Correlation was used to evaluate the relationship between Fill Rate and Gross Sales. The Independent variable Fill Rate and Dependent variable Gross Sales are found to be moderately correlated, $r(408) = .47$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{1.4}$ is rejected and there is a moderately significant relation between Fill Rate and Gross Sales. Also the model depicts the 22% variance in gross sales due to Fill Rate (Table 4.20)

Table 4-21: ANOVAs between Fill Rate and Gross Sales

Model		Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1	Regression	6434780.157	1	6434780.157	120.578	.000[b]
	Residual	21773395.992	408	53366.167		
	Total	28208176.149	409			

Table 4-22: Regression between Fill Rate and Gross Sales

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.	95.0% CI for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	-34.870	62.073		-.562	.575	-156.893	87.153
Fill rate	61.431	5.594	.478	10.981	.000	50.434	72.428

Both ANOVA and Simple Linear Regression were used to assess whether Fill Rate and Gross Sales have a relation. The results of ANOVA (Table: 4.22) suggests that Fill Rate explained 22% of the variance, $R^2 = .22$, F (1, 408) = 120.57, p < .001. According to regression outcome (Table 4.22) Fill Rate predicted Gross Sales, $b = .478$, $t = 10.98$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{1.4}$, and indicated Fill Rate and Gross Sales have a statistically significant relation with each other.

Dependent Variable: Gross Sales (Cr.)
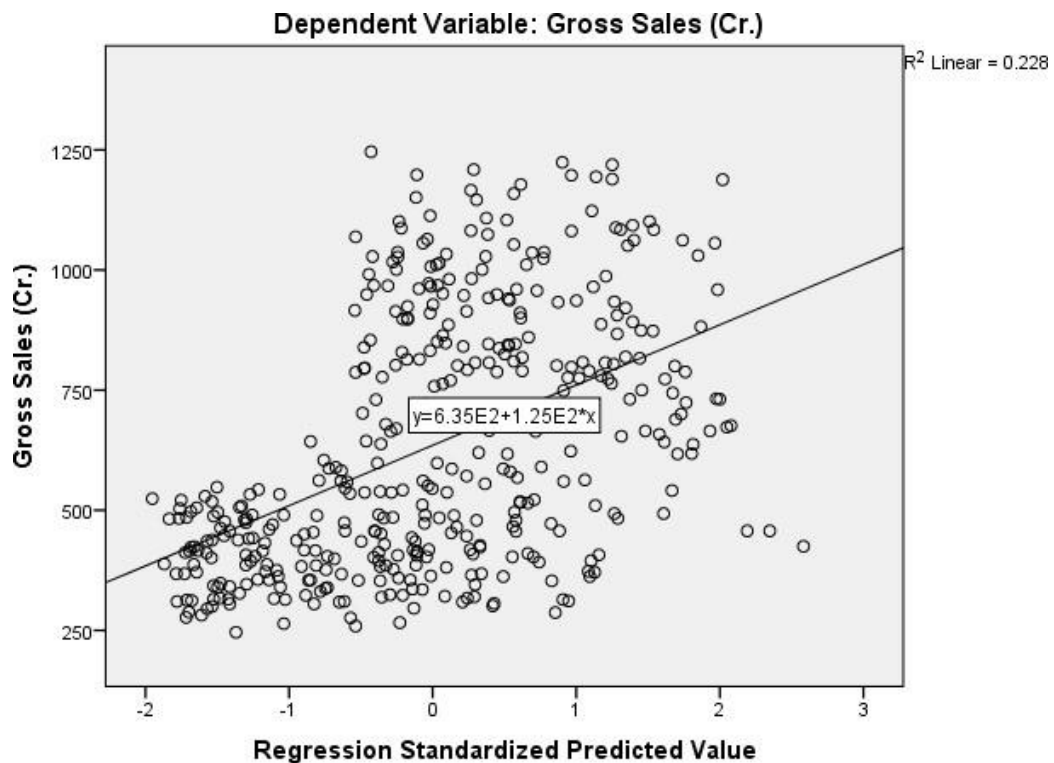
Figure 4.9: There is quite a difference betwween actual and predicted values.

4.7 $H_0^{1.5}$: No statistical significance exists between supply chain management costs and the gross sales of the companies.

Costs in the supply chain are those that account for a sizable portion of the final sales price of an item or service. Manufacturers frequently use the total cost of ownership to determine supply chain expenses.

Table 4-23: There are no missing values in SC cost data

	Cases					
	Valid		Missing		Total	
	#	%	#	%	#	%
Supply Chain Costs (%)	410	100.0%	0	0.0%	410	100.0%

The Fill Rate is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 4.23 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 4.24) of Fill rate are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 4.10) for Fill rate to evaluate the frequency of value along with the mean and standard deviation of 12.32and 2.23 respectively.

Table 4-24: Descriptives of SC costs.

			Statistic	Std. Error
Supply Chain Costs (%)	Mean		12.1030	.07602
	95% C.I for Mean	Lower Bound	11.9536	
		Upper Bound	12.2525	
	5% Trimmed Mean		12.0758	
	Median		12.1050	
	Variance		2.369	
	Std. Deviation		1.53928	
	Min		9.53	
	Max		15.28	
	Range		5.75	
	Interquartile Range		2.40	
	Skewness		.172	.121
	Kurtosis		-.934	.240
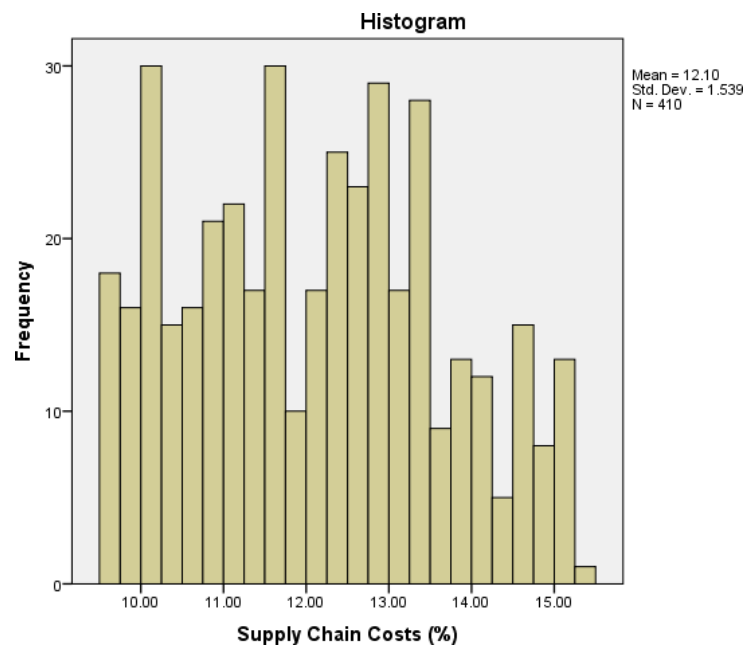
Figure 4.10: Frequency Plot for SC costs.

Table 4-25: Correlation between Supply Chain Cost and Gross Sales.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	-.753[a]	.567	.566	173.075

a. Predictors: (Constant), Supply Chain Costs (%)

b. Dependent Variable: Gross Sales (Cr.)

Pearson's Correlation was used to evaluate the relationship between supply chain management costs and Gross Sales. The Independent variable supply chain management costs and Dependent variable Gross Sales are found to be negatively correlated, $r(408) = -.73$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{1.5}$ is rejected and there is a significantly negative relation between supply chain management costs and Gross Sales. Also the model depicts the 56% variance in gross sales due to supply chain management costs (Table 4.25).

Table 4-26: Anova Between supply chain management costs and Gross Sales.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15986606.316	1	15986606.316	533.690	.000[b]
	Residual	12221569.833	408	29954.828		
	Total	28208176.149	409			

Table 4-27: Regression Between supply chain management costs and Gross Sales.

Model	Unstandardized Coefficients		Std. Coefficients			95.0% C.I for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1 (Constant)	2189.640	67.830		32.281	.000	2056.299	2322.980
Supply Chain Costs (%)	-128.440	5.560	-.753	-23.102	.000	-139.369	-117.510

a. Dependent Variable: Gross Sales (Cr.)

Both ANOVA (Table 4.26) and Simple Linear Regression (Table 4.27) were used to assess whether Supply chain costs and Gross Sales have a relation. The results of regression suggests that Supply chain costs explained 22% of the variance, $R^2 = .56$, F(1, 408) = 533.69, p < .001. Supply chain costs predicted Gross Sales, $b = -.753$, $t = -23.10$, $p< .001$. Hence our test suggests that we reject our null hypothesis $\mathbf{H_0^{1.5}}$, and indicated Supply chain costs and Gross Sales have a statistically significant relation with each other**.**

4.8 Regression model between supply chain management and gross sales

There were five predictors fed - POI, Cash Cycle (cycle time), Service Rate, Fill Rate, and Supply Chain Costs and one dependent predictor Gross Sales to generate a model. Via automatic linear modelling in SPSS we generated a linear model to predict gross sales. The regression equation generated through model is

$$Y = -499.21 + .380a - .295b + .739c + .732d - .265e$$

$$Where, = POI, b = cycle\ time, c = fill\ rate, d = service\ rate, e = supply\ chain\ costs$$

Table 4-28: Unstandardized coefficients for regression model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-449.214	392.179		-1.145	.253
	Perfect order Index	3578.771	519.119	.380	6.894	.000
	Cycle Time	-17.766	2.903	-.295	-6.119	.000
	Fill rate	-95.082	64.433	.739	-1.476	.141
	Service rate	86.163	57.190	.732	1.507	.133
	Supply Chain Costs (%)	-45.221	8.149	-.265	-5.549	.000

a. Dependent Variable: Gross Sales (Cr.)
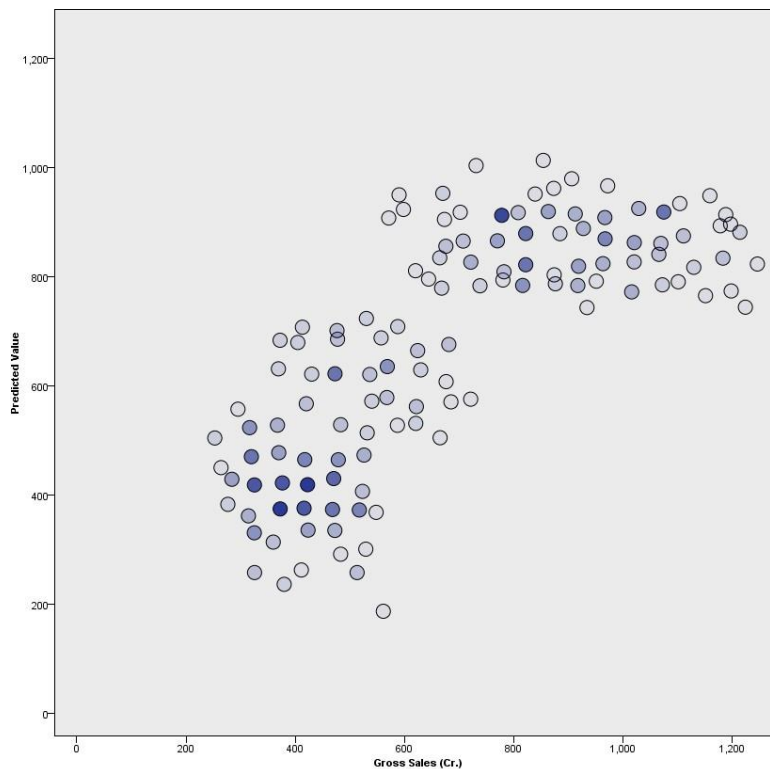
Figure 4.11: Gross Sales Actual Values vs. Predicted values

The Figure 4.11 shows that the model constructed is not a perfect linear model. There is a slight difference between the predicted and the actual values. During our experiment in SPSS we find that the proposed model has 68.6% accuracy (Figure 4.12), the reason we can see a little scatter in the plot.
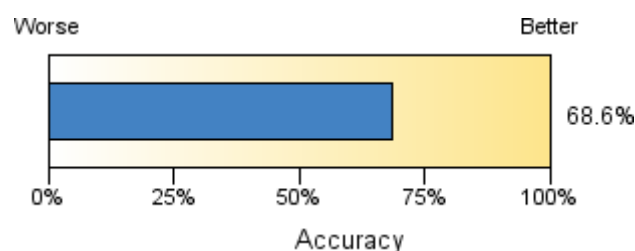
Figure 4.12: Accuracy of the model estimated through automatic linear modelling

Table 4-29: Regression model for Cycle Time, Service rate, Perfect order Index, Supply Chain Costs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.831ᵃ	.690	.686	147.106	.690	179.900	5	404	.000

a. Predictors: (Constant), Cycle Time, Service rate, Perfect order Index, Supply Chain Costs (%), Fill rate

There were five predictors fed to the model- POI, Cash Cycle (cycle time), Service Rate, Fill Rate, and Supply Chain Costs. The model provides the best predictors among them. The best predictors according to the model are POI, Cash Cycle (cycle time) and Supply Chain Costs. It depicts the relevance of a predictor, illustrating POI as the most relevant predictor with maximum 42% value.

Table 4-30: Predictor Importance Table

Nodes	Importance	Importance	V4	V5
SupplyChainCosts_transformed	0.2466	0.2466	Supply Chain Costs (%)	0.2466
CycleTime_transformed	0.3278	0.3278	Cycle Time	0.3278
PerfectorderIndex_transformed	0.4255	0.4255	Perfect order Index	0.4255
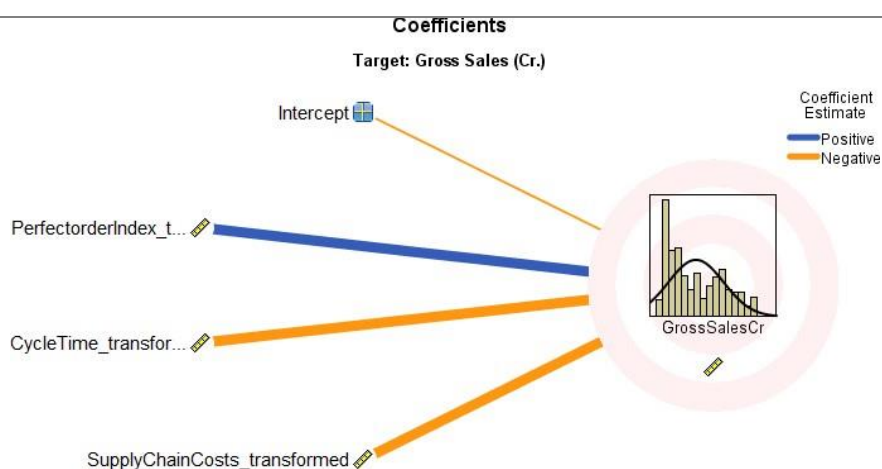
Figure 4.13: Important Predictors with their effects on the gross sales.

As illustrate in Figure 4.12 Perfect order index has positive effect and cycle time and supply chain has negative effect on gross sales.

4.9 Summary

In the proposed model we find that the best predictors of gross sales are POI, Cash Cycle (cycle time) and Supply Chain Costs along with the accuracy of 68.6 %. Also POI, cycle time, supply chain costs does have an impact on finances of the firm. POI has positive and both supply chain costs and cycle time have negative impact on gross sales. This indicates that Supply Chain Management does have an effect Finance of a firm. Therefore we reject the hypothesis that Supply chain and finance has no relationship in fact there is significant correlation and relationship between supply chain management and the financial performance of the firm as proven by the analysis of this survey.

4.10 Managerial Implications

Managerial implications refer to the practical insights and recommendations that can be drawn from research or analysis and used to inform decision-making within a business or organization. These implications can be used to guide management strategies and tactics in order to achieve better outcomes or address particular challenges. There are some possible managerial implications based on the hypothesis that there is a positive relationship between the Perfect Order Index (POI) and cash cycle on gross sales:

1. **Improve Supply Chain Performance**: As there is a positive relationship between POI and cash cycle on gross sales, it suggests that improving supply chain performance can lead to better financial performance. This can be done by increasing the efficiency of the supply chain process, reducing lead times, and improving delivery accuracy. By doing so, companies can increase their POI and reduce their cash cycle, which can in turn lead to an increase in gross sales.

2. **Monitor Cash Flow**: As cash cycle is found to have a significant correlation with gross sales, it is important for companies to monitor their cash flow closely. This can be done by implementing effective cash management practices, such as managing inventory levels, collecting receivables, and delaying payments to suppliers. By doing so, companies can optimize their cash cycle and maximize their gross sales.

3. **Use POI as a Metric for Supply Chain Performance**: POI can be used as a metric to measure supply chain performance, and can be used to identify areas for improvement. By monitoring POI, companies can identify which areas of the supply chain are performing well and which areas need improvement. This can help companies optimize their supply chain and improve their overall financial performance.

4. **Optimize Inventory Management**: As cash cycle is closely linked to inventory management, companies can optimize their inventory management practices to reduce their cash cycle. This can be done by implementing just-in-time (JIT) inventory management, reducing excess inventory, and improving

inventory turnover. By doing so, companies can reduce their cash cycle, increase their POI, and improve their gross sales.

In summary, the positive relationship between POI and cash cycle on gross sales suggests that companies can improve their financial performance by improving their supply chain performance, monitoring their cash flow, using POI as a metric for supply chain performance, and optimizing their inventory management practices.

Chapter 5

Relationship between Inventory Management and Financial Management

5.1 Introduction

IM as a part of business management that deals with organising and managing inventories, whereas finance deals with the monetary flow among all the functions of a firm. The objective of this research is to find the relation between both IM and FM (if exists). To carry out the research we will state a hypothesis and on the basis of outcomes of the hypothesis testing we will look whether there is a relation among between SCM and FM or not and what kind of relationship they hold and how they have an impact on each other.

5.2 H_0^2: Inventory Management and Financial Performance

H_0^2 hypothesis constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis H_0^2 forstudding the impact of Inventory Management on financial performance can be sub divided into:

$H_0^{2.1}$: No statistical significance exists between Inventory turnover ratio and the gross sales of the companies.

$H_0^{2.2}$: No statistical significance exists between Turn Earn Index and the gross sales of the companies.

$H_0^{2.3}$: No statistical significance exists between Inventory Conversion Period and the gross sales of the companies.

$H_0^{2.4}$: No statistical significance exists between Inventory-to-sales ratio and the gross sales of the companies.

5.3 Hypothesis testing

For best results, before performing hypothesis testing we need to test KPIs data for accuracy, validation, missing data, skewness and anomalies. This will make sure that the outcome of our test is correct and are based on valid and true dataset because

inaccurate data may cause wrong results. Later the dataset is tested on Correlation and General Linear Models (ANOVA and Linear Regression) to test the hypothesis.

5.4 $H_0^{2.1}$: No statistical significance exists between Inventory turnover ratio and the gross sales of the companies.

It is the number of times a business sells and buys back its stocks in a certain time frame, often a year. This calculated Inventory Turnover Ratio is analysed through SPSS and a case processing summary (Table 5.1) is evaluated on number of values for Inventory Turnover Ratio to make sure there are no missing values and no anomalies. The descriptives (Table 5.2) of Inventory Turnover Ratio are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram (Figure 5.1) is plotted for Inventory Turnover Ratio to evaluate the frequency of value along with the mean and standard deviation of 12.49 and 5.60 respectively. Gross Sales Descriptives has been already discussed in chapter 4(Relationship between Supply Performance and Gross Sales)

Table 5-1: No missing values in our Inventory Turnover Ratio dataset.

	Cases					
	Valid		Missing		Total	
	Number	%	Number	%	Number	%
Inventory Turnover Ratio	410	100.0%	0	0.0%	410	100.0%

Table 5-2: Descriptives of Inventory Turnover Ratio

			Statistic	Std. Error
Inventory Turnover Ratio	Mean		12.4984	.27694
	95% CIl for Mean	Lower Bound	11.9540	
		Upper Bound	13.0428	
	5% Trimmed Mean		12.4533	
	Median		12.6850	
	Variance		31.446	
	Std. Deviation		5.60764	
	Min		4.51	
	Max		21.35	
	Range		16.84	
	Interquartile Range		10.54	
	Skewness		.072	.121
	Kurtosis		-1.556	.240
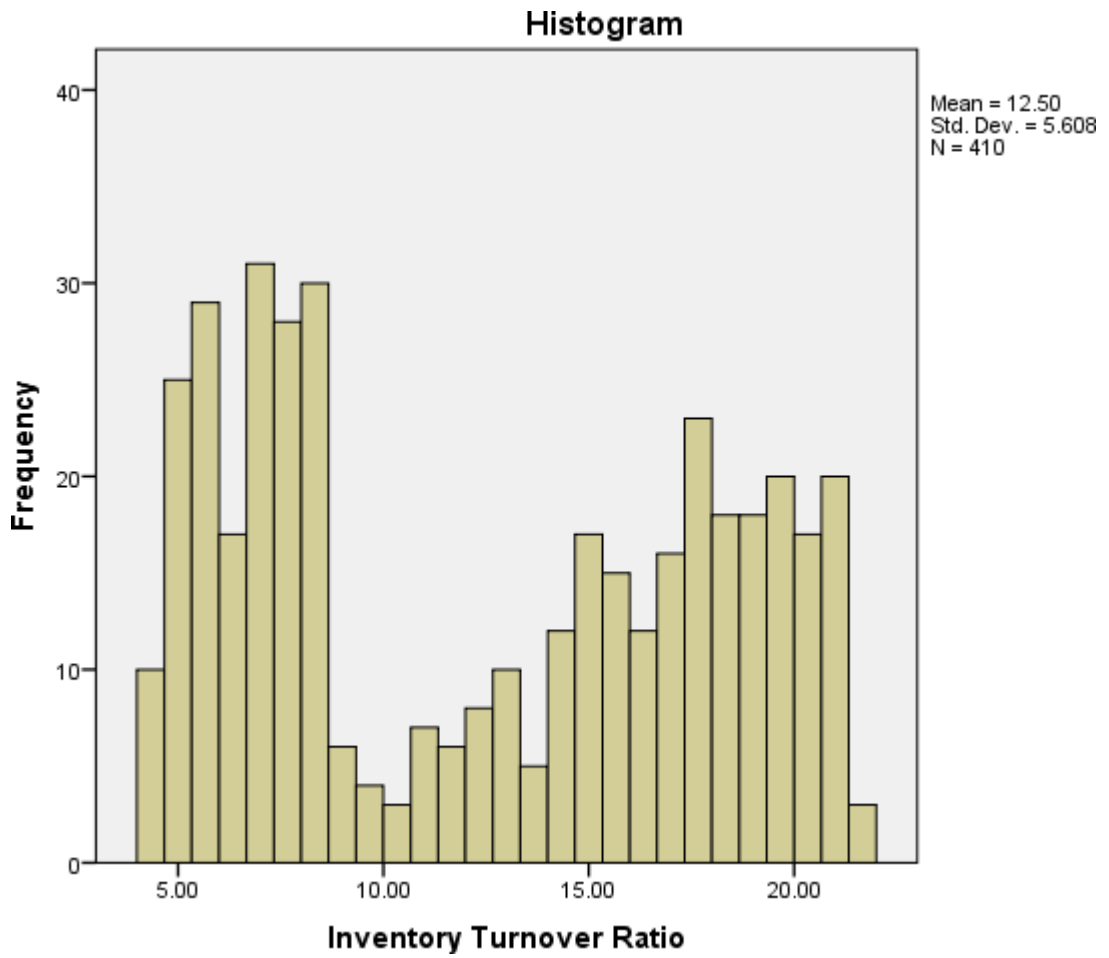
Figure 5.1 Frequency Plot for Inventory Turnover Ratio.

Table 5-3: Correlation(R) between Inventory Turnover Ratio and Gross Sales.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.844[a]	.712	.712	141.055

a. Predictors: (Constant), Inventory Turnover Ratio

Pearson's Correlation was used to access the relationship between Inventory Turnover Ratio and Gross Sales. The Independent variable Inventory Turnover Ratio and Dependent variable Gross Sales are found to be strongly correlated, $r(408) = .84$, $p<$ .05. This statistics test suggests that Null Hypothesis is rejected and there is a significant relation between Inventory Turnover Ratio and Gross Sales. Also the model depicts the 71% (the more- the better) variance in gross sales due to Inventory Turnover Ratio (Table 5.3) indicating the accuracy of the model.

Table 5-4: Analysis of variance between Inventory Turnover Ratio and Gross Sales

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	20090404.229	1	20090404.229	1009.746	.000[b]
Residual	8117771.920	408	19896.500		
Total	28208176.149	409			

a. Dependent Variable: Gross Sales (Cr.)

b. Predictors: (Constant), Inventory Turnover Ratio

Table 5-5: Inventory Turnover Ratio and Gross sales

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	141.150	17.035		8.286	.000
Inventory Turnover Ratio	39.523	1.244	.844	31.776	.000

a. Dependent Variable: Gross Sales (Cr.)

Simple Linear Regression was used to assess whether both Inventory Turnover Ratio and Gross Sales have a relation. The results of ANOVA (Table 5.4) suggests that Inventory Turnover Ratio explained 71.2% of the variance, R^2 = .71, F(1, 408) = 1009.74, p < .001. Inventory Turnover Ratio predicted Gross Sales, b = .844, t = 31.77, p< .001. Hence our test suggests that we reject our null hypothesis $\mathbf{H_0^{2.1}}$, and indicated Inventory Turnover Ratio and Gross Sales have a statistically significant linear relation with each other (Figure 5.2).
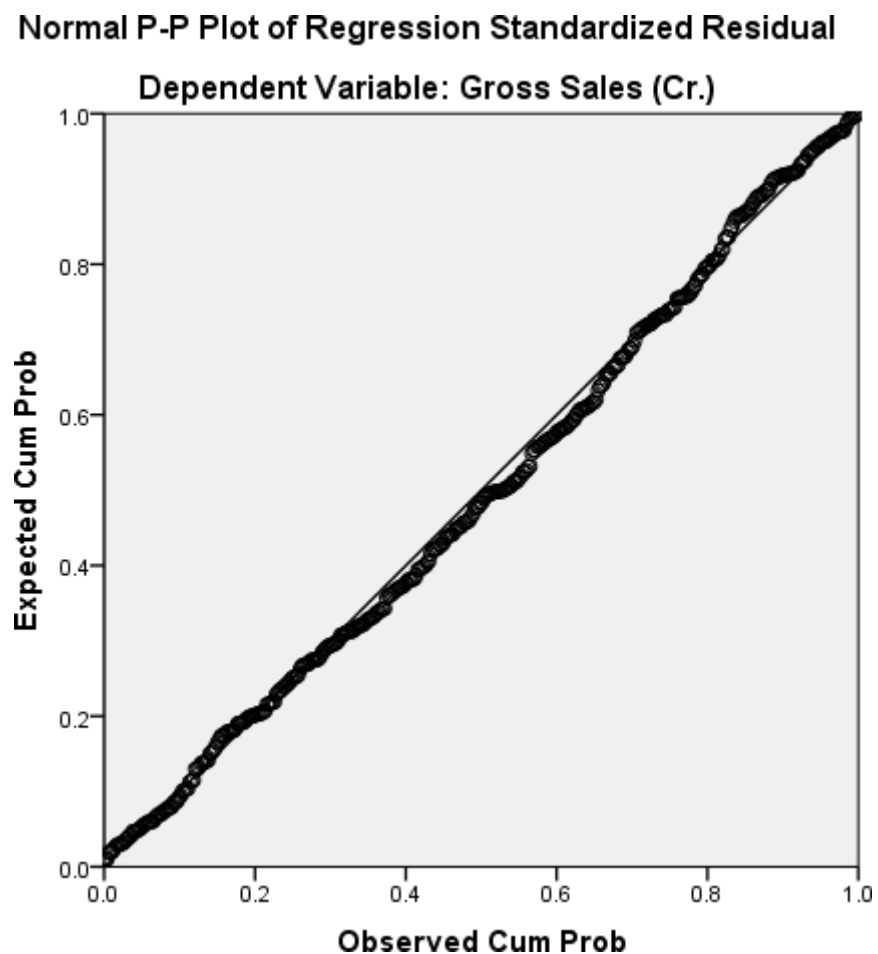
Figure 5.2: There is almost a linear relation between actual and predicted values of Gross Sales

5.5 $H_0^{2.2}$: No statistical significance exists between Turn Earn Index and the gross sales of the companies.

Turn and Earn Index is a is an inventory management metric and is also famous as gross margin return on investment(GMROI), It analyses the capacity to convert inventory into cash at a profitable rate over the cost of the inventory in order to measure the profitability of your inventory using a straightforward ratio. It can be calculated using **gross margin / average inventory investment**

Table 5-6: No missing values in Turn Earn Index Data.

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Turn-earn index	410	100.0%	0	0.0%	410	100.0%

The Turn and Earn Index is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 5.6 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 5.7) of Turn and Earn Index are also evaluated. These descriptive include mean, median, standard deviation, variance, confidence interval etc. Also a histogram is plotted (Figure 5.3) for Turn and Earn Index to evaluate the frequency of value along with the mean and standard deviation of 32.6035and 4.36 respectively.

Table 5-7: Descriptives of Turn and Earn Index

		Statistic	Std. Error
Cycle Time	Mean	32.6035	.21546
	95% Confidence Interval for Mean — Lower Bound	32.1799	
	Upper Bound	33.0270	
	5% Trimmed Mean	32.5561	
	Median	31.6800	
	Variance	19.033	
	Std. Deviation	4.36266	
	Minimum	24.33	
	Maximum	41.72	
	Range	17.39	
	Interquartile Range	7.52	
	Skewness	.200	.121
	Kurtosis	-1.174	.240

Figure 5.3: Frequency Histogram of Turn Earn Index.

Pearson's Correlation was used to access the relationship between Turn Earn Index and Gross Sales. The Independent variable Turn Earn Index and Dependent variable Gross Sales are found to be statistically significantly correlated, $r(408) = .86$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{2.2}$ is rejected and there is a positive relation between Turn Earn Index and Gross Sales. Also the model depicts the 73% variance in gross sales due to Turn Earn Index.

Table 5-8: Correlation(R) between Turn Earn Index and Gross Sales.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.860[a]	.739	.738	134.302

a. Predictors: (Constant), Turn-earn index

b. Dependent Variable: Gross Sales (Cr.)

Table 5-9: ANOVA between Turn Earn Index and Gross Sales

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20849107.364	1	20849107.364	1155.912	.000[b]
	Residual	7359068.785	408	18036.933		
	Total	28208176.149	409			

a. Dependent Variable: Gross Sales (Cr.)

b. Predictors: (Constant), Turn-earn index

Table 5-10: Regression Between Turn Earn Index and Gross Sales

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	291.040	12.100		24.052	.000
	Turn-earn index	1.878	.055	.860	33.999	.000

a. Dependent Variable: Gross Sales (Cr.)

Both General Linear Models ANOVA (Table 5.9) and Simple Linear Regression (Table 5.10) were used to assess whether both Turn Earn Index and Gross Sales have a relation. The results of regression suggests that Turn Earn Index explained 73% of the variance (same in Pearson model), $R^2 = .73$, $F(1, 408) = 1155.91$, $p < .001$. Turn Earn Index predicted Gross Sales, $b = .860$, $t = 33.99$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{2.2}$, and indicated Turn Earn Index and Gross Sales have a statistically significant relation with each other**.**

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Gross Sales (Cr.)
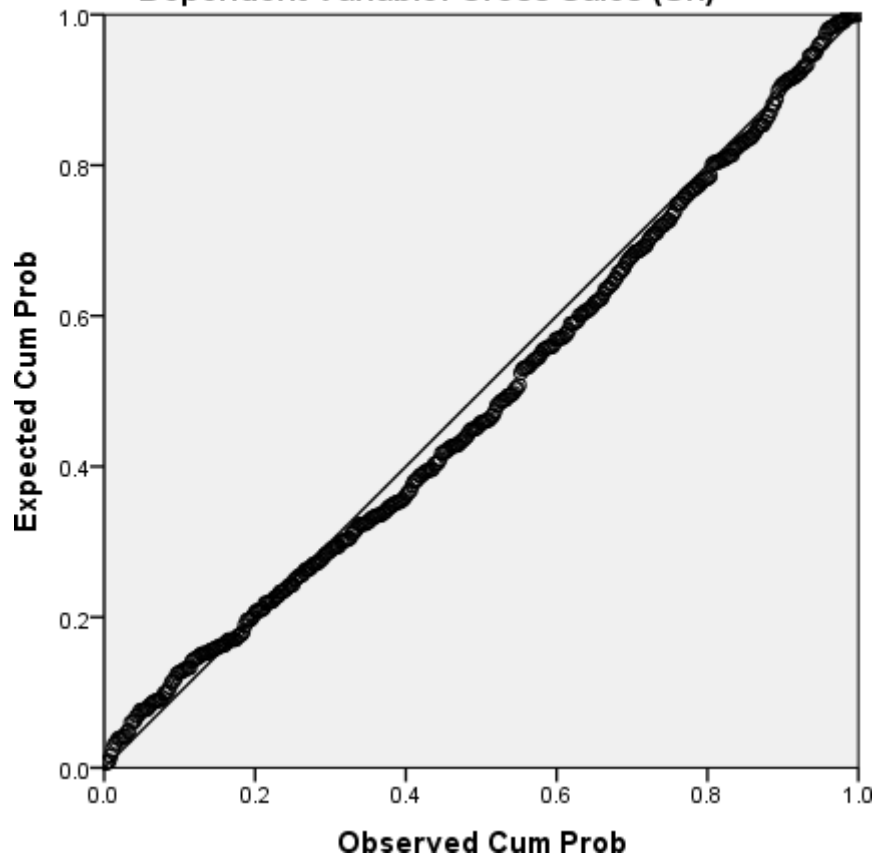
Figure 5.4: There is a slight deviation in actual and observed values of Gross Sales.

5.6 $H_0^{2.3}$: No statistical significance exists between Inventory Conversion Period and the gross sales of the companies.

The inventory conversion period determines how much time it takes to convert the inventory into sales, i.e., the time from purchasing the new stock to the actual product sale. It is calculated as inventory divided by average sales or cost of sales and multiplied by 365 to know the exact days of inventory conversion into sales.

Table 5-11: There are no missing values in Inventory Conversion Period

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Inventory Conversion Period	410	100.0%	0	0.0%	410	100.0%

The inventory conversion period is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 5.11 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 5.12) of service rate are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 5.5) for service rate to evaluate the frequency of value along with the mean and standard deviation of 15.55and 2.24 respectively.

Table 5-12:Descriptives of Inventory Conversion Period

			Statistic	Std. Error
Inventory Conversion Period	Mean		15.5580	.11569
	95% Confidence Interval for Mean	Lower Bound	15.3306	
		Upper Bound	15.7855	
	5% Trimmed Mean		15.4868	
	Median		15.0650	
	Variance		5.487	
	Std. Deviation		2.34249	
	Minimum		12.00	
	Maximum		20.99	
	Range		8.99	
	Interquartile Range		3.97	
	Skewness		.384	.121
	Kurtosis		-.926	.240

Table 5-13 Regression model summary for H^2_0 Turn-earn index, Inventory Turnover Ratio, Inventory-to-sales ratio

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.899ᵃ	.809	.807	115.441	.809	427.916	4	405	.000

a. Predictors: (Constant), Inventory Conversion Ratio, Turn-earn index, Inventory Turnover Ratio, Inventory-to-sales ratiox
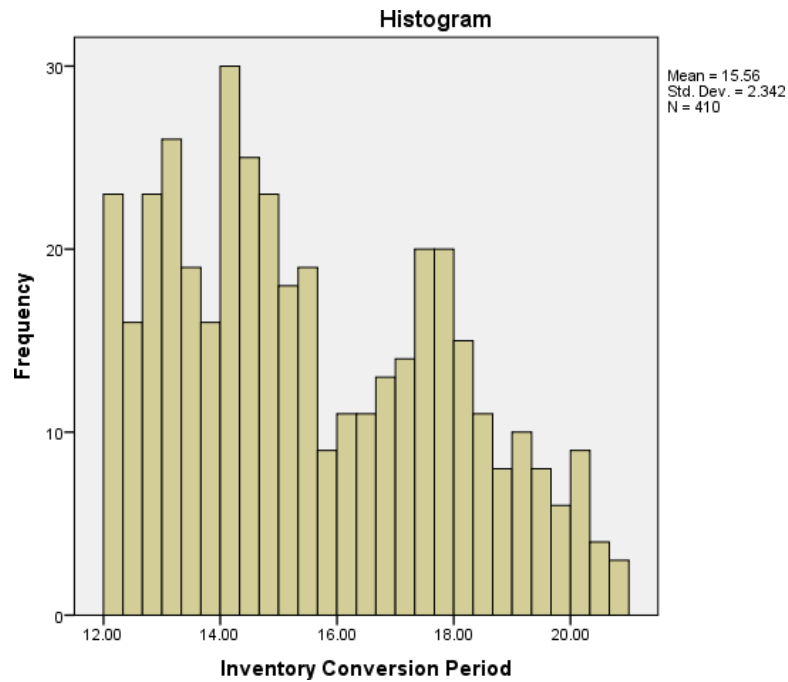
Figure 5.5: Frequency plot for Inventory Conversion Period

Table 5-14: Correlation between Inventory Conversion Period and Gross Sales

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.824ᵃ	.678	.678	149.122

a. Predictors: (Constant), Inventory Conversion Period

b. Dependent Variable: Gross Sales (Cr.)

Pearson's Correlation was used to access the relationship between Inventory Conversion Period and Gross Sales. The Independent variable Inventory Conversion Period and Dependent variable Gross Sales are found to be statistically strongly correlated, $r(408) = .82$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{2.3}$ is rejected and there is a significantly positive relation between Inventory Conversion Period and Gross Sales. Also the model depicts the 67.8% variance in gross sales due to Inventory Conversion Period (Table 5.13).

Table 5-15 ANOVA between Inventory Conversion Period and Gross Sales

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19135335.677	1	19135335.677	860.504	.000[b]
	Residual	9072840.472	408	22237.354		
	Total	28208176.149	409			

a. Dependent Variable: Gross Sales (Cr.)

b. Predictors: (Constant), Inventory Conversion Period

Table 5-16: For every one unit increase in Inventory Conversion Period, Gross sales would increase by 0.824 points.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-801.466	49.524		-16.183	.000
	Inventory Conversion Period	92.338	3.148	.824	29.334	.000

a. Dependent Variable: Gross Sales (Cr.)

Simple Linear Regression (Table 5.16) and ANOVA (Table 5.15) were used to assess whether both Inventory Conversion Period and Gross Sales have a relation. The results of ANOVA suggests that Inventory Conversion Period explained 67.8% of the variance, R^2 = .67.8, $F(1, 408)$ = 860.50, p < .001. Inventory Conversion Period predicted Gross Sales, b = .824, t = 29.33, p< .001. Hence our test suggests that we reject our null hypothesis $H_0^{2.3}$, and indicated Inventory Conversion Period and Gross Sales have a positive statistically significant relation with each other.
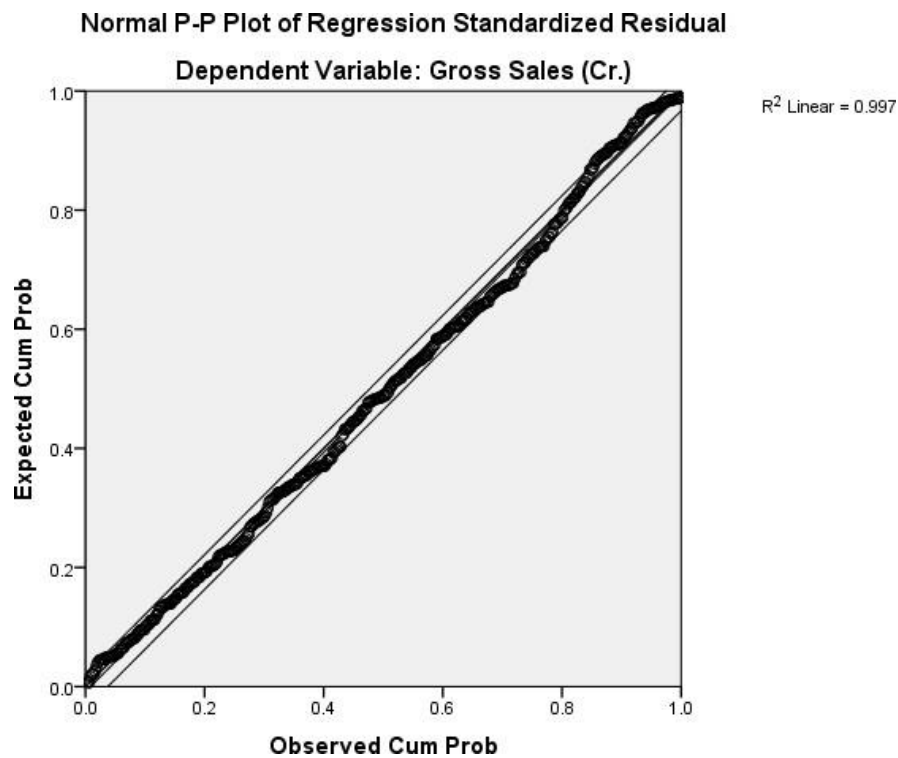
Figure 5.6: Inventory Conversion Period and Gross Sales have a statistically moderate relation with each other.

5.7 $H_0^{2.4}$: **No statistical significance exists between Inventory-to-sales ratio and the gross sales of the companies.**

Inventory to sales, calculates the proportion of sales fulfilled by stock on hand. This aids in figuring out how long it takes for each product to sell, which may therefore aid in predicting and preparing for the future.

Table 5-17: No missing values in Inventory to sales data

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Inventory to sales ratio	410	100.0%	0	0.0%	410	100.0%

Table 5-18: Descriptives of Inventory to sales ratio

		Statistic	Std. Error
Inventory-to-sales ratio	Mean	.1555	.00118
	95% Confidence Interval for Mean Lower Bound	.1532	
	Upper Bound	.1579	
	5% Trimmed Mean	.1549	
	Median	.1500	
	Variance	.001	
	Std. Deviation	.02384	
	Minimum	.12	
	Maximum	.21	
	Range	.09	
	Interquartile Range	.04	
	Skewness	.377	.121
	Kurtosis	-.901	.240

The Inventory to sales is evaluated in SPSS and its data is evaluated for any missing values and anomalies for better validation of hypothesis result. The outcome shown in Table 5.18 tells there are 100% valid cases and no missing values with total of N = 410. The descriptives (Table 5.19) of Inventory to sales are also evaluated. These descriptive include mean, median, standard deviation, and variance, confidence interval etc. Also a histogram is plotted (Figure 5.7) for Inventory to sales to evaluate the frequency of value along with the mean and standard deviation of .15 and .02 respectively.
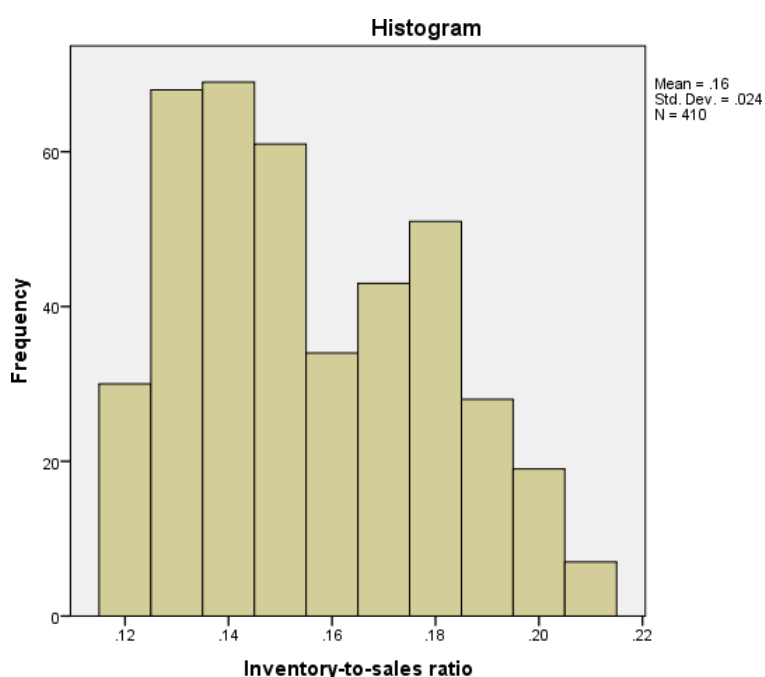

Figure 5.7: A Frequency Histogram of Inventory to sales ratio.

Table 5-19: Correlation between Inventory to Sales and Gross Sales

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.814[a]	.662	.661	152.914

a. Predictors: (Constant), Inventory-to-sales ratio

b. Dependent Variable: Gross Sales (Cr.)

Pearson's Correlation was used to evaluate the relationship between Inventory to Sales and Gross Sales. The Independent variable Inventory to Sales and Dependent variable Gross Sales are found to be strongly correlated, $r(408) = .81$, $p < .05$. This statistics test suggests that Null Hypothesis $H_0^{2.4}$ is rejected and there is a strongly significant relation between Inventory to Sales and Gross Sales. Also the model depicts the 66% variance in gross sales due to Inventory to Sales (Table 5.18)

Table 5-20: Analysis of Variance for Inventory to Sales and Gross Sales

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	18668042.078	1	18668042.078	798.370	.000[b]
Residual	9540134.071	408	23382.682		
Total	28208176.149	409			

a. Dependent Variable: Gross Sales (Cr.)

b. Predictors: (Constant), Inventory-to-sales ratio

Table 5-21: Regression between Inventory to Sales and Gross Sales

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1 (Constant)	-758.479	49.897		-15.201	.000	-856.565	-660.392
Inventory-to-sales ratio	8960.001	317.107	.814	28.255	.000	8336.634	9583.369

a. Dependent Variable: Gross Sales (Cr.)

Both ANOVA and Simple Linear Regression were used to assess whether Inventory to Sales and Gross Sales have a relation. The results of ANOVA (Table: 5.19) suggests that Inventory to Sales explained 66% of the variance, $R^2 = .66$, $F(1, 408) = 798.37$, $p < .001$. According to regression outcome (Table 5.20) Inventory to Sales predicted Gross Sales, $b = .814$, $t = 8336.63$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{2.4}$, and indicated Inventory to Sales and Gross Sales have a statistically significant relation with each other**.**

5.8 Regression Model between Inventory Management and Gross Sales

There were four predictors fed – Inventory Turnover Ratio, Inventory to Sales Ratio, Inventory to Conversion ratio, Turn Earn Index and one dependent predictor Gross Sales to generate a model. Via automatic linear modelling in SPSS we generated a linear model to predict gross sales. The regression equation generated through model is as seen in Table 5.29.

$$Y = -294.00 + .523a - .047b + .447c + .035d$$

Where $a = Turn - earn$ index, $b = Inventory - to - sales$ ratio, $c = Inventory$ Conversion Period, $d = Inventory$ Turnover Ratio,

Table 5-22: Unstandardized coefficients for regression model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-294.006	49.558		-5.933	.000
Turn-earn index	1.141	.162	.523	7.026	.000
Inventory-to-sales ratio	-516.168	1978.836	-.047	-.261	.794
Inventory Conversion Period	50.135	20.581	.447	2.436	.015
Inventory Turnover Ratio	1.621	3.576	.035	.453	.651

a. Dependent Variable: Gross Sales (Cr.)
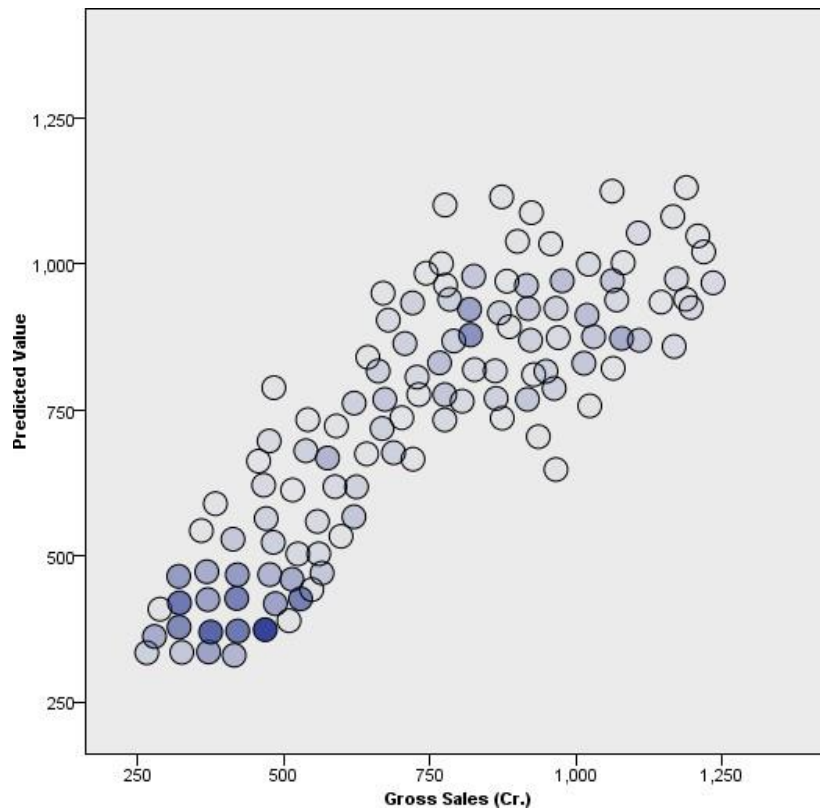
Figure 5.8 : Gross Sales Actual Values vs. Predicted values

The Figure 5.8 shows that the model constructed is not a perfect linear model. There is a slight difference between the predicted and the actual values. During our experiment in SPSS we find that the proposed model has 80.8% accuracy (Figure 5.9), the reason we can see a little scatter in the plot.
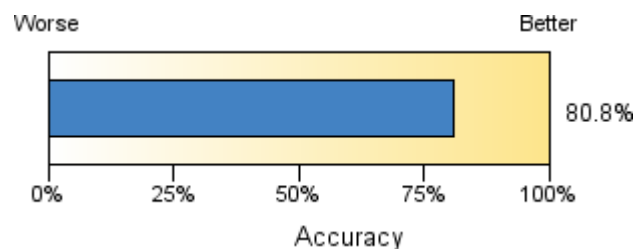
Figure 5.9: Accuracy of the model estimated through automatic linear modelling

The model also helps us to find the best predictors. The best predictors according to the model are Turn and earn Index (with maximum value, hence more important)

197

and Inventory Conversion Ratio. It depicts the relevance of a predictor, illustrating Turn earn index as the most relevant predictor with maximum 65.22% value.

Table 5-23: Predictor Importance Table

Nodes	Importance	Importance	V4	V5
InventoryConversionRatio_transformed	0.3478	0.3478	Inventory Conversion Period	0.3478
Turnearnindex_transformed	0.6522	0.6522	Turn-earn index	0.6522
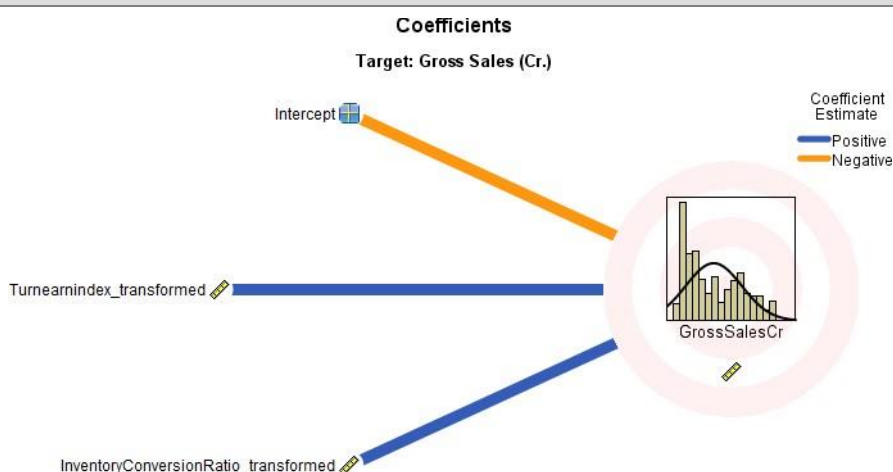
Figure 5.10: Important Predictors with their effects on the gross sales.

As illustrate in Figure 5.10 Turn and earn Index and Inventory Conversion Ratio both are positively related to the Gross Sales. Indicating one unit increase in Turn and earn Index will always increase the gross sales.

5.9 Summary

In the proposed model we find that the best predictors of gross sales are Turn and earn Index and Inventory Conversion Ratio with the accuracy of 80%. Also Inventory Turnover Ratio, Inventory to Sales Ratio, Inventory to Conversion ratio, Turn Earn Index does have an impact on finances of the firm. All these predictors have significantly positive relation with Gross Sales. This indicates that Inventory

Management does have an effect on Finances of a firm. Therefore we reject our hypothesis that Inventory Management and finance has no relationship.

5.10 Managerial Implications

By Exploring the Positive Relationship and Significant Correlation of Inventory Turnover Ratio on Gross Sales we can provide some managerial implications. Inventory turnover ratio, which measures how quickly a company's inventory is sold and replaced, is an important financial metric for businesses. A hypothesis that suggests a positive relationship and significant correlation between inventory turnover ratio and gross sales has important managerial implications. Here are some potential implications for businesses:

1. **Optimize Inventory Management**: A higher inventory turnover ratio indicates that a company is selling its inventory more quickly. This suggests that businesses can optimize inventory management by reducing excess inventory and improving inventory turnover. By doing so, companies can reduce the carrying costs of inventory and free up capital for other investments. This, in turn, can lead to an increase in gross sales as more capital is available to invest in areas such as marketing, product development, or expansion.

2. **Improve Forecasting and Planning**: Companies can use inventory turnover ratio as a measure of the effectiveness of their forecasting and planning processes. If a company has a low inventory turnover ratio, it may indicate that it is not accurately predicting customer demand or that it is overstocking inventory. In such cases, businesses can improve their forecasting and planning processes to ensure that they have the right inventory levels to meet customer demand. By doing so, they can increase inventory turnover, reduce carrying costs, and increase gross sales.

3. **Identify Product Trends**: An analysis of the inventory turnover ratio can help companies identify product trends and consumer preferences. If a particular product has a high inventory turnover ratio, it may indicate that there is high demand for that product, which can be used to guide product development and

marketing strategies. By leveraging this information, businesses can improve their product offerings, target the right audience, and increase their gross sales.

4. **Monitor Supply Chain Performance**: Inventory turnover ratio can also be used to monitor the performance of the supply chain. A low inventory turnover ratio may indicate that there are bottlenecks or inefficiencies in the supply chain, such as delays in receiving inventory or production processes that are slowing down. By monitoring the inventory turnover ratio, businesses can identify these bottlenecks and work to improve the performance of the supply chain. This, in turn, can increase inventory turnover and gross sales.

In conclusion, the positive relationship and significant correlation between inventory turnover ratio and gross sales provide important insights for businesses. By optimizing inventory management, improving forecasting and planning, identifying product trends, and monitoring supply chain performance, businesses can increase their inventory turnover ratio and, as a result, increase their gross sales.

Chapter 6

Effect of Supply Chain and Inventory Management on Finance

The main objective of our research is to find out the relation among Supply Chain, Inventory Management and Finance. To find the relation we first study the relation between Gross Sales as an Independent Variable with Inventory Turnover Ratio as Dependent Variable. Second Relation between Gross Sales as an Independent Variable with Supply Management Costs as Dependent Variable. The is achieved through testing the hypothesis for Pearson Correlation and using General Linear Model (ANOVA and Linear Regression)
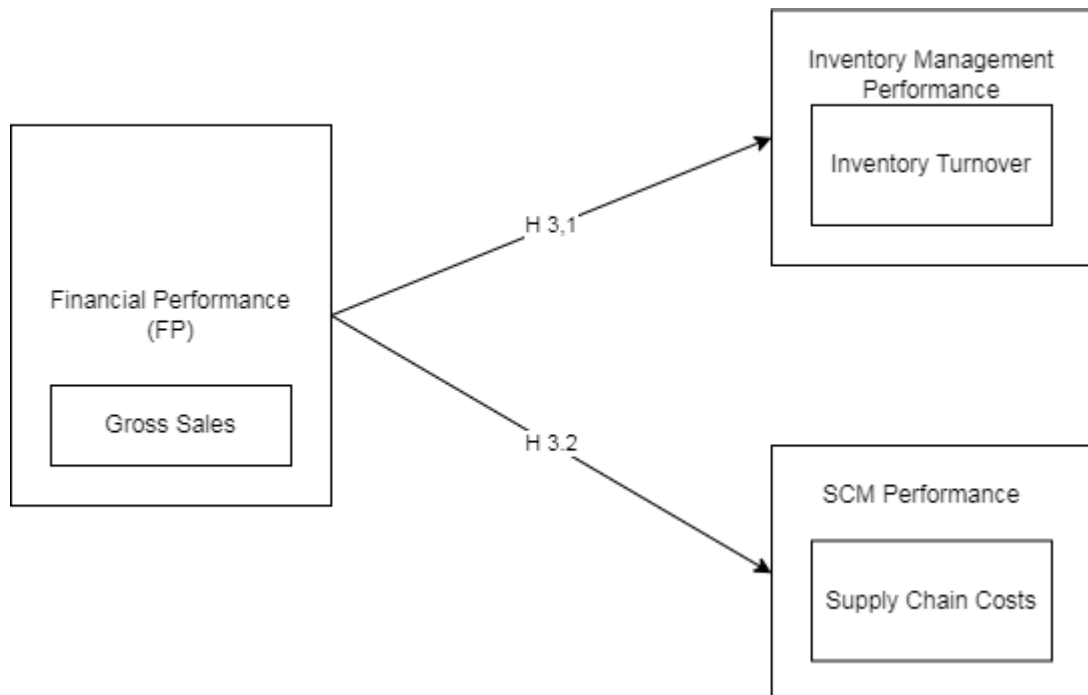
Figure 6.1: Initial Hypothesis under test for gross sales as predictor of inventory management and SCM performance

H_0^3 hypothesis constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis H_0^3forstudding the impact of financial performance on SCM and IM performance can be sub divided into:

> $H_0^{3.1}$: No statistical significance exists between gross sales and Inventory turnover ratio of the companies.

$\mathbf{H_0^{3.2}}$: No statistical significance exists between gross sales and the overall supply chain costs of the companies.

6.1 $\mathbf{H_0^{3.1}}$: No statistical significance exists between gross sales and Inventory turnover ratio of the companies.

The gross sales and inventory turnover Ratio data has been validated against missing values and anomalies in Chapter 4 and Chapter 5. In this chapter we reverse the roles serving gross sales as independent and inventory turnover as dependent variable and look for the correlation and form a linear regression model.

Table 6-1 : Correlation between Inventory Turnover Ratio and Gross Sales.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.844[a]	.712	.712	3.01191

Pearson's Correlation was used to access the relationship between Inventory Turnover Ratio and Gross Sales. The Independent variable Gross Sales and Dependent variable Inventory Turnover Ratio are found to be strongly correlated(same as earlier), $r(408) = .84$, $p< .05$. This statistics test suggests that Null Hypothesis is rejected and there is a significant relation between Inventory Turnover Ratio and Gross Sales. Also the model depicts the 71% (the more- the better) variance in gross sales due to Inventory Turnover Ratio (Table 6.1) indicating the accuracy of the model.

Table 6-2: ANOVA Inventory Turnover Ratio and Gross Sales

Model		Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1	Regression	9160.038	1	9160.038	1009.746	.000[b]
	Residual	3701.225	408	9.072		
	Total	12861.263	409			

Table 6-3: Gross Sales, Inventory Turnover Ratio

Model		Unstandardized Coefficients		Std. Coefficients	T	Sig.	95.0% C.I for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.053	.390		2.703	.007	.287	1.819
	Gross Sales (Cr.)	.018	.001	.844	31.776	.000	.017	.019

$$Y = .844a + 1.05$$

In the above equation $a = gross\ sales, y = Inventory\ Turnover\ Ratio$.

Simple Linear Regression was used to assess whether both Inventory Turnover Ratio and Gross Sales have a relation. The results of ANOVA (Table 6.2) suggests that Gross Sales explained 71.2% of the variance, $R^2 = .71$, F(1, 408) = 1009.74, p < .001. Gross Sales predicted Inventory Turnover Ratio, $b = .844$, $t = 31.77$, $p< .001$. Hence our test suggests that we reject our null hypothesis $H_0^{3.1}$, and indicated Inventory Turnover Ratio and Gross Sales have a statistically significant linear relation with each other (Figure 6.3).

6.2 $H_0^{3.2}$: No statistical significance exists between gross sales and the overall supply chain costs of the companies.

Just like the above hypothesis the correlation (Table 6.4), the F- value (Table 6.5) and the T-value (Table 6.6) would be same for both the variables. But there is a change in the regression coefficient.

Table 6-4: Correlation(R) between Supply Chain Costs and Gross Sales.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	-.753[a]	.567	.566	1.01444

Table 6-5: ANOVA Supply Chain Costs and Gross Sales

Model		Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
1	Regression	549.212	1	549.212	533.690	.000[b]
	Residual	419.866	408	1.029		
	Total	969.078	409			

Table 6-6: Gross sales, Supply Chain Costs

Model		Unstandardized Coefficients		Std. Coefficients			95.0% C.I for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	14.906	.131		113.567	.000	14.648	15.164
	Gross Sales (Cr.)	-.004	.000	-.753	-23.102	.000	-.005	-.004

$$Y = -.753a + 14.90$$

In the above equation $y = Supply\ Chain\ Costs, a = Gross\ sales$
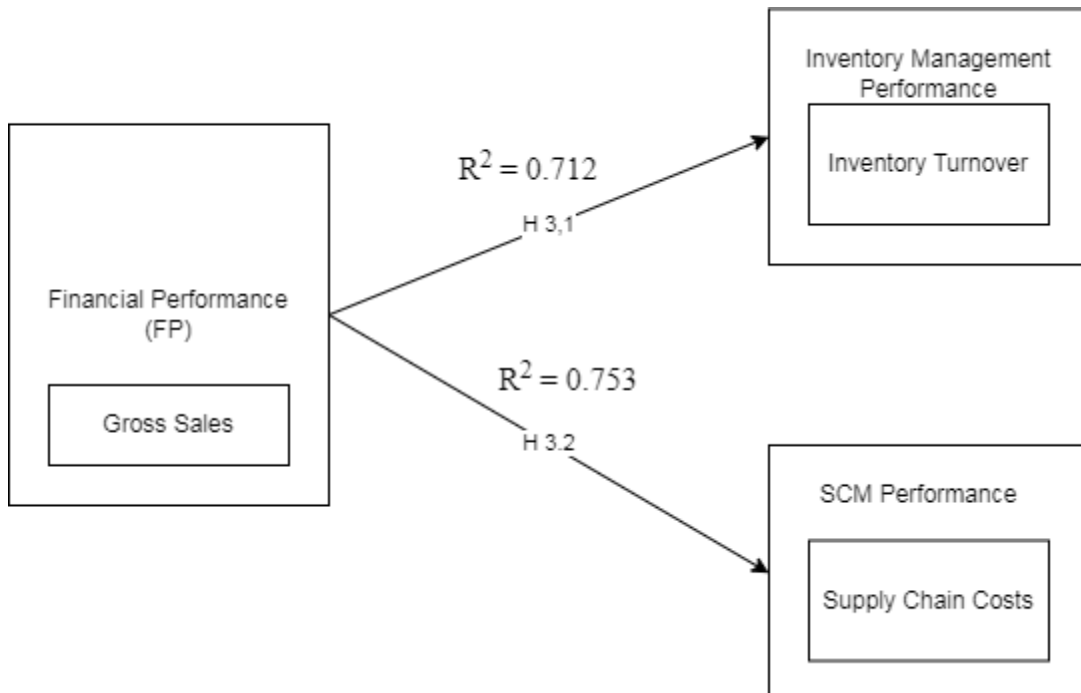

Figure 6.2: Final Model between gross sales as predictor and ITR and SCM Costs as responses.

Both ANOVA (Table 6.5) and Simple Linear Regression (Table 6.6) were used to assess whether Supply chain costs and Gross Sales have a relation. The results of regression suggests that Gross Sales explained 22% of the variance, $R^2 = .56$, F(1, 408) = 533.69, p < .001. Gross Sales predicted Supply chain costs, $b = -.004$, $t = -23.10$, $p < .001$. Hence our test suggests that we reject our null hypothesis $H_0^{3.2}$, and indicated Supply chain costs and Gross Sales have a statistically significant negative relation with each other.

6.3 Relation between Inventory Turnover Ratio and Supply chain costs

Correlations

		Inventory Turnover Ratio	Supply Chain Costs (%)
Inventory Turnover Ratio	Pearson Correlation	1	-.828[**]
	Sig. (2-tailed)		.000
	N	410	410
Supply Chain Costs (%)	Pearson Correlation	-.828[**]	1
	Sig. (2-tailed)	.000	
	N	410	410

[**]. Correlation is significant at the 0.01 level (2-tailed).

Pearson's Correlation was used to access the relationship between Inventory Turnover Ratio and Supply Chain Costs. As shown in the table it is clear that, both the variables are negatively correlated with $r(408) = -0.82$, $p < .01$. The relation is also significant as the sigma value we get here is greater is here is less than 0.01. Also in the Chapter 4 and Chapter 5 we have seen that both Supply chain KPI's and Inventory KPI's hold significant relation with gross sales. Consequently, we can say that, these three (Supply chain, Inventory, and Financial management) hold a triangular relation with each other.

6.4 Summary

In the proposed model correlation between Inventory Turnover Ratio and Gross Sales is 84.4% with the accuracy (R^2) of 71.2%. The model indicates that Inventory TurnoverRatio and gross sales hold a significantly positive relationship with each other with beta value b of .018. Therefore we reject our finance and Inventory

Management holds no relationship. The Correlation(R) between Supply Chain Costs and Gross Sales is 75.3% with the accuracy of 56.7%. Also predictor variable Supply chain costs and Gross Sales hold a significantly negative relation with each other. Therefore, again we reject our hypothesis that finance and Supply Chain holds no relationship.

6.5 Managerial Implications

Effective supply chain and inventory management are critical factors for any business that deals with the production, distribution, and sale of goods. These processes have a significant impact on the financial performance of a company. A hypothesis that better financial management leads to better inventory turnover ratio and better supply chain costs has important managerial implications. Here are some potential implications for businesses:

1. **Efficient Use of Working Capital**: A better financial management system can ensure that the business is efficiently using its working capital to finance inventory and supply chain operations. This can improve inventory turnover and reduce supply chain costs. By minimizing the need for excess inventory, businesses can reduce carrying costs and improve cash flow. This, in turn, can increase profitability and provide more resources for future investment.

2. **Improved Supplier Relationship Management**: A better financial management system can help businesses to build strong relationships with suppliers. This can lead to better quality raw materials and faster delivery times, which can improve inventory turnover and reduce supply chain costs. By negotiating better prices, businesses can reduce their procurement costs and increase their profitability.

3. **Real-time Visibility of Inventory and Supply Chain**: Better financial management can provide businesses with real-time visibility of inventory and supply chain operations. This can help businesses to identify inefficiencies and bottlenecks in the supply chain, enabling them to optimize their processes and improve inventory turnover. By having a clear understanding of their inventory levels and supply chain performance, businesses can make informed decisions that can reduce costs and increase profitability.

4. **Optimized Inventory Control**: Better financial management can enable businesses to optimize inventory control. This can help them to reduce inventory holding costs, avoid stockouts, and improve inventory turnover. By implementing a robust inventory management system, businesses can automate their inventory control processes, improving accuracy and reducing the likelihood of overstocking or stockouts.

5. **Improved Financial Reporting and Analysis**: A better financial management system can provide businesses with accurate and timely financial reporting and analysis. This can help businesses to identify areas where they can reduce costs and improve profitability. By tracking financial metrics such as inventory turnover ratio and supply chain costs, businesses can make informed decisions that can improve their financial performance.

In conclusion, the hypothesis that better financial management leads to better inventory turnover ratio and better supply chain costs highlights the importance of effective supply chain and inventory management. By improving financial management, businesses can optimize their working capital, improve supplier relationship management, gain real-time visibility of inventory and supply chain, optimize inventory control, and improve financial reporting and analysis. These implications provide a roadmap for businesses to increase profitability and achieve long-term success.

Chapter 7

Research Findings

Supply chain management is the crucial aspect of any company which is directly or indirectly deals with manufacturing and production line of products. One of the important factors of supply chain management is inventory management. Supply chain management and inventory management are an integral part of any organization and most of the manufacturing firm's working depends upon effective supply chain and inventory management. Thus, it also has a significant impact on the financial performance of the firm with respect to many financial parameters and Key Performance Indicators (KPIs). This research study while addressing the above mentioned research gaps, will tend to analyze strategically the impact of supply chain and inventory management on the financial performance of the manufacturing firms, taking all the possible parameters and KPIs into consideration, which will further help scholars and researchers to develop modelling on such parameters through the gained results.

The study basically aims to develop an understanding about the mutual relationship between: Supply chain management and Inventory management, Supply chain management and financial performance of the organisation and the Inventory management and financial performance of the organisation. Further the study aims to understand an associated interdependent relationship between supply chain management, inventory management and the financial performance of the company. The research is performed on five companies that belong to automobile sector of India. Selected companies are selected based on highest market capitalisation of the sector. This research presented a case study to investigate the triangular relationship between the supply chain management and inventory management on the financial performance of the selected Automobile components in India. Three main hypothesis are framed for the proposed study which were

$H_0{}^1$: No statistical significance exists between Supply Chain Performance and the financial performance of the companies.

H_0^2 No statistical significance exists between Inventory management Performance and the financial performance of the companies.

H_0^3 No statistical significance exists between Financial Performance and the Supply Chain and Inventory performance of the companies.

These hypotheses test the triangular relationship between financial performance of the firm with respect to supply chain management and Inventory management and vice versa. Various KPIs of the firm performance where computed using collected survey data from 5 automobile firms namely Maruti Suzuki India Ltd., Tata Motors Ltd., Mahindra & Mahindra Ltd., Bajaj Auto Ltd. and Hero MotoCorp Ltd. in the north India. A total of 410 samples were collected from various locations of these companies spanning north India. Research methodology is developed to analyse strategically the impact of supply chain and inventory management on the financial performance of the manufacturing firms, taking all the possible parameters and KPIs into consideration. Results of statistical analysis found positive relationship between Good Supply Chain Practices on the overall firm's financial performance. Same is found true for the inventory management practices.

Finally, the work analysed both quantitative and qualitative factors/variables in order to get the best analysis and results. Both primary as well as secondary data is used, and hypothesis to be tested through Correlation, ANOVA, Linear Regression and Multiple Linear Regression in order to provide better relational diagnosis and analysis to the problem statement. This study finally proves that there is positive relationship between Supply Chain Management performance and Inventory management performance on the financial performance the firm's under consideration. Not only that, it was also found that if a firm's which financially more performant and manage Supply Chains and Inventories better. The hypothesis H_0^1

H_0^1 *No statistical significance exists between Supply Chain Performance and the financial performance of the companies.*

This hypothesis constitute of various sub hypothesis each having dependent and independent variables (KPIs). For the Hypothesis H_0^1forstudding the impact of SCM on financial performance can be sub divided into:

$H_0^{1.1}$: No statistical significance exists between Perfect Order Index and the gross sales of the companies.

$H_0^{1.2}$: No statistical significance exists between Cycle Time and the gross sales of the companies.

$H_0^{1.3}$: No statistical significance exists between Fill Rate and the gross sales of the companies.

$H_0^{1.4}$: No statistical significance exists between Service Rate and the gross sales of the companies.

$H_0^{1.5}$: No statistical significance exists between supply chain management costs and the gross sales of the companies.
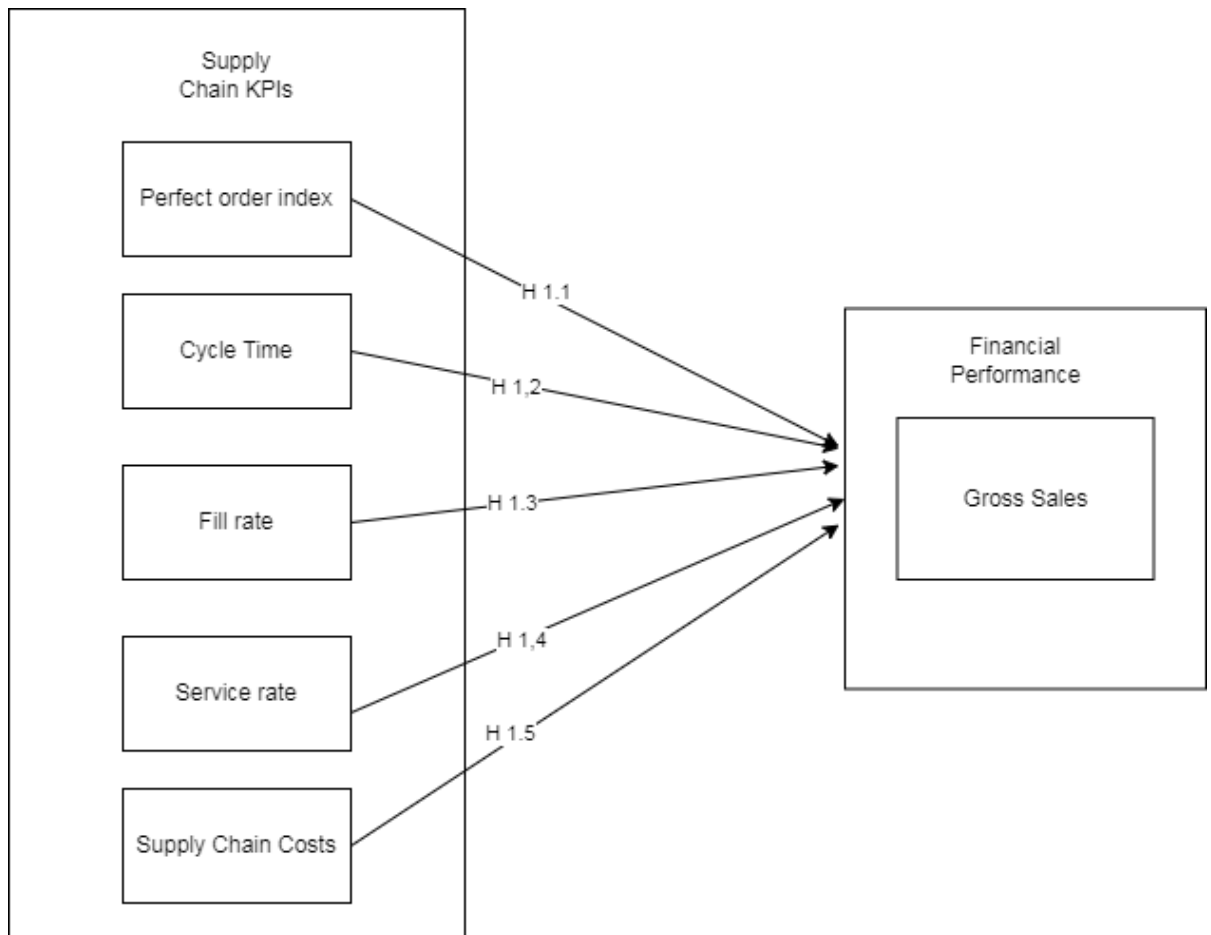

Figure 7-1: Sub Hypothesis for impact Supply Chain performance on financial performance of the automobile companies

Research Finding: Was rejected as we have found statistical significant positive correlation between Supply Chain Performance and the financial performance of the

companies. In developed model we find that the best predictors of gross sales are POI, Cash Cycle (cycle time) and Supply Chain Costs were able to predict financial performance with the accuracy of 68.6 %. Therefore H_0^1 was rejected in fact there is *statistical significant* relationship between supply chain management and the financial performance of the firm.

H_0^2: *No statistical significance exists between Inventory management Performance and the financial performance of the companies.*

Figure 7-2: Sub Hypothesis for impact Inventory Management performance on financial performance of the automobile companies

$H_0^{2.1}$: No statistical significance exists between Inventory turnover ratio and the gross sales of the companies.

$H_0^{2.2}$: No statistical significance exists between Turn & Earn Index and the gross sales of the companies.

$H_0^{2.3}$: No statistical significance exists between Inventory Conversion Period and the gross sales of the companies.

$H_0^{2.4}$: No statistical significance exists between Inventory-to-sales ratio and the gross sales of the companies.

Research Finding: During the analysis and after model development we found that the gross sales are Turn and earn Index and Inventory Conversion Ratio can predict the firm's performance with the accuracy of 80%. All these predictors have significantly positive relation with Gross Sales. This indicates that Inventory Management does have an effect Finances of a firm. Therefore H_0^2 was rejected.

H_0^3: *No statistical significance exists between Financial Performance and the Supply Chain and Inventory performance of the companies.*
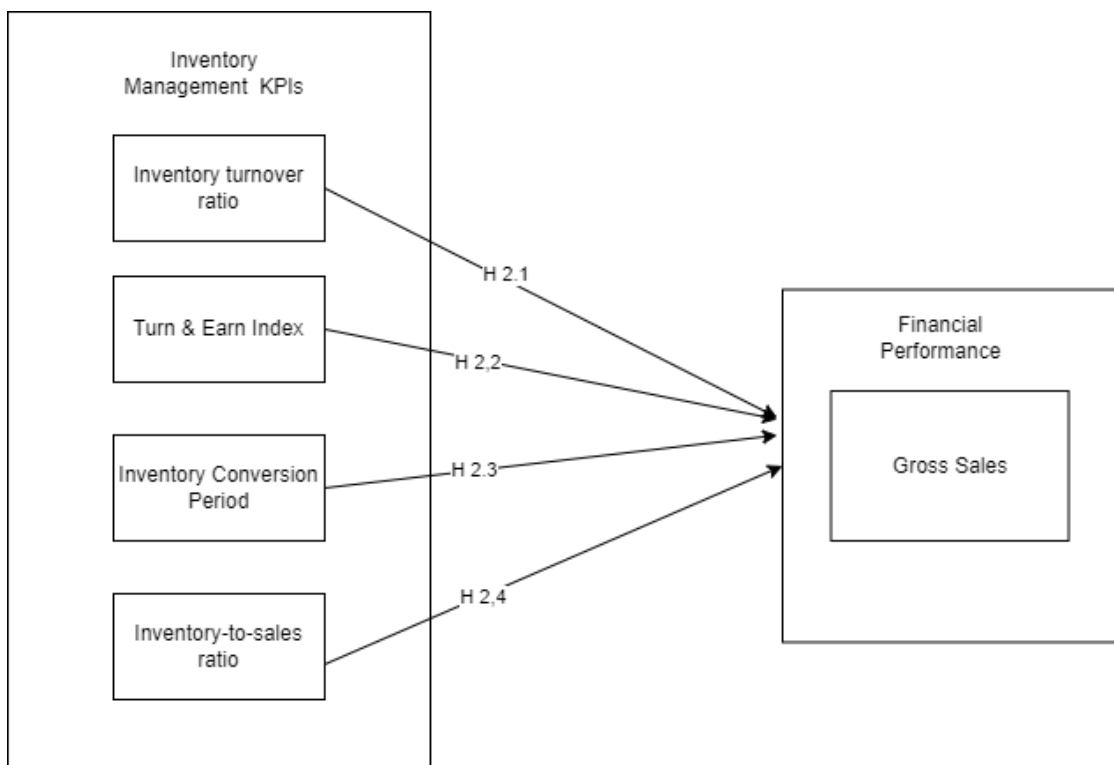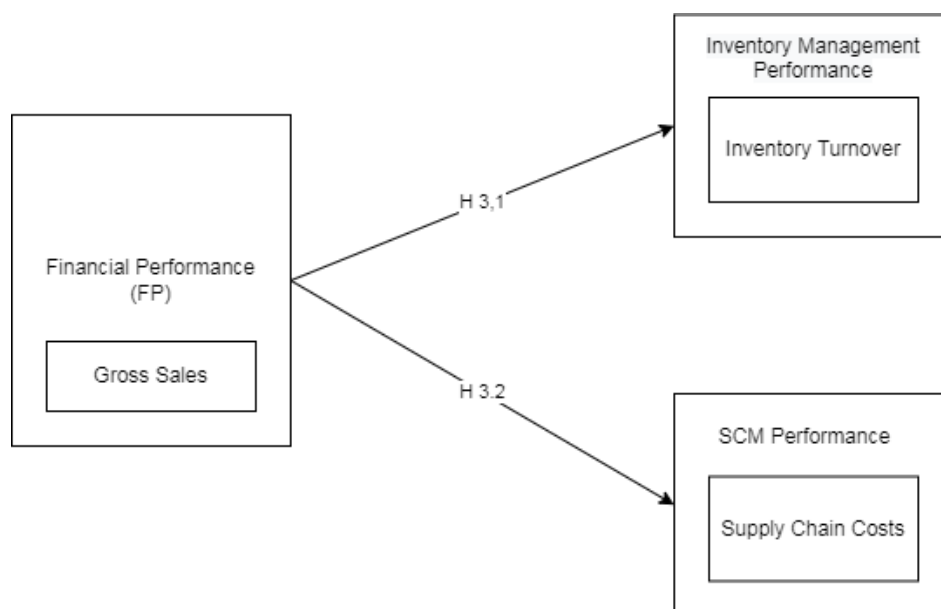

Figure 7-3: Sub Hypothesis for impact Financial Management performance on SCM and IM performance of the automobile companies

$H_0^{3.1}$: No statistical significance exists between gross sales and Inventory turnover ratio of the companies.

$H_0^{3.2}$: No statistical significance exists between gross sales and the overall supply chain costs of the companies.

Research Finding: In final mode model correlation between Inventory Turnover Ratio and Gross Sales is 84.4% with the accuracy (R^2) of 71.2%. The model indicated that Inventory Turnover Ratio and gross sales hold a significantly positive relationship with each other with beta value *b* of .018. Therefore we reject our finance and Inventory Management holds no relationship. The Correlation(R) between Supply

Chain Costs and Gross Sales is 75.3% with the accuracy of 56.7%. Also predictor variable Supply chain costs and Gross Sales hold a significantly negative relation with each other with beta value *b* of -.004. Therefore, again we reject H_0^3 finance and Supply Chain holds no relationship.

This study finally proves that there is positive relationship between Supply Chain Management performance and Inventory management performance on the financial performance the firm's under consideration. All the Results were interpreted with a significance level of $p<0.01$. These steps present guidelines that Not only that, it was also found that if a firm's which financially more performant and manage Supply Chains and Inventories better.

7.1 Managerial Implications

Managerial implications refer to the practical insights and recommendations that can be drawn from research or analysis and used to inform decision-making within a business or organization. These implications can be used to guide management strategies and tactics in order to achieve better outcomes or address particular challenges. There are some possible managerial implications based on the hypothesis that there is a positive relationship between the Perfect Order Index (POI) and cash cycle on gross sales. Managerial Implications of the Effects of Supply Chain and Inventory Management on Finance: Exploring the Hypothesis that Better Financial Management Leads to Better Inventory Turnover Ratio and Better Supply Chain Costs. By Exploring the Positive Relationship and Significant Correlation of Inventory Turnover Ratio on Gross Sales we can provide some managerial implications. Inventory turnover ratio, which measures how quickly a company's inventory is sold and replaced, is an important financial metric for businesses. A hypothesis that suggests a positive relationship and significant correlation between inventory turnover ratio and gross sales has important managerial implications. Effective supply chain and inventory management are critical factors for any business that deals with the production, distribution, and sale of goods. These processes have a significant impact on the financial performance of a company. A hypothesis that better financial management leads to better inventory turnover ratio and better supply

chain costs has important managerial implications. Here are some potential implications for businesses:

In conclusion, the positive relationship between POI and cash cycle on gross sales suggests that companies can improve their financial performance by improving their supply chain performance, monitoring their cash flow, using POI as a metric for supply chain performance, and optimizing their inventory management practices. Also, the positive relationship and significant correlation between inventory turnover ratio and gross sales provide important insights for businesses. By optimizing inventory management, improving forecasting and planning, identifying product trends, and monitoring supply chain performance, businesses can increase their inventory turnover ratio and, as a result, increase their gross sales. Finaly, the hypothesis that better financial management leads to better inventory turnover ratio and better supply chain costs highlights the importance of effective supply chain and inventory management. By improving financial management, businesses can optimize their working capital, improve supplier relationship management, gain real-time visibility of inventory and supply chain, optimize inventory control, and improve financial reporting and analysis. These implications provide a roadmap for businesses to increase profitability and achieve long-term success

.

Chapter 8

Conclusion and Future Scope

8.1 Conclusion

In the economic environment, to meet the needs of business concerns, firms require financing. Any type of commercial activity is financially dependent. As a result finance is the organization's lifeblood. Regardless of how big or small a firm's business concerns are, they all require funding, inventory and a strong supply chain to carry out their daily operations. In the current world, everything is dependent on socio-economic activities run by supply chains around the world. SCM has grown in importance over the last few years in contemporary company and manufacturing processes. The techniques used by businesses to manage their operations, supply chain structures, and strategic alliances are changing as a result of recent technological advancements, particularly in information technology and the growing use of web-based platforms. Many businesses today use cutting-edge techniques and technologies to enhance their supply chain operations Supply chain management and inventory management are an integral part of any organization and most of the manufacturing firm's working depends upon effective supply chain and inventory management.

Thus, it also has a significant impact on the financial performance of the firm with respect to many financial parameters and Key Performance Indicators (KPIs). This study is proposed to examine the impact of supply chain management and inventory management on the financial performance of the manufacturing firms. The aim of this study was to develop an understanding about the mutual relationship between the Supply chain management and Inventory management. Supply chain management and financial performance of the organization. Inventory management and financial performance of the organization. The work focused to study the direction and magnitude of the impact of inventory management and supply chain management on the financial performance of the companies considered in the study, to evaluate the impact of financial performance of companies considered on their supply chain

management and inventory management and finally to develop a triangular relationship between inventory management, supply chain management and financial performance of companies. Three main hypotheses are developed and tested using various statistical methods mentioned above. These Hypothesis where

$H_0{}^1$: No statistical significance exists between Supply Chain Performance and the financial performance of the companies.

$H_0{}^2$: No statistical significance exists between Inventory management Performance and the financial performance of the companies.

$H_0{}^3$: No statistical significance exists between Financial Performance and the Supply Chain and Inventory performance of the companies.

These hypotheses test the triangular relationship between financial performance of the firm with respect to supply chain management and Inventory management and vice versa. Various KPIs of the firm performance where computed using collected survey data from 5 automobile firms namely Maruti Suzuki India Ltd., Tata Motors Ltd., Mahindra & Mahindra Ltd., Bajaj Auto Ltd. and Hero MotoCorp Ltd. in the north India. A total of 410 samples were collected from various locations of these companies spanning north India. Research methodology is developed to analyze strategically the impact of supply chain and inventory management on the financial performance of the manufacturing firms, taking all the possible parameters and KPIs into consideration. Results of statistical analysis found positive relationship between Good Supply Chain Practices on the overall firm's financial performance. Same is found true for the inventory management practices.

Finally, the work analyzed both quantitative and qualitative factors/variables in order to get the best analysis and results. Both primary as well as secondary data is used, and hypothesis to be tested through Correlation, ANOVA, Linear Regression and Multiple Linear Regression in order to provide better relational diagnosis and analysis to the problem statement. This study finally proves that there is positive relationship between Supply Chain Management performance and Inventory management performance on the financial performance the firm's under consideration. Not only that, it was also found that if a firm's which financially more performant and manage Supply Chains and Inventories better. The hypothesis $H_0{}^1$

H_0^1: No statistical significance exists between Supply Chain Performance and the financial performance of the companies.

Was rejected as we have found statistical significant positive correlation between Supply Chain Performance and the financial performance of the companies. In developed model we find that the best predictors of gross sales are POI, Cash Cycle (cycle time) and Supply Chain Costs were able to predict financial performance with the accuracy of 68.6 %. Therefore H_0^1 was rejected in fact there is *statistical significant* relationship between supply chain management and the financial performance of the firm.

H_0^2: No statistical significance exists between Inventory management Performance and the financial performance of the companies.

During the analysis and after model development we found that the gross sales are Turn and earn Index and Inventory Conversion Ratio can predict the firm's performance with the accuracy of 80%. All these predictors have significantly positive relation with Gross Sales. This indicates that Inventory Management does have an effect Finances of a firm. Therefore H_0^2 was rejected.

H_0^3: No statistical significance exists between Financial Performance and the Supply Chain and Inventory performance of the companies.

In final mode model correlation between Inventory Turnover Ratio and Gross Sales is 84.4% with the accuracy (R^2) of 71.2%. The model indicated that Inventory Turnover Ratio and gross sales hold a significantly positive relationship with each other with beta value *b* of .018. Therefore we reject our finance and InventoryManagement holds no relationship. The Correlation(R) between Supply Chain Costs and Gross Sales is 75.3% with the accuracy of 56.7%. Also predictor variable Supply chain costs and Gross Sales hold a significantly negative relation with each other with beta value *b* of -.004. Therefore, again we reject *H^3* finance and Supply Chain holds no relationship.

This study finally proves that there is positive relationship between Supply Chain Management performance and Inventory management performance on the financial performance the firm's under consideration. All the Results were interpreted with a

significance level of $p<0.01$. These steps present guidelines that Not only that, it was also found that if a firm's which financially more performant spend and manage Supply Chains and Inventories better.

8.2 Future Works

The use of secondary data for supply chain management research is significant since it allows for the triangulation of results between primary and secondary data gathering studies, as well as a variety of unique opportunities. For example, it enables longitudinal analysis, which is extremely challenging with traditional data gathering methods. We believe that the full presentation of our research' methodological processes will be valuable to anyone who are interested in utilizing archive data from secondary sources. As for our future plans we would like to focus on

1. Exploring the relationship between efficient supply chain management and firm innovation.
2. Sustainability Practices in supply chain management practices and its impact on the firm performance.
3. Impact of new technologies like block-chain on performance of supply chain management.
4. Also, the scope of further research can be extended to more KPIs and profitability measures including
5. The work can further be extended for a longer term study.

References

Abbas, F., Nobanee, H., Khan, M., & Varas, J. (2017). The influence of supply chain management and net trade cycle on financial performance. International Journal of Supply Chain Management, 6(4), 51-60.

Abd Karim, N., Nawawi, A., & Salin, A. S. A. P. (2018). Inventory management effectiveness of a manufacturing companyûMalaysian evidence. International Journal of Law and Management.

Abdullah, H., & Tursoy, T. (2021). Capital structure and firm performance: evidence of Germany under IFRS adoption. Review of Managerial Science, 15(2), 379-398.

Agustina, I. L., Fauziv, E., Anwar, A., Ogalo, H. S., & Ratnasari, I. (2019). The role of financial management in bringing efficiency in supply chain management. Int J Supply Chain Manag, 8(3), 1-9.

Akkawuttiwanich, P., & Yenradee, P. (2018). Fuzzy QFD approach for managing SCOR performance indicators. Computers & Industrial Engineering, 122, 189-201.

Ali, Z., Gongbing, B., & Mehreen, A. (2018). Does supply chain finance improve SMEs performance? The moderating role of trade digitization. Business Process Management Journal.

Anand, N., & Grover, N. (2015). Measuring retail supply chain performance: Theoretical model using key performance indicators (KPIs). Benchmarking: An international journal.

Analytics, M. (n.d.). Stock screener and fundamental analysis tool for Indian stocks. Screener. Retrieved December 20, 2022, from https://www.screener.in/

Aro-Gordon, S., & Gupte, J. (2016). Review of modern inventory management techniques. Global Journal of Business & Management, 1(2), 1-22.

Atnafu, D., & Balda, A. (2018). The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence

from micro and small enterprises in Ethiopia. Cogent Business & Management, 5(1), 1503219.

Atnafu, D., & Balda, A. (2018). The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence from micro and small enterprises in Ethiopia. Cogent Business & Management, 5(1), 1503219.

Banerjee, M., & Mishra, M. (2017). Retail supply chain management practices in India: A business intelligence perspective. Journal of Retailing and Consumer Services, 34, 248-259.

Barber, K. D., Garza-Reyes, J. A., Kumar, V., & Abdi, M. R. (2017). The effect of supply chain management practices on supply chain and manufacturing firmsÆ performance. Journal of Manufacturing Technology Management.

Barnes, L., & Lea-Greenwood, G. (2006). Fast fashioning the supply chain: shaping the research agenda. Journal of Fashion Marketing and Management: An International Journal.

Beamon, B. M. (1998). Supply chain design and analysis:: Models and methods. International journal of production economics, 55(3), 281-294.

Calisir, F., & Han?erliogullari, G. (2016, April). Linking inventory management performance and operational performance: An Empirical Analysis of US Fashion Apparel and Accessory Industries. In Workshop on Business Models and ICT Technologies for the Fashion Supply Chain (pp. 153-161). Springer, Cham.

Caniato, F., Henke, M., & Zsidisin, G. A. (2019). Supply chain finance: historical foundations, current research, future developments. Journal of Purchasing and Supply Management, 25(2), 99-104.

Castillo, V. E., Mollenkopf, D. A., Bell, J. E., & Bozdogan, H. (2018). Supply chain integrity: A key to sustainable supply chain management. Journal of Business Logistics, 39(1), 38-56.

Chakuu, S., Masi, D., & Godsell, J. (2019). Exploring the relationship between mechanisms, actors and instruments in supply chain finance: A systematic literature review. International Journal of Production Economics, 216, 35-53.

Chen, H. L. (2018). Supply chain riskÆs impact on corporate financial performance. International Journal of Operations & Production Management.

Chen, X., Liu, C., & Li, S. (2019). The role of supply chain finance in improving the competitive advantage of online retailing enterprises. Electronic Commerce Research and Applications, 33, 100821.

Cherrafi, A., Garza-Reyes, J. A., Kumar, V., Mishra, N., Ghobadian, A., & Elfezazi, S. (2018). Lean, green practices and process innovation: A model for green supply chain performance. International Journal of Production Economics, 206, 79-92.

Choi, D., & Hwang, T. (2015). The impact of green supply chain management practices on firm performance: the role of collaborative capability. Operations Management Research, 8(3), 69-83.

Chorfi, Z., Berrado, A., & Benabbou, L. (2015, October). Selection of key performance indicators for supply chain monitoring using MCDA. In 2015 10th International Conference on Intelligent Systems: Theories and Applications (SITA) (pp. 1-6). IEEE.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. Industrial marketing management, 29(1), 37-44.

Christopher, Martin, 1994. Logistics and Supply Chain Management, Richard D. Irwin, Inc., Financial Times, New York, NY

Coluccia, D., Dabic, M., Del Giudice, M., Fontana, S., & Solimene, S. (2020). R&D innovation indicator and its effects on the market. An empirical assessment from a financial perspective. Journal of Business Research, 119, 259-271.

Dao, B. T. T., & Ta, T. D. N. (2020). A meta-analysis: capital structure and firm performance. Journal of Economics and Development.

Das, D. (2017). Development and validation of a scale for measuring Sustainable Supply Chain Management practices and performance. Journal of Cleaner Production, 164, 1344-1362.

Demeter, K., & Matyusz, Z. (2011). The impact of lean practices on inventory turnover. International journal of production economics, 133(1), 154-163.

Dubey, R., Gunasekaran, A., & Papadopoulos, T. (2017). Green supply chain management: theoretical framework and further research directions. Benchmarking: An International Journal.

Duclos, L. K., Vokurka, R. J., & Lummus, R. R. (2003). A conceptual model of supply chain flexibility. Industrial Management & Data Systems.

Elking, I., Paraskevas, J. P., Grimm, C., Corsi, T., & Steven, A. (2017). Financial dependence, lean inventory strategy, and firm performance. Journal of Supply Chain Management, 53(2), 22-38.

Erdogmus, H., Favaro, J., & Strigel, W. (2004). Return on investment. Ieee Software, 21(3), 18-22.

Esrar, H., Zolfaghariania, H., & Yu, H. (2022). Inventory management practices at a big-box retailer: a case study. Benchmarking: An International Journal, (ahead-of-print).

Fisher, M. L. (1997). What is the right supply chain for your product?. Harvard business review, 75, 105-117.

Flores, J. E., Boada, P., & Moscoso, P. (2014). An empirical analysis of sell-through in a fashion setting. Int. Journal of Supply Chain Management, 3(4), 13-22.

G?mez, A. H., & Herrera, R. A. (2021, June). Does capital structure influence the profitability of Ecuadorian communication companies?. In 2021 16th Iberian Conference on Information Systems and Technologies (CISTI) (pp. 1-6). IEEE.

Gandhi, A. V., Shaikh, A., & Sheorey, P. A. (2017). Impact of supply chain management practices on firm performance: Empirical evidence from a developing country. International Journal of Retail & Distribution Management.

Gardas, B., Raut, R., Jagtap, A. H., & Narkhede, B. (2019). Exploring the key performance indicators of green supply chain management in agro-industry. Journal of modelling in management.

Gelsomino, L. M., Mangiaracina, R., Perego, A., & Tumino, A. (2016). Supply chain finance: a literature review. International Journal of Physical Distribution & Logistics Management.

Giannakis, M., Spanaki, K., & Dubey, R. (2019). A cloud-based supply chain management system: effects on supply chain responsiveness. Journal of Enterprise Information Management.

Gitman, L. J., Juchau, R., & Flanagan, J. (2015). Principles of managerial finance. Pearson Higher Education AU.

Goyal, K., & Kumar, S. (2021). Financial literacy: A systematic review and bibliometric analysis. International Journal of Consumer Studies, 45(1), 80-105.

Guo, S., Choi, T. M., Shen, B., & Jung, S. (2018). Inventory management in mass customization operations: A review. IEEE Transactions on Engineering Management, 66(3), 412-428.

Harland, C., Telgen, J., Callender, G., Grimm, R., & Patrucco, A. (2019). Implementing government policy in supply chains: an international coproduction study of public procurement. Journal of supply chain management, 55(2), 6-25.

Hausman, W. H. (2004). Supply chain performance metrics. In The practice of supply chain management: Where theory and application converge (pp. 61-73). Springer, Boston, MA.

Hill, C. A., Zhang, G. P., & Miller, K. E. (2018). Collaborative planning, forecasting, and replenishment & firm performance: An empirical evaluation. International journal of production economics, 196, 12-23.

Hines, T. (2004) The emergence of supply chain management as a critical success factor for retail organisations in Bruce, M.; Moore, C. & Birtwistle, G. Eds. (2004) International Retail Marketing Elsevier Butterworth Heinemann, Oxford

Hoeur, S., & Kritchanchai, D. (2015). Key performance indicator framework for measuring healthcare logistics in ASEAN. In Toward sustainable operations of supply chain and logistics systems (pp. 37-50). Springer, Cham.

How to Master Your Stock Levels. (2022). Retrieved 15 June 2022, from https://www.netsuite.com/portal/resource/articles/inventory-management/inventory-management.shtml#:~:text=Inventory%20ma

Huang, M. J., Cheng, K. C., Huang, C. J., Lin, K. M., Wang, H. M., Chuang, C. K., & Wu, M. C. (2021). Establishing a Dynamic Capital Structure Model for Company Sustainability Performance Using Data Mining Techniques. Sustainability, 13(11), 6026.

Hutchison, P. D., Farris, M. T., & Anders, S. B. (2007). Cash-to-cash analysis and management. CPA journal, 77(8), 42.

Introduction to Financial Management (2021). Retrieved 4 July 2022, from https://www.osgu.ac.in/blog/introduction-to-financial management/#:~:text=The%20modern%2

Inventory Management Definition. (2022). Retrieved 15 June 2022, from https://www.investopedia.com/terms/i/inventory-management.asp

Ivanov, D., Tsipoulanidis, A., & Sch÷nberger, J. (2021). Inventory management. In Global supply chain and operations management (pp. 385-433). Springer, Cham.

Izadi, A., Nabipour, M., & Titidezh, O. (2020). Cost models and cost factors of road freight transportation: a literature review and model structure. Fuzzy Information and Engineering, 1-21.

Jermsittiparsert, K., Wattanapongphasuk, S., & Phonwattana, S. (2019). The impact of supply chain capabilities on the performance of food industry in Thailand. International Journal of Supply Chain Management, 8(3), 131-142.

Jia, F., Blome, C., Sun, H., Yang, Y., & Zhi, B. (2020). Towards an integrated conceptual framework of supply chain finance: An information processing perspective. International Journal of Production Economics, 219, 18-30.

Jia, F., Zhang, T., & Chen, L. (2020). Sustainable supply chain Finance: Towards a research agenda. Journal of cleaner production, 243, 118680.

Kalar, B., Primc, K., Erker, R. S., Dominko, M., & Ogorevc, M. (2021). Resource efficiency in the innovative and conservative stages of a firm's evolution. Resources, Conservation and Recycling, 164, 105112.

Katehakis, M. N., Melamed, B., & Shi, J. (2016). Cash-flow based dynamic inventory management. Production and Operations Management, 25(9), 1558-1575.

Khan, A. K., Faisal, S. M., & Aboud, O. A. A. (2018). An Analysis of Optimal Inventory Accounting Models–Pros and Cons. European Journal of Accounting, Auditing and Finance Research, 6(3), 65-77.

Khan, S. A. R., & Qianli, D. (2017). Impact of green supply chain management practices on firmsÆ performance: an empirical study from the perspective of Pakistan. Environmental Science and Pollution Research, 24(20), 16829-16844.

Kintonova, A. Z., Yermaganbetova, M. A., Abildinovaa, G. M., Ospanova, N. N., Abdugulova, Z. K., & Glazyrina, N. S. (2019). Optimization of business processes based on the supply chain management in an accounting department. International Journal of Supply Chain Management, 8(3), 369-379.

Kirchoff, J. F., Tate, W. L., & Mollenkopf, D. A. (2016). The impact of strategic organizational orientations on green supply chain management and firm performance. International Journal of Physical Distribution & Logistics Management.

Kitchenham, B., Brereton, O. P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering–a systematic literature review. Information and software technology, 51(1), 7-15.

Kumar, S., Sureka, R., & Colombage, S. (2020). Capital structure of SMEs: a systematic literature review and bibliometric analysis. Management Review Quarterly, 70(4), 535-565.

Kumar, V., Chibuzo, E. N., Garza-Reyes, J. A., Kumari, A., Rocha-Lona, L., & Lopez-Torres, G. C. (2017). The impact of supply chain integration on

performance: Evidence from the UK food sector. Procedia Manufacturing, 11, 814-821.

Laari, S., T÷yli, J., & Ojala, L. (2018). The effect of a competitive strategy and green supply chain management on the financial and environmental performance of logistics service providers. Business Strategy and the Environment, 27(7), 872-883.

Lamola, A. A., Yamane, T., & Trozzolo, A. M. (1973). Cholesterol hydroperoxide formation in red cell membranes and photohemolysis in erythropoietic protoporphyria. Science, 179(4078), 1131-1133.

Larsen, S. B., Masi, D., Feibert, D. C., & Jacobsen, P. (2018). How the reverse supply chain impacts the firmÆs financial performance: A manufacturerÆs perspective. International Journal of Physical Distribution & Logistics Management.

Lii, P., & Kuo, F. I. (2016). Innovation-oriented supply chain integration for combined competitiveness and firm performance. International Journal of Production Economics, 174, 142-155.

Liu, H., Ke, W., Wei, K. K., & Hua, Z. (2013). The impact of IT capabilities on firm performance: The mediating roles of absorptive capacity and supply chain agility. Decision support systems, 54(3), 1452-1462.

Lu, D., Ding, Y., Asian, S., & Paul, S. K. (2018). From supply chain integration to operational performance: The moderating effect of market uncertainty. Global Journal of Flexible Systems Management, 19(1), 3-20.

Ma, H. L., Wang, Z. X., & Chan, F. T. (2020). How important are supply chain collaborative factors in supply chain finance? A view of financial service providers in China. International Journal of Production Economics, 219, 341-346.

Maestre, J. M., Fernßndez, M. I., & Jurado, I. J. C. E. P. (2018). An application of economic model predictive control to inventory management in hospitals. Control Engineering Practice, 71, 120-128.

Malhotra, M. K., & Grover, V. (1998). An assessment of survey research in POM: from constructs to theory. Journal of operations management, 16(4), 407-425.

Mardnly, Z., Mouselli, S., & Abdulraouf, R. (2018). Corporate governance and firm performance: an empirical evidence from Syria. International Journal of Islamic and Middle Eastern Finance and Management.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. Journal of Business logistics, 22(2), 1-25.

Mezouar, H., El Afia, A., Chiheb, R., & Ouzayd, F. (2016, May). Proposal of a modeling approach and a set of KPI to the drug supply chain within the hospital. In 2016 3rd International Conference on Logistics Operations Management (GOL) (pp. 1-6). IEEE.

Mkumbo, F. A. E., Ibrahim, A. R., Salleh, A. L., Sundram, V. P. K., & Atikah, S. B. (2019). The influence of supply chain practices and performance measurement practices towards firm performance. International Journal of Supply Chain Management, 8(3), 809-819.

Modi, S. B., & Mabert, V. A. (2010). Exploring the relationship between efficient supply chain management and firm innovation: an archival search and analysis. Journal of Supply Chain Management, 46(4), 81-94.

Mohammadnazari, Z., & Ghannadpour, S. F. (2021). Sustainable construction supply chain management with the spotlight of inventory optimization under uncertainty. Environment, Development and Sustainability, 23(7), 10937-10972.

Moretto, A., Grassi, L., Caniato, F., Giorgino, M., & Ronchi, S. (2019). Supply chain finance: From traditional to supply chain credit rating. Journal of Purchasing and Supply Management, 25(2), 197-217.

Nariswari, T. N., & Nugraha, N. M. (2020). Profit growth: impact of net profit margin, gross profit margin and total assests turnover. International Journal of Finance & Banking Studies (2147-4486), 9(4), 87-96.

Obermaier, R., & Donhauser, A. (2009). Disaggregate and aggregate inventory to sales ratios over time: the case of German corporations 1993–2005. Logistics Research, 1(2), 95-111.

Ochoa, O. L., Claes, B., Koryak, O., & Diaz, A. (2017). Integration through orchestration: The interplay between enterprise systems and inventory management capabilities. Journal of Enterprise Information Management.

Paam, P., Berretta, R., Heydar, M., & Garc?a-Flores, R. (2019). The impact of inventory management on economic and environmental sustainability in the apple industry. Computers and Electronics in Agriculture, 163, 104848.

Pakurßr, M., Haddad, H., Nagy, J., Popp, J., & Olßh, J. (2019). The impact of supply chain integration and internal control on financial performance in the Jordanian banking sector. Sustainability, 11(5), 124

Panahifar, F., Byrne, P. J., Salam, M. A., & Heavey, C. (2018). Supply chain collaboration and firmÆs performance: the critical role of information sharing and trust. Journal of Enterprise Information Management.

Panigrahi, R. R., Jena, D., Meher, J. R., & Shrivastava, A. K. (2022). Assessing the impact of supply chain agility on operational performances-a PLS-SEM approach. Measuring Business Excellence.

Panigrahi, R. R., Mishra, P. C., Samantaray, A., & Jena, D. (2022). Management of inventory for firmsÆ efficiencyûa study on steel manufacturing industry. Journal of Advances in Management Research.

Paramasivan, C. (2009). Financial management. New Age International.

Paulraj, A., Chen, I. J., & Blome, C. (2017). Motives and performance outcomes of sustainable supply chain management practices: A multi-theoretical perspective. Journal of Business Ethics, 145(2), 239-258.

Pellegrino, R., Costantino, N., & Tauro, D. (2019). Supply Chain Finance: A supply chain-oriented perspective to mitigate commodity risk and pricing volatility. Journal of Purchasing and Supply Management, 25(2), 118-133.

Perez, H. D., Hubbs, C. D., Li, C., & Grossmann, I. E. (2021). Algorithmic approaches to inventory management optimization. Processes, 9(1), 102.

Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. Perceptual and motor skills, 105(3), 997-1014.

Pournader, M., Kach, A., & Talluri, S. (2020). A review of the existing and emerging topics in the supply chain risk management literature. Decision Sciences, 51(4), 867-919.

Protopappa-Sieke, M., & Seifert, R. W. (2017). Benefits of working capital sharing in supply chains. Journal of the Operational Research Society, 68(5), 521-532.

Rajhans, N., Patil, S., & Kulkarni, P. (2015). Mathematical Model for Calculating Inventory Carrying Cost. IIIE Journal, 8(1), 12-14.

Ramey, V. A., & Vine, D. (2004). Why do real and nominal inventory-sales ratios have different trends.

Ramezani, M., Kimiagari, A. M., Karimi, B., & Hejazi, T. H. (2014). Closed-loop supply chain network design under a fuzzy environment. Knowledge-Based Systems, 59, 108-120.

Report, C., Encyclopedia, O., Encyclopedia, P., & Encyclopedia, M. (2022). Stocking Cycle Time Definition & Benchmarks | OpsDog. Retrieved 12 July 2022, from https://opsdog.com/products/cycle-time-material-stocking

Saad, S. B., & Belkacem, L. (2021). How does corporate social responsibility influence firm financial performance?. Corporate Governance: The International Journal of Business in Society.

Schmidt, C. G., Foerstl, K., & Schaltenbrand, B. (2017). The supply chain position paradox: green practices and firm performance. Journal of supply chain management, 53(1), 3-25.

Shen, B., Wang, X., Cao, Y., & Li, Q. (2020). Financing decisions in supply chains with a capital-constrained manufacturer: competition and risk. International Transactions in Operational Research, 27(5), 2422-2448.

Song, H., Yu, K., & Lu, Q. (2018). Financial service providers and banksÆ role in helping SMEs to access finance. International Journal of Physical Distribution & Logistics Management, 48(1), 69-92.

Song, J. S. (1998). On the order fill rate in a multi-item, base-stock inventory system. Operations research, 46(6), 831-845.

Stevens, G. C., & Johnson, M. (2016). Integrating the supply chainà 25 years on. International Journal of Physical Distribution & Logistics Management.

Stopkovß, M., Stopka, O., & Luptßk, V. (2019). Inventory model design by implementing new parameters into the deterministic model objective function to streamline effectiveness indicators of the inventory management. Sustainability, 11(15), 4175.

Sundram, V. P. K., Chandran, V. G. R., & Bhatti, M. A. (2016). Supply chain practices and performance: the indirect effects of supply chain integration. Benchmarking: An International Journal.

Sunjoko, M. I., & Arilyn, E. J. (2016). Effects of inventory turnover, total asset turnover, fixed asset turnover, current ratio and average collection period on profitability. Jurnal Bisnis dan Akuntansi, 18(1), 79-83.

Supply Chain Management - Quick Guide Supply Chain Management - Quick Guide. (2022). Retrieved 1 July 2022, from https://www.tutorialspoint.com/supply_chain_

Teerasoponpong, S., & Sopadang, A. (2022). Decision support system for adaptive sourcing and inventory management in small-and medium-sized enterprises. Robotics and Computer-Integrated Manufacturing, 73, 102226.

Toomey, J. W. (2000). Inventory management: principles, concepts and techniques (Vol. 12). Springer Science & Business Media.

Transchel, S. (2017). Inventory management under price-based and stockout-based substitution. European Journal of Operational Research, 262(3), 996-1008.

Truong, H. Q., Sameiro, M., Fernandes, A. C., Sampaio, P., Duong, B. A. T., Duong, H. H., & Vilhenac, E. (2017). Supply chain management practices and firmsÆ operational performance. International Journal of Quality & Reliability Management.

Turrini, L., & Meissner, J. (2019). Spare parts inventory management: New evidence from distribution fitting. European Journal of Operational Research, 273(1), 118-130.

Van der Vorst, J. G. (2000). Effective food supply chains: generating, modelling and evaluating supply chain scenarios. Wageningen University and Research.

Villafuerte, H., Viacava, G., & Raymundo, C. (2019, August). Continuous improvement model for inventory planning applying MRP II in small and medium sized enterprises. In International Conference on Human Interaction and Emerging Technologies (pp. 842-848). Springer, Cham.

Volk, H. E., Neuman, R. J., & Todd, R. D. (2005). A systematic evaluation of ADHD and comorbid psychopathology in a population-based twin sample. Journal of the American Academy of Child & Adolescent Psychiatry, 44(8), 768-775.

Vovchenko, N. G., Andreeva, L. Y., Kokhanova, V. S., & Dzhemaev, O. T. (2018). Information and financial technologies in a system of Russian banksÆ digitalization: A competency-based approach. In Contemporary Issues in Business and Financial Management in Eastern Europe. Emerald Publishing Limited.

Wang, J., Hou, K., & Zhu, X. (2021). Does sticky inventory management improve productivity?. Journal of Manufacturing Technology Management.

Wang, X., Lin, Y., & Shi, Y. (2020). Linking industrial agglomeration and manufacturers inventory performance: the moderating role of firm size and enterprise status in the supply chain. Journal of Manufacturing Technology Management, 32(2), 448-484.

What is a Supply Chain? - Definition, Models and Best Practices -- WhatIs.com What is a Supply Chain? - Definition, Models and Best Practices -- WhatIs.com. (2022). Retrieved 6 June 2022, from https://www.techtarget.com/whatis/definition/supply-chain#:~:text=A%20supply%20chain%2

What Is Fill Rate? (Definition, Types and How To Calculate). (2022). Retrieved 14 July 2022, from https://www.indeed.com/career-advice/career-development/fill-rate

Wuttke, D. A., Rosenzweig, E. D., & Heese, H. S. (2019). An empirical analysis of supply chain finance adoption. Journal of Operations Management, 65(3), 242-261.

Yang, L., Li, H., & Campbell, J. F. (2020). Improving order fulfillment performance through integrated inventory management in a multi-item finished goods system. Journal of Business Logistics, 41(1), 54-66.

Younis, H., Sundarakani, B., & Vel, P. (2016). The impact of implementing green supply chain management practices on corporate performance. Competitiveness Review.

Youssef, A. E., & El-Nakib, I. (2015). Investigating the impact of supply chain practices on the financial performance of active firms in Egyptian stock market. International Journal of Supply Chain Management, 4(4), 28-42.

Zhang, T., Zhang, C. Y., & Pei, Q. (2019). Misconception of providing supply chain finance: Its stabilising role. International Journal of Production Economics, 213, 175-184.