INVENTORY MANAGEMENT OF DAIRIES IN NEPAL

A Dissertation submitted to the Office of the Dean, Faculty of Management in partial fulfilment of the requirements for the Master's Degree

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Certification of Authorship

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled “Inventory Management of Dairies of Nepal”. The work of this dissertation has not been submitted previously for the purpose of conferral of any degrees nor it has been proposed and presented as part of requirements for any other academic purposes.

The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declare that all information sources and literature used are cited in the reference section of the dissertation.

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Report of Research Committee

Ms./Mr. **Januka Bista** has defended research proposal entitled **"Inventory Management of Dairies of Nepal**" successfully. The research committee has registered the dissertation for further progress. It is recommended to carry out the work as per suggestions and guidance of supervisor, Mr. Kapil Khanal and submit the thesis for evaluation and viva voce examination.

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We, the undersigned, have examined the dissertation entitled **"Inventory Management of Dairies of Nepal"** presented by **Januka Bista** a candidate for the degree of Master of Business Studies (MBS semester) and conducted the Vice voce examination of the candidate. We hereby certify that the dissertation is worthy of acceptable.

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TABLE OF CONTENTS *Page No.*

CHAPTERS Page No.

LIST OF TABLES

List of Figure

ABBREVIATIONS

Avg	Average
CY	Current Year
DDC	Dairy Development Corporation
e.g.	Example
EOQ	Economic Order Quantity
F.Y.	Fiscal Year
i.e.	That is
KG	Kilogram
Ltd.	Limited
Ltr	Leter
NRB	Nepal Rastra Bank
Pkt	Packets
Pvt.	Private
PY	Previous Year
R	Correlation of Coefficient
ROL	Re-order Level
Rs/NRs.	Nepalese rupees
Std Dev	Standard Deviation
TU	Tribhuvan University

ABSTRACT

The dairy industry plays a vital role in global food supply chains, providing essential products such as milk, yogurt, cheese, and butter. Efficient inventory management and supply chain practices are crucial for ensuring the profitability and sustainability of dairy operations. This study investigates inventory management, supply chain practices, and profitability within the dairy industry, focusing on two case studies: Dairy Development Corporation (DDC) and Sujal Dairy. The background of the study is rooted in the need to understand the factors influencing profitability and supply chain management in dairy industries, given the challenges posed by fluctuating demand, perishable products, and complex supply chains.

The research objectives are twofold: firstly, to explore the relationships between key variables such as Economic Order Quantity (EOQ), inventory turnover, stockout rates, and profitability; and secondly, to assess the effectiveness of inventory management and supply chain practices in driving profitability in DDC and Sujal Dairy. The methodology encompasses descriptive statistics, correlation analysis, regression modeling, and ANOVA testing, providing a robust framework for examining the complex interactions between variables and identifying significant predictors of profitability and supply chain management.

The findings of the study reveal significant correlations between inventory turnover, EOQ, and profitability in both DDC and Sujal Dairy, underscoring the importance of efficient inventory management practices. Additionally, strong positive correlations between stockout rates and supply chain management effectiveness highlight the critical role of inventory availability in ensuring smooth supply chain operations. Comparative analysis between the two dairy industries elucidates similarities and differences in profitability, supply chain management practices, and inventory costs, emphasizing the need for tailored strategies to address operational challenges and capitalize on opportunities for improvement.

KeyWords: Inventory Management, Dairy Industry in Nepal, Supply Chain Management, cost efficiency, Inventory Turnover, Stockout rates, EOQ

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Inventory management stands as a pivotal facet within the broader spectrum of supply chain operations, encompassing the strategic orchestration of planning, monitoring, and control over the flow of goods and materials within an organizational framework. This discipline becomes particularly critical in sectors such as the dairy industry in Nepal, where managing perishable goods, fluctuating demand patterns, and unique operational challenges introduce a heightened level of complexity. The overarching objective of inventory management is to strike an equilibrium between maintaining optimal stock levels to meet customer demand and mitigating issues such as holding costs, stock outs, and excess inventory.

In the intricate web of inventory management, accurate demand forecasting emerges as a cornerstone. A comprehensive understanding of market trends, historical sales data, and external factors influencing demand enables businesses to formulate effective inventory planning strategies. Concurrently, the establishment of ordering and reordering policies, such as the Economic Order Quantity (EOQ) and reorder points, allows organizations to determine the opportune moments for replenishing their inventory, steering clear of stock outs while minimizing the financial burden of holding costs.

Further enhancing the intricacies of inventory management is the ABC analysis, a classification system that segregates inventory items based on their value and significance. This categorization facilitates a nuanced approach, enabling businesses to prioritize their focus on high-value items that demand more meticulous monitoring. Additionally, the adoption of Just-in-Time (JIT) inventory strategies has gained prominence, minimizing inventory levels by acquiring goods precisely when needed in the production process. While this approach curtails holding costs, it necessitates a resilient and reliable supply chain infrastructure.

In the era of technological advancements, the integration of cutting-edge solutions becomes imperative for efficient inventory management. Utilizing inventory management software, barcoding systems, RFID technology, and real-time tracking tools empowers businesses to streamline processes, enhance accuracy, and gain instantaneous visibility into their inventory levels. Such technological integrations are especially pertinent for industries like dairy in Nepal, where the perishable nature of products demands a swift and precise response to market dynamics. The collaborative dimension of inventory management extends to the relationships with suppliers. Establishing and maintaining robust ties with suppliers is paramount for ensuring timely and reliable deliveries. Such collaborative efforts can lead to improved terms, reduced lead times, and an overall enhancement of efficiency within the supply chain.

In the context of Nepal, the intricacies of inventory management take on a distinctive character shaped by the country's geographical and economic landscape. The dairy industry in Nepal is not only vital for the sustenance of rural livelihoods but also plays a crucial role in addressing the nutritional needs of the population. However, the challenges inherent in managing inventory within this context are multifaceted. One of the distinctive features is the rugged terrain and diverse climate of Nepal, which poses logistical challenges to the transportation of dairy products. The topographical variations may impact the efficiency of supply chains, making it imperative for inventory management practices to be adaptable and responsive to these geographic nuances. Additionally, the seasonal variations in milk production, influenced by factors such as monsoons and agricultural cycles, add a layer of complexity to inventory planning. Balancing the demand for dairy products during periods of peak production against the lean seasons requires a nuanced approach to inventory management.

The dairy industry in Nepal comprises a significant number of small-scale and traditional producers, each contributing to the overall supply chain. Coordinating with these diverse stakeholders presents a challenge in terms of standardizing inventory practices. Collaborative initiatives that extend beyond individual businesses to include smallholder farmers, cooperatives, and local vendors are essential for creating a cohesive and efficient inventory management ecosystem.

In the context of perishable dairy products, maintaining the cold chain becomes paramount. Nepal's diverse climatic conditions, ranging from the lowland Terai to the high-altitude regions, necessitate robust cold storage and transportation infrastructure to prevent spoilage and ensure the quality and safety of dairy products. Effective inventory management should, therefore, encompass strategies for cold chain logistics, including investment in refrigeration facilities and transportation systems tailored to the unique geographical challenges of the region.

Considering the socio-economic fabric of Nepal, where agriculture and agribusinesses are integral to rural livelihoods, inventory management practices should align with the principles of sustainability and inclusivity. Empowering local producers through capacity building, technology transfer, and access to finance can contribute to a more resilient and sustainable dairy supply chain. The inventory management landscape in Nepal's dairy industry is a delicate interplay of geographical, climatic, and socio-economic factors. Tailoring strategies to address these specific challenges is crucial for the industry's success. As Nepal navigates the complexities of managing inventory in its dairy sector, a holistic approach that integrates technology, collaboration, and sustainability is essential to ensure the resilience and growth of this vital sector in the nation's economy.

1.2 Problem Statement

Dairy industry in Nepal is a cornerstone of agricultural livelihoods and nutritional sustenance, yet its potential is hindered by inadequacies in inventory management practices. Despite the sector's crucial role, the geographical, climatic, and socio-economic complexities unique to Nepal present formidable challenges. The rugged terrain and diverse climate impact transportation logistics, seasonal variations in milk production add uncertainty to demand forecasting, and the prevalence of small-scale producers complicates the standardization of inventory practices.

While the literature emphasizes the importance of effective inventory management in optimizing resources and reducing waste (Fisher, 1997), there is a dearth of research addressing the nuanced challenges faced by the dairy industry in Nepal. Limited cold chain infrastructure in a country with diverse climatic conditions (UNDP, 2019) exacerbates the risk of product spoilage. Additionally, the absence of cohesive inventory

strategies that integrate smallholder farmers, cooperatives, and local vendors further impedes the industry's resilience and growth (Minot & Sawyer, 2016).

Furthermore, the socio-economic fabric of Nepal, deeply rooted in agriculture, necessitates a sustainable and inclusive approach to inventory management. The lack of capacity building initiatives and technological interventions tailored to the specific needs of local producers undermines the sector's potential for growth and competitiveness in a global market (Dairy Development Corporation, 2020).

Therefore, this study seeks to comprehensively investigate and address the unique challenges in inventory management within the Nepalese dairy industry. By identifying gaps and proposing context-specific solutions, the research aims to contribute valuable insights that will empower stakeholders to enhance the efficiency, sustainability, and inclusivity of inventory management practices in Nepal's dairy sector. Mainly this study will try to find out the following questions;

i. How can inventory management practices be improved to optimize turnover and minimize stockouts?

ii. What strategies can be implemented to enhance supply chain practices, such as forecasting, supplier relationships, and order optimization, to minimize disruptions and improve operational efficiency in dairy industries?

iii. How can EOQ be optimized to align with daily requirements, reducing carrying costs while ensuring adequate inventory levels for cost efficiency and profitability in dairy industries like DDC and Sujal Dairy?

1.3 Objectives of the Study

Based on the research questions, the following objectives has been formulated:

i. To improve inventory management practices to optimize turnover and minimize stockouts, enhancing profitability and supply chain efficiency.

ii. To enhance supply chain practices, focusing on forecasting, supplier relationships, and order optimization to minimize disruptions and improve operational efficiency.

iii. To optimize EOQ to align with daily requirements, reducing carrying costs while ensuring adequate inventory levels for cost efficiency and profitability.

1.4 Rationale of the Study

The rationale for undertaking this study lies in the critical role of the dairy industry in Nepal and the unique challenges it faces in inventory management. As a cornerstone of agricultural livelihoods and nutritional sustenance, the dairy sector is integral to the socio-economic fabric of Nepal. However, despite its significance, the industry grapples with multifaceted challenges that impact its efficiency and growth. The geographical and climatic complexities of Nepal introduce a layer of intricacy to the transportation logistics of dairy products. The rugged terrain and diverse climate create impediments that demand tailored strategies for efficient inventory movement. Understanding how these factors impact transportation logistics is essential to optimize the supply chain and ensure the timely delivery of dairy products. Demand forecasting in the dairy sector is fraught with challenges, particularly given the seasonal variations in milk production. The fluctuations in supply and demand necessitate a nuanced approach to inventory management. By exploring the key challenges in demand forecasting, this study aims to provide insights into how the industry can better anticipate and respond to market dynamics.

Lack of standardized inventory practices poses a substantial obstacle to collaboration and coordination within the dairy supply chain. Small-scale dairy producers, cooperatives, and local vendors operate within a diverse landscape, making it imperative to establish common ground for effective inventory management. Investigating the impact of non-standardized practices will shed light on the barriers hindering seamless collaboration.

At the end, the study seeks to address the identified challenges by proposing measures to create a more cohesive inventory management ecosystem. The formulation of actionable recommendations is grounded in the understanding that a well-integrated inventory framework is vital for the sustainability and competitiveness of the Nepalese dairy industry. The study's outcomes are expected to contribute not only to the academic discourse on inventory management but also

to provide practical insights that can be applied by industry stakeholders and policymakers. In essence, the rationale for this study is rooted in the imperative to enhance the efficiency, sustainability, and inclusivity of inventory management practices within the dairy sector in Nepal. By delving into the unique challenges faced by the industry and proposing targeted solutions, the research aims to catalyze positive change and foster a more resilient and competitive dairy ecosystem in the country.

1.5 Limitations of the Study

i) Limited Sample Size.
ii) Potential Response Bias in Data Collection.
iii) Dependency on Self-Reported Data.
iv) Geographical and Cultural Specificity of Findings.
v) Seasonal Variations in Dairy Production.
vi) Accessibility to Data from Small-Scale Producers.
vii) Time and Resource Constraints.
Viii) External Factors Impacting Inventory Management (e.g., Regulatory Changes, Market Fluctuations).
viii) Potential Inaccuracy in Financial Data Reporting.

CHAPTER II
LITERATURE REVIEW

Within this chapter, an exploration of the conceptual and theoretical foundations of inventory management in the Nepalese dairy sector unfolds, delving into factors such as supply chain dynamics, demand forecasting, and operational challenges. A thorough examination of empirical studies related to inventory management practices in Nepal's dairy industry is presented, covering aspects such as inventory optimization strategies, technological innovations, and regulatory frameworks. This review extends to encompass studies examining the specific challenges and opportunities faced by dairy businesses in managing their inventory effectively. This comprehensive review of relevant literature is essential for gaining insights into the intricacies of inventory management in Nepalese dairies, facilitating informed decision-making and strategic planning. Furthermore, by critically analyzing past studies and propositions, this chapter contributes to advancing scholarly discourse on inventory management practices in the dairy sector, fostering continuous improvement and innovation within the industry.

i. Conceptual review
ii. Review of previous work
   - Review of articles in the journal
   - Review of previous dissertation
iii. Research gap

2.1 Conceptual Review

In the conceptual review, key concepts such as inventory management, supply chain practices, and profitability within the dairy industry are examined in-depth, providing a theoretical foundation for the study. This review highlights the significance of efficient inventory management and robust supply chain practices in driving profitability and sustainability in dairy operations, setting the stage for the empirical investigation conducted in this research.

2.1.1 Definition and Concept of Inventory Management

Inventory management refers to the systematic planning, control, and optimization of all activities related to the acquisition, storage, movement, and utilization of inventory within an organization. It encompasses the strategic balancing of inventory levels to meet demand while minimizing costs, maximizing efficiency, and ensuring timely availability of goods or materials. In the context of the dairy industry in Nepal,

inventory management involves managing the stock of raw materials, such as milk and packaging materials, as well as finished products, such as milk, yogurt, and cheese. It entails forecasting demand based on seasonal variations, market trends, and customer preferences, and maintaining appropriate inventory levels to avoid stock outs or overstocking. Effective inventory management in dairies also involves optimizing storage facilities, implementing efficient distribution channels, and adopting technologies for real-time monitoring and control of inventory movements.

The concept of inventory management extends beyond mere stock control; it encompasses strategic decision-making processes aimed at achieving a balance between supply and demand, minimizing costs associated with inventory holding and stock outs, and enhancing overall operational efficiency. By implementing sound inventory management practices, dairies in Nepal can improve their competitiveness, enhance customer satisfaction, and contribute to the sustainable growth of the dairy industry.

2.1.1.2 Concept of Dairy Industries

The dairy industry encompasses a broad range of activities related to the production, processing, distribution, and marketing of dairy products derived from milk. It plays a vital role in the global food supply chain, providing essential nutrients such as protein, calcium, and vitamins to consumers worldwide. The dairy industry comprises various stakeholders, including farmers, processors, manufacturers, distributors, retailers, and consumers, each contributing to different stages of the dairy supply chain.

In the center of the dairy industry are dairy farms, where cows, goats, sheep, or other dairy animals are raised and milked. Dairy farms vary in size, ranging from small-scale family-owned operations to large commercial enterprises. The primary objective of dairy farming is to produce high-quality milk, which serves as the raw material for a wide array of dairy products. Once milk is collected from farms, it undergoes processing at dairy processing plants. Processing involves pasteurization, homogenization, and various other treatments to ensure the safety, quality, and longevity of the milk. Processed milk is then used to manufacture a diverse range of dairy products, including milk, cheese, yogurt, butter, ice cream, and more.

The dairy industry operates within a complex regulatory environment, with government agencies setting standards for milk quality, safety, and labeling. Regulatory bodies also oversee aspects such as animal welfare, environmental

sustainability, and trade regulations. Distribution and marketing are crucial components of the dairy business, ensuring that dairy products reach consumers efficiently and effectively. Dairy products are distributed through various channels, including supermarkets, grocery stores, convenience stores, farmers' markets, and online platforms. Marketing efforts often focus on highlighting the nutritional benefits, taste, and versatility of dairy products to attract consumers.

In recent years, the dairy industry has faced various challenges and opportunities driven by changing consumer preferences, technological advancements, environmental concerns, and market dynamics. Sustainability initiatives, innovation in product development, and expansion into new markets are some strategies adopted by dairy businesses to adapt to evolving trends and maintain competitiveness. The dairy industry remains a cornerstone of the global food economy, providing nutritious and delicious products that are enjoyed by people of all ages and cultures around the world.

2.2 Dairy Industry in the Context of Nepal

In Nepal, the commencement of structured dairy development initiatives dates back to 1952, marked by the establishment of the Yak cheese factory in Rasuwa district with support from the FAO (FAO, 2010). The momentum for growth in the dairy sector further surged with the creation of the Dairy Development unit within the Department of Agriculture (DOA) in 1954 (GIDA Nepal P.Ltd, 2012). Emphasizing the necessity for a modern dairy industry, the First Five Year Plan (1956-61) underscored the 2imperative of such development (NPC, 1956).

2.2.1 Policy Framework

i) Dairy Development Policy 2007

The Dairy Development Policy has endeavored to assess and enhance quality control measures for milk and dairy products, establish and enforce suitable packaging standards, conduct routine quality monitoring of marketed milk and dairy items, raise consumer awareness regarding storage techniques, consumption duration, and consumption methods for these products, enforce a code of practice for milk collection and processing at chilling centers and dairy processing facilities, and reinforce laboratory infrastructure at various levels to support the production and marketing of high-quality milk and dairy products.

ii) Food Act, 2023 B.S

Food safety regulation in Nepal commenced in 1966 through the enforcement of the Food Act and Food Rules of 1970 by the government. This legislation serves as the primary framework governing food safety regulation in Nepal (Bajgain, 2012). The food acts prohibit the production, sale, distribution, export, or import of adulterated or substandard food, or the possession of such food for any such purposes. Furthermore, it forbids the sale or distribution of food by misrepresenting it as another food or falsely elevating its standard. Additionally, the act includes a provision for the establishment of a standard fixation committee to periodically update standards. Moreover, the government possesses the authority to specify the quality standards for food (Government of Nepal, 2023).

iii) Animal Health and Livestock services act 1998 and Regulations 1999

The Animal Health and Livestock Service Act of 1998, along with its accompanying Regulations of 1999, were established and enforced to promote the healthy production, sale, and distribution of animals and their products. Additionally, the act governs the import and export of livestock, their products, and essential livestock production materials crucial for food security and public health. Moreover, the act includes provisions for establishing animal quarantine posts to oversee the importation of animals, animal products, and production materials.

2.2.2 Framework of Institutions Addressing Quality

i) National Dairy Development Board

The National Dairy Development Board (NDDB) was founded in 1992. Its primary role is to aid the Nepal government in formulating various policies and plans concerning the dairy sector. Additionally, it offers technical support for the establishment, enhancement, promotion, and protection of dairy industries (GIDA Nepal P.Ltd, 2012).

ii) Dairy Development Corporation (DDC)

Established in 1969 under the Corporation Act of 1964 and known by its abbreviation DDC, the Dairy Development Corporation (DDC) is a wholly state-owned entity established to foster the economic advancement of impoverished farming communities. It ensures rural farmers a reliable market for their milk at equitable prices, provides pasteurized milk and dairy products to urban consumers, establishes organized milk collection systems to meet the rising demand for pasteurized products,

and develops structured marketing channels for milk and its derivatives in urban locales.

iii) Department of Food Technology and Quality Control

Founded in 1961, the Department of Food Technology and Quality Control (DFTQC) is tasked with overseeing the quality control of dairy products, conducting research and development in food processing, and implementing nutrition support programs. It serves as the exclusive governmental body responsible for enforcing the Food Act to improve the quality and safety of food and feed products nationwide. Recently, the Nepalese government ratified the National Food Safety Policy 2076 (2019) to establish comprehensive food standards and ensure safety. Department of Livestock Services (DLS).

iv) Department of Livestock Services (DLS)

The Department of Livestock Services also shares responsibilities for enforcing regulations related to animal production to ensure the safety of food originating from animals. It is tasked with implementing the Animal Health and Livestock Services Act of 1998, the Animal Health and Livestock Services Regulation of 1999, the Animal Slaughterhouse and Meat Inspection Act of 1999, and the Animal Slaughterhouse and Meat Inspection Regulation of 2001. Additionally, the department is responsible for conducting animal disease surveillance, managing animal quarantine check posts, and regulating the use of drugs and hormones in food animals.

2.3 Inventory Management System of Dairies in Nepal

Rather than the previously discussed policy frameworks, government of Nepal has not implemented any specified inventory management system to the dairy industries so far. Although, the inventory management system in dairy industries in Nepal plays a crucial role in ensuring efficient operations and meeting consumer demands. With the dairy sector being a significant contributor to the country's economy, effective inventory management practices are essential for maintaining the quality and availability of dairy products.

One key aspect of the inventory management system is the tracking and monitoring of raw materials and ingredients used in dairy production. This includes items such as milk, packaging materials, additives, and other supplies necessary for the manufacturing process. By maintaining accurate records of inventory levels and replenishing supplies in a timely manner, dairy companies can avoid stock outs and

production delays. Inventory management systems help dairy industries optimize their production schedules and minimize wastage. By forecasting demand and adjusting production levels accordingly, companies can prevent overproduction and reduce the risk of perishable products expiring before they can be sold.

In order to manage raw materials, inventory management systems also track finished goods inventory, including various dairy products such as milk, yogurt, cheese, and butter. This involves monitoring product expiry dates, ensuring proper storage conditions, and implementing strategies to rotate stock to prevent spoilage.

While discussing the inventory management system of dairy industries, technology can't be apart from it. Here, technology plays a significant role in modern inventory management systems in Nepalese dairy industries. Many companies utilize software solutions and automated systems to streamline inventory tracking, order management, and logistics. These technologies enable real-time monitoring of inventory levels, facilitate efficient communication between production and distribution teams, and support data-driven decision-making processes. An effective inventory management system is essential for dairy industries in Nepal to maintain product quality, meet consumer demand, and optimize operational efficiency in a rapidly evolving market. By implementing robust inventory management practices and leveraging technology solutions, dairy companies can enhance their competitiveness and sustainability in the industry.

2.3.1 Popular Inventory Management System in Dairy Industries

Effective inventory management is crucial for dairy industries to ensure efficient operations, minimize costs, and meet customer demands. Several inventory management systems can be considered popular inventory management system in dairy industries:

i) First-In, First-Out (FIFO)

This system assumes that the oldest inventory items are sold or used first. In dairy industries, where products have limited shelf life, FIFO helps in reducing the risk of spoilage by ensuring that the oldest milk or dairy products are utilized first.

ii) Just-In-Time (JIT)

JIT inventory management aims to minimize inventory holding costs by receiving goods only when they are needed for production or sale. In dairy industries, JIT can

help in reducing storage costs and ensuring freshness of products by minimizing inventory levels.

iii) ABC Analysis

This inventory management technique categorizes inventory items into A, B, and C categories based on their value and contribution to sales. In dairy industries, high-value products like milk and cheese would fall under category A, while low-value items like packaging materials may fall under category C. This analysis helps in prioritizing inventory management efforts and resources.

iv) Economic Order Quantity (EOQ)

EOQ helps in determining the optimal order quantity that minimizes total inventory costs, including ordering and holding costs. Dairy industries can use EOQ to determine the most cost-effective batch sizes for ordering raw materials or packaging materials.

v) Vendor-Managed Inventory (VMI)

In VMI, suppliers or vendors manage inventory levels at customer locations based on agreed-upon criteria such as sales forecasts or inventory levels. For dairy industries, VMI can help in ensuring timely replenishment of milk and dairy products at retail outlets or distribution centers.

vi) Radio Frequency Identification (RFID) Technology

RFID technology enables real-time tracking and monitoring of inventory items using radio frequency signals. In dairy industries, RFID can be used to track the movement of milk and dairy products throughout the supply chain, ensuring accurate inventory management and reducing the risk of stockouts or overstocking.

These inventory management systems are popularly in practice to suit the specific needs and requirements of dairy industries, helping them optimize inventory levels, reduce costs, and improve overall efficiency.

2.4 Empirical Review

This section will undertake a review of diverse research studies sourced from various articles, journals, and unpublished research works. Its importance lies in its capacity to pinpoint research gaps, furnish a theoretical framework, and offer guidance for research design and methodology. This process aids in preventing redundancy and aids in formulating hypotheses and research inquiries. Through the examination of

prior studies, it identifies critical variables and indicators, thereby bolstering the credibility and validity of the research. Additionally, the literature review aids in recognizing methodological shortcomings, compiling a comprehensive bibliography, and shaping implications and recommendations for the study.

Table 1

Meta Table for Empirical Review

Writer	Topic	Objectives	Methodology	Findings
Soto, Asis, Norabuena and Avalos (2023)	Predictable inventory management within dairy supply chain operations	To analyze existing dairy supply chain (DSC) optimization strategies	descriptive statistics	AI/ML-based methods are quickly becoming the preferred method
Panta and Paswan (2023)	Exploring trade prospects of Chhurpi and the present status of Chhurpi producers and exporters of Nepal	To investigate the current status of producers and exporters of Chhurpi and the crosscutting issues of the Chhurpi trade	Survey method	exporting companies are making annual average growth of 10–11% from the last five fiscal years resulting in an increment of export
Kireeti and Kumar (2022)	A Study on Inventory Management in Dodla Dairy Ltd	To study the inventory management practices of Dodla Dairy Pvt Ltd, to analyze the inventory control techniques of Dodla Dairy Pvt Ltd and to know the effective utilization of inventory.	An analytical research technique w	By strictly following inventory management techniques like EOQ, ABC analysis which can increase its profits
Malik, Gahlawat and Yadav (2022)	Application of Optimization Techniques in the Dairy Supply Chain: A Systematic Review	To explore optimization techniques applied in the dairy supply chain (DSC) and assess their impact on improving operational efficiency	Descriptive statistics	highlights the benefits and implications of optimization techniques throughout the DSC
Collins and Patrick (2021)	inventory management practices and the performance of milk processing firms in kiambu county in Kenya	To assess the impact of various inventory management practices on the performance of milk processing firms in the region	Survey and primary questionnaires/ Quantitative	Perpetual Stock Taking and the Just In Time model have positive and significant effects on firm performance
Rao and Nayak (2017)	A study on the effectiveness of inventory management and control system in a milk producer organization	To assess the performance of the organization's inventory management system and identify areas for improvement.	a mixed-method approach, combining surveys, interviews, and quantitative analysis of inventory data	overstocking, understocking, and forecasting accuracy are identified as key challenges

Khadka (2013)	Inventory Management of DDC	Analyzing DDC's current inventory management position, identifying and addressing inventory management problems, determining the optimum inventory levels to minimize costs	ABC analysis	Underscores the importance of aligning purchasing practices with EOQ principles, maintaining appropriate inventory levels relative to fixed assets and profitability.
Neupane (2013)	Inventory Management System in Dairies in Nepal	To analyze the budget target and its actual achievement along with the reason of deviation	Descriptive and analytical research methodology	Company's sales trend found 14% increasing but not satisfactory as growth trend was fluctuating. The company's collection expense is more than 85 percent share of expenses of DDC.
Ghimire (2011)	Supply Policy and Inventory Management of DDC	To find out what techniques have been applied by those companies to manage the inventory and suggest using the scientific techniques to help to reduce cost for the purpose.	Descriptive and survey methodology	Lack of effective and efficient inventory management system and because of un- systematic planning there is a large amount of mon
Chaudhary (2010)	Inventory Management	Maintaining appropriate levels of capital investment in inventory	ABC analysis and EOQ analysis	The study highlights the need for closer examination of inventory-to-sales ratios to better understand the relationship between inventory management practices and financial performance over time.
Rawal (2009)	A Comparative Analysis on Inventory Management of Dairy Development Corporation and Sitaram Gokul Milk Pvt. Ltd.	To identify challenges, assess the impact on profitability, and recommend improvements in inventory management systems	Quantitative and descriptive	the lack of timely improvements in inventory management, resulting in the inefficient allocation of resources
Poudel (2008)	Inventory Management System in DDC	To study trends in cost and profit, exploring the relationship between Cost, Volume, and Profit (CVP)	Quantitative and descriptive	Identified a lack of effective cost control techniques and plans for cost reduction within DDC

2.4.1 Review of Articles and Journals

Soto, Asis, Norabuena and Avalos (2023) conducted a study on "Predictable inventory management within dairy supply chain operations" with the purpose of analyze existing dairy supply chain (DSC) optimization strategies and to look for ways in which DSC could be further improved. The study tends to enhance the

operational excellence and continuous improvements of optimization strategies for DSC management. For this study, the authors relied on descriptive statistics. As a result of this modernization initiative, dairy sector has been able to boost operational efficiency by using cutting-edge optimization strategies. Historically, DSC researchers have relied on mathematical modeling tools, but recently authors have started using artificial intelligence (AI) and ML-based approaches. While mathematical modeling-based methods are still most often used, AI/ML-based methods are quickly becoming the preferred method. During the transit phase, cloud computing, shared databases and software actually transmit data to distributors, logistics companies and retailers. The company has developed comprehensive deployment, distribution and storage space selection methods as well as a supply chain road map.

Malik, Gahlawat and Yadav (2022) examined the application of optimization techniques in the dairy supply chain. The objective of this study was to explore optimization techniques applied in the dairy supply chain (DSC) and assess their impact on improving operational efficiency. Following PRISMA guidelines, a systematic review approach was employed. Descriptive statistics were utilized for analysis. The dairy industry's modernization has facilitated the implementation of effective optimization techniques, with researchers increasingly shifting from mathematical modeling to artificial intelligence (AI) and machine learning (ML) approaches. While mathematical modeling techniques remain prevalent (56% of articles), AI and ML-based methods are gaining momentum, appearing in approximately 44% of articles. In conclusion, the review highlights the benefits and implications of optimization techniques throughout the DSC, demonstrating how advancements in technology have influenced supply chain operations at every stage.

Kireeti and Kumar (2022) investigated inventory management practices within Dodla Dairy Ltd. in Palamaner. The objective of the study were to study the inventory management practices of Dodla Dairy Pvt Ltd, to analyze the inventory control techniques of Dodla Dairy Pvt Ltd and to know the effective utilization of inventory. The study employs an analytical research technique as research methodology. Data is collected from various departments within Dodla Dairy Ltd. and analyzed using statistical techniques.
Findings indicates the company by strictly following inventory management techniques like EOQ, ABC analysis which can increase its profits. The study highlights the importance

of effective inventory management in enhancing operational efficiency and competitiveness within the dairy industry.

Collins and Patrick (2021) delves into the challenges and opportunities facing milk production and processing in Kenya, with a focus on Kiambu County in an article entitled inventory management practices and the performance of milk processing firms in kiambu county in Kenya. The primary objective of the reviewed study is to assess the impact of various inventory management practices on the performance of milk processing firms in the region. The research methodology involves surveying seventy-eight active milk processing firms, employing a census sampling technique and targeting inventory managers responsible for stock management. Quantitative data collected through self-administered questionnaires are analyzed using statistical software. Findings indicate that Perpetual Stock Taking and the Just In Time model have positive and significant effects on firm performance. The study recommends the adoption of mechanisms to enhance inventory management practices, such as perpetual review and spot checks, as well as implementing systems like the Kanban system and pull production. Concluded as, effective inventory management plays a crucial role in optimizing milk production and processing operations in Kiambu County. By implementing sound inventory management practices, milk processing firms can enhance operational efficiency.

Rao and Nayak (2017) examines the effectiveness of inventory management and control systems within a milk producer organization. The primary objective is to assess the performance of the organization's inventory management system and identify areas for improvement. Methodologically, the study employs a mixed-method approach, combining surveys, interviews, and quantitative analysis of inventory data. Data is collected from the organization's inventory managers and analyzed using statistical techniques. The study compares inventory management practices across different departments within the organization and benchmarks them against industry standards. Findings indicate that while the organization demonstrates strengths in certain aspects of inventory management, such as order fulfillment and inventory turnover, there are also areas for improvement. Specifically, issues related to overstocking, understocking, and forecasting accuracy are identified as key challenges. Recommendations for enhancing inventory management effectiveness include implementing technology-driven solutions, improving forecasting methods, and optimizing inventory control processes. Overall, the study underscores the

importance of effective inventory management in enhancing operational efficiency and competitiveness within the dairy industry.

2.4.2 Review of Unpublished Dissertations

Panta and Paswan (2023) undertook a study to assess the current status of Chhurpi producers and exporters, as well as the overarching issues in the Chhurpi trade. The study, conducted in July/August 2021, utilized distinct questionnaires tailored for exporters and producers. Five municipalities in Ilam were purposively selected for producers, while Kathmandu served as the study area for exporters. Notably, the study was conducted amidst the COVID-19 pandemic. Analysis of the collected data revealed that exporting companies have experienced an average annual growth of 10–11% over the past five fiscal years, leading to increased export volumes. As annual sales rise, exporters are witnessing a corresponding surge in profits, averaging between 10–15% of sales annually. However, the percentage of annual export decreased in the fiscal year 2020/21 due to the impact of COVID-19, resulting in decreased demand and subsequently lower production. The study demographic predominantly comprised educated, middle-aged male respondents, with Brahmin and Chhetri ethnic groups being predominant among producers, many of whom are affiliated with cooperatives. Most producers reported annual earnings of up to NPR 5 lakhs (USD 3817) solely from Chhurpi. Price discrepancies between wholesalers and retailers were observed in the production areas. Additionally, producers commonly faced challenges such as feed shortages, animal diseases, and the need for breed improvement. The study suggests that the government should establish Foot and Mouth Disease-free zones in production areas through specific legislation to facilitate further export expansion into new markets.

Khadka (2013) provides valuable insights into DDC's inventory management practices and the challenges faced in optimizing inventory levels to minimize costs and enhance operational efficiency. The study aims to achieve several objectives, including analyzing DDC's current inventory management position, identifying and addressing inventory management problems, determining the optimum inventory levels to minimize costs, assessing the corporation's utilization of inventory resources, and providing recommendations based on major findings. The findings underscore the importance of aligning purchasing practices with EOQ principles, maintaining appropriate inventory levels relative to fixed assets and profitability, and implementing effective inventory management strategies to address financial

challenges. Recommendations based on these findings are essential for stakeholders to improve DDC's inventory management practices and drive organizational performance. The study employs ABC analysis as the methodology to evaluate inventory management practices. This approach allows for the classification of inventory items based on their relative importance, enabling DDC to allocate resources effectively and prioritize inventory management efforts.the study examines DDC's reorder points, inventory-to-fixed assets ratios, and inventory-to-net profit ratios across different fiscal years. The analysis indicates fluctuations in these ratios, with some years exhibiting satisfactory levels while others indicate inefficiencies and financial losses. Notably, the inventory-to-fixed assets ratio in 2064/065 suggests good efficiency in inventory management, while inventory-to-net profit ratios show positive values in only two fiscal years, indicating financial challenges faced by DDC.

Neupane (2013) investigated the problems associated with inventory management system of dairy industry in Nepal with the major objectives to analyze the budget target and its actual achievement along with the reason of deviation, to analyze the trend of expenses & cost variability and to explore the profitability position of DDC. The study also made effort to identify the relationship between Cost, Volume and Profit as a managerial tool of profit planning using descriptive and analytical methodology. As a findings, it was found that DDC practiced only short term planning rather than long term planning. The company’s sales trend is average 14% increasing but not satisfactory as growth was fluctuating. The company’s collection expense is more than 85 percent share of expenses of DDC. The company's variable cost covers high proportion as 92% than fixed cost in total cost amount which contribute lower contribution margin.

Ghimire (2011) conducted a study on the supply policy and inventory management practices at DDC to explore the techniques employed by the company for inventory management and suggest cost-reduction strategies using scientific methods. The researcher conducted interviews with officials and personally observed the inventory system. Data were gathered from multiple sources, and quantitative tools were utilized for analysis. The findings revealed deficiencies in the effectiveness and efficiency of DDC's inventory management system. Additionally, due to inadequate planning, substantial financial resources were being expended. The study identified economic order quantity (EOQ) as the optimal model for inventory valuation, yet DDC was not adhering to EOQ principles in purchasing decisions. Furthermore, DDC

lacked a policy for inventory categorization, treating all items equally for control purposes.

Chaudhary (2010) aimed to achieve several objectives in their study, including ensuring the availability of various types of inventory when needed, maintaining appropriate levels of capital investment in inventory, minimizing wastage during storage, and mitigating the risks of spoilage and obsolescence through the use of LIFO and FIFO methods. The methodology employed was ABC analysis and EOQ analysis. The findings of the study revealed that while the corporation was implementing inventory management techniques such as ABC analysis and EOQ analysis, their application was ineffective and lacked systematic implementation. Additionally, it was observed that the inventories to total assets ratio fluctuated inconsistently over the study period. Moreover, the inventories to net sales ratios for the past four years showed an increase, which was attributed to a decline in net sales.

Rawal (2009) conducted a comparative analysis of inventory management practices at Dairy Development Corporation (DDC) and Sitaram Gokul Milk Private Ltd. The study aimed to identify challenges, assess the impact on profitability, and recommend improvements in inventory management systems. Employing a quantitative and descriptive methodology, the author provided valuable insights into the inventory management practices of these companies. The objectives of the study were multi-faceted. It was aimed to compare the current inventory management positions of DDC and Sitaram Gokul Milk Private Ltd. This involved analyzing inventory control systems, identifying problems, and assessing the utilization of inventory resources. Additionally, the study sought to evaluate the impact of inventory management practices on profitability and recommend suggestions based on major findings and conclusions. The major findings of the study revealed several shortcomings in inventory management practices at both companies.

Poudel (2008) aimed to investigate various aspects of cost, profit, and profit planning within the context of DDC. The objectives included studying trends in cost and profit, exploring the relationship between Cost, Volume, and Profit (CVP) as a managerial tool for profit planning, analyzing the impact of CVP on profit planning, evaluating DDC's profitability and financial position, assessing budget targets and their achievement, and providing recommendations for improving DDC's financial situation. The research methodology employed was quantitative and descriptive. As a

findings, DDC primarily engaged in short-term planning rather than long-term planning, with only one year being covered. Sales trends were observed to be increasing but inconsistently fluctuating, indicating unsatisfactory growth. Variable costs were found to constitute a higher proportion of total costs compared to fixed costs, resulting in a lower contribution margin. Moreover, the study identified a lack of effective cost control techniques and plans for cost reduction within DDC. Profit trends were poor, with losses outweighing profits significantly. Furthermore, DDC lacked detailed and systematic expense plans, including fixed, variable, and semi-variable expenses, which are crucial elements for profit planning and control.

2.5 Research Gap

While there exists a growing body of literature on inventory management practices in various industries, including the dairy sector, there is a noticeable gap in research specifically focusing on the inventory management practices of dairies in Nepal. Despite the significant role of the dairy industry in Nepal's economy and its importance in meeting nutritional needs and rural livelihoods, there is limited scholarly attention given to understanding the specific challenges, strategies, and effectiveness of inventory management within this context.

Existing studies on inventory management in the dairy industry often originate from developed countries and may not fully capture the unique complexities and dynamics present in Nepal. Factors such as the country's geographical terrain, climatic variations, seasonal fluctuations in milk production, and the predominance of small-scale dairy operations contribute to a distinct inventory management landscape that warrants dedicated research attention. There have been rare studies conducted in the inventory management area in the latest past years in the context of Nepal. Furthermore, the scarcity of comprehensive empirical studies focusing on inventory management practices in Nepalese dairies limits the understanding of the specific issues faced by industry stakeholders and hinders the development of tailored strategies to optimize inventory operations and enhance overall efficiency.

Addressing this research gap is crucial for informing policy decisions, guiding industry practices, and enhancing the competitiveness and sustainability of the dairy sector in Nepal. By exploring the nuances of inventory management practices in Nepalese dairies, future research can contribute valuable insights that enable stakeholders to address challenges, improve resource allocation, minimize waste, and

ultimately enhance the sector's contribution to economic growth and food security in Nepal.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

The research design forms a crucial cornerstone of a dissertation, serving as a guide for conducting the study and addressing the research questions or hypotheses. It offers a structured plan for the entire research endeavor, delineating the strategies and methodologies to be employed in data collection and analysis.

In crafting the research design for a dissertation, several factors must be taken into account, including the research questions, objectives, and theoretical framework. In this particular study, the emphasis lies predominantly on quantitative methods.

Data and information are sourced from various repositories spanning a decade's worth of fiscal records obtained from relevant companies. Essential data points are carefully selected and organized in a manner conducive to analysis. Subsequently, the data undergo analysis utilizing appropriate financial and statistical tools. The study primarily incorporates quantitative data analysis, complemented by the administration of primary questionnaires. Both descriptive and analytical approaches are employed as necessitated by the research objectives.

3.2 Population and Sample and, sampling design

The term "Population" refers to the collective industry comprising similar types of service providers or product sellers, while "Sample" denotes a representative subset of firms selected from this industry or population. Sampling designs are methodologies employed to select a subset (sample) from a larger population for research purposes. Various common sampling designs are utilized in research, with simple random sampling being employed in this study. In this design, each member of the population has an equal probability of being selected for the sample, often facilitated through random number generators or lottery-style methods.

Given that this study focuses on the Inventory Management System of Dairy Companies in Nepal, all dairy industries across Nepal constitute the population, with Dairy Development Corporation (DDC) and Sujal Dairy Pvt. Ltd. serving as the sample for the study. Samples are drawn from distinct sectors, with one selected from

the government sector and another from the private sector. The results or conclusions derived from this study are assumed to reflect the outcomes of the entire population. Consequently, the findings from the samples provide insight into the overall performance of cooperatives within this municipality.

3.2.1 Introduction to Sample Dairies

In the dairy industry, efficient inventory management and streamlined supply chain practices are essential for maximizing profitability and maintaining competitiveness. This study focuses on two prominent dairy industry players, Dairy Development Corporation (DDC) and Sujal Dairy, aiming to explore the factors influencing their inventory management, supply chain practices, and overall profitability.

3.2.1.1 Dairy Development Corporation (DDC)

The Dairy Development Corporation (DDC) was established with the aim of meeting the growing demand for high-quality milk and dairy products at affordable prices, while also ensuring its financial stability and contributing to the national treasury through surplus revenue. Recognizing the evolving needs of consumers, efforts were made to enhance the operations of the Dairy Development Center, leading to its rebranding as the Dairy Development Board in 2019 B.S. DDC officially commenced operations on the 1st of Shrawan 2026 as a manufacturing enterprise under the Corporate Act of 2021 B.S.

In Nepal, public enterprises like DDC play a crucial role in the country's social and economic development. They are established across various sectors with diverse objectives aimed at fostering overall national progress. DDC's primary objective is to provide rural milk farmers with a stable market and fair prices, while also supplying urban consumers with hygienic, pasteurized milk and dairy products. As a public enterprise, its focus lies on serving societal needs rather than solely pursuing profit.

DDC's core mission includes ensuring rural farmers have access to a reliable market for their milk at equitable prices, while also facilitating the distribution of pasteurized milk and dairy items to urban areas. To meet the growing demand for such products, efforts are underway to establish an organized infrastructure for milk collection and to create efficient marketing channels in urban centers. In line with its public enterprise status, DDC prioritizes delivering societal benefits over profit maximization.

3.2.1.2 Sujal Dairy Pvt. Ltd.

Sujal Dairy Pvt Ltd, a subsidiary of Laxmi Group, stands out as one of Nepal's leading milk processing companies, boasting a stellar reputation spanning over a decade in the dairy industry. The company made its foray into the sector through the successful acquisition of Pokhara Milk Supply Scheme (PMSS) in 2005. Positioned as a specialist in the dairy domain, Sujal Dairy prides itself on pioneering the adoption of new ideas, technologies, production methods, and product innovations.

In line with this commitment, the Pokhara factory has already secured ISO 22000:2005 certification, while efforts are underway to obtain the same credentials for the Kathmandu facility. With nearly a decade of operational expertise, Sujal Dairy, nestled in the scenic city of Pokhara, offers a comprehensive range of dairy products, including milk, curd, ghee, ice cream, butter, nauni, paneer, and flavored milk under the brand name "Safal," emerging as the preferred choice among consumers and establishing itself as the top brand in Pokhara.

The addition of a powder plant facility marked a significant milestone, enabling Sujal Dairy to introduce Skimmed Milk Powder (SMP) for industrial use and Alpine Dairy Whitener for tea and coffee, achieving remarkable success. Driven by a commitment to innovation and consumer satisfaction, the company introduced Lovebirds Ice Cream, renowned for its creative and high-quality offerings at competitive prices, captivating ice cream enthusiasts across retail outlets and parlors.

Expanding its footprint, Sujal Dairy commenced supplying its complete range of milk products to Kathmandu, Nepal's premier metropolitan city and largest market, since 2012 AD. Today, the company enjoys widespread consumer recognition as one of the leading dairy brands, commanding a significant market share and cementing its position as a trusted name in the industry.

3.3 Nature and Sources of Data, and the Instrument of Data Collection

The study primarily relies on primary data, obtained directly from original sources through the use of questionnaires. Surveys, conducted through questionnaires or interviews with respondents, serve as the primary method for gathering factual information. Collecting primary data necessitates meticulous planning, ethical considerations, and the use of suitable data collection tools to ensure the accuracy and

reliability of the gathered information. Additionally, secondary information is gathered to assess the inventory management system and its implications on the supply chain, sales, and profits.

3.4 Methods of Analysis

The dissertation employs statistical techniques, alongside software tools such as MS Word, SPSS, and MS Excel, for data analysis and to draw research conclusions. The dataset covers a period of ten years, ranging from 2012/13 to 2021/22, and will be systematically presented in tables for ease of comparison and interpretation. A variety of statistical methods will be utilized to effectively analyze the gathered data and extract valuable insights for the study.

3.4.1 Mean

In this research, the mean serves as a fundamental statistical measure used to summarize central tendencies within the dataset. Specifically, the mean provides a simple yet informative representation of the average value of a variable across observations. In descriptive statistics, calculating the mean allows to understand the typical value of key variables such as inventory turnover, spoilage rates, and daily inventory costs. By calculating the mean, researchers can gain insights into the general level or magnitude of these variables within the dataset, facilitating comparisons across different dairy products, farms, or industries. As such, the mean plays a crucial role in quantifying and interpreting the central tendencies of the data, thereby informing analyses and decision-making processes within the dairy industry. Mean value is obtained using the below formula;

$$\text{Mean } (\bar{X}) = \frac{\sum X}{N}$$

x = Value of responses of each independent or dependent variable

N = Number of observations

$\sum$ = Sum of value of all items

3.4.2 Standard Deviation

Standard deviation is a statistical measure that quantifies the dispersion or variability of data points around the mean. It provides valuable insights into the spread of values within a dataset, offering a measure of how much individual data points deviate from

the average. For example, when examining inventory turnover, spoilage rates, or daily inventory costs, a higher standard deviation indicates greater variability among observations, while a lower standard deviation suggests more consistency or uniformity. Understanding the standard deviation is crucial for assessing the reliability and stability of data, as it helps researchers gauge the degree of dispersion and identify potential outliers or anomalies. By considering both the mean and standard deviation together, researchers can gain a comprehensive understanding of the distribution and variability of key variables within the dataset, informing more accurate analyses and decision-making processes within the dairy industry.

$$\text{Standard Deviation (SD)} = \sqrt{\frac{\sum(X-\overline{X})^2}{N}}$$

Where,

S = Standard Deviation of a sample

Σ = Sum of

X = each value in the data set

$\overline{X}$ = mean of all values in the data set

N = Number of values in the data set

3.4.3 Formulas for Inventory Management

Formulas are commonly used in inventory management to calculate various metrics and parameters. In the same way below few formulas are used for calculation in this study.

i) Economic Order Quantity Calculation (EOQ)

Under this the Economic Order Quantity (EOQ) for each inventory item using the EOQ formula is calculated. This determines the optimal order quantity that minimizes total inventory costs.

Following is the EOQ formula;

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

Where,

A = Annual Requirement

O = Ordering Cost

C = Carrying Cost

ii) Inventory Turnover Ratio

Finally, the inventory turnover ratio (cost of goods sold divided by average inventory) for each category is calculated. This indicates how quickly inventory is being sold or used up within each category.

$$Inventory\ Turnover\ Ratio\ By\ Category = \frac{Cost\ of\ Goods\ Sold}{Average\ Inventory\ Value}$$

iii) Total Inventory Cost Analysis

Calculate the total inventory cost for each inventory item, considering ordering costs, holding costs, and shortage costs. Compare the total inventory costs under different order quantities to identify cost-saving opportunities.

Total Inventory Cost=Ordering Costs + Holding Costs + Stockout Costs + Other Inventory Related Costs

3.4.4 SPSS

SPSS, or Statistical Package for the Social Sciences, is a powerful software widely used in research studies across various disciplines, particularly in social sciences. It provides researchers with a comprehensive platform for data analysis, manipulation, and visualization. From basic descriptive statistics to advanced multivariate analyses, SPSS offers a diverse array of features tailored to meet the needs of both novice and experienced researchers. Its ability to handle large datasets and produce clear, interpretable results makes it an indispensable tool in the research process, facilitating evidence-based decision-making and enhancing the rigor of scholarly inquiry. Within this study, the SPSS is used for all pertinent variables.

3.4.5 Statistical Analysis

Statistical analysis is a powerful and essential methodology used in various fields to analyze data, draw meaningful insights, and make informed decisions. It involves the application of statistical techniques to data sets, allowing researchers, analysts, and decision-makers to uncover patterns, relationships, and trends within the data. This methodology plays a crucial role in this research.

3.4.5.1 Correlation

Correlation serves as a statistical instrument utilized for gauging the degree of connection between two or more variables. When alterations in one variable prompt adjustments in another, they are deemed correlated. If the objective is to assess the connection between two variables solely, it is termed as simple correlation. The correlation coefficient is employed to quantify the extent of the association between two datasets. In this investigation, Karl Pearson's approach (utilizing SPSS) is employed to compute the correlation coefficient. This aids in discerning the level of relationship between independent and dependent variables across all samples. The correlation coefficient is typically expressed as:

$$r = \frac{\mathrm{N}\Sigma XY \ - \ (\Sigma X)(\Sigma Y)}{\sqrt{[\mathrm{N}\Sigma X2 \ - \ (\Sigma X)2]}\,\sqrt{[\mathrm{N}\Sigma Y2 \ - \ (\Sigma Y)2]}}$$

Where,

N = Numbers of pairs in observation

X = Product of the first variable

Y = Product of the second variable

3.4.6 Regression

Regression analysis, a statistical technique utilized in this research, examines the relationship between independent variables (such as Economic Order Quantity, inventory turnover, and stockout rates) and dependent variables (like profitability and supply chain management) within the dairy industry. By estimating the strength and direction of these relationships, regression analysis allows researchers to identify significant predictors and develop predictive models for forecasting future outcomes. This analysis aids dairy industry stakeholders in making informed decisions to optimize inventory management, enhance supply chain practices, and improve overall profitability.

3.5 Research Framework and Definition of Variables

The research framework is established to facilitate the research process. The second chapter's review of theories and empirical studies has influenced the development of this framework. The variables under consideration include the EOQ, Inventory

Turnover Ratio, Stockout Rates, Profitability and Supply Chain Management. The objective is to analyze and establish the interrelationship between these variables in the context of the research topic.

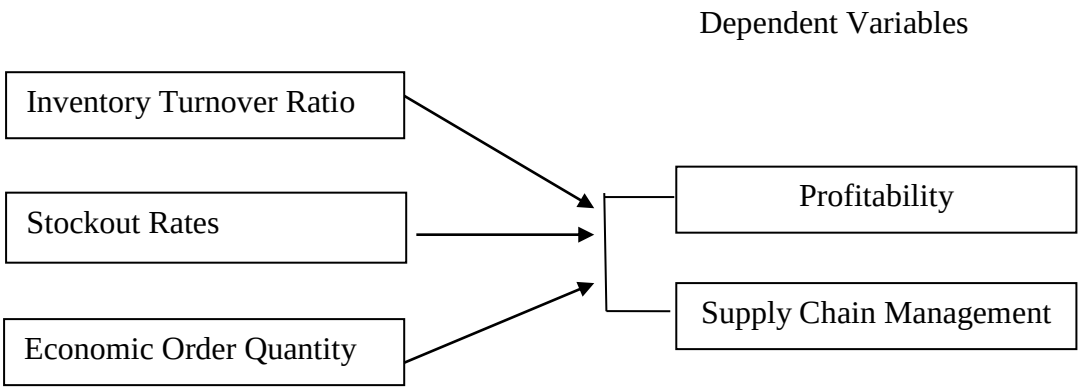

Figure 1 Conceptual Framework

Source: Khadka (2013) & Rawal (2009)

The variables can be defined as follows:

Independent variables

a) Inventory Turnover Ratio

Inventory turnover ratio measures how efficiently inventory is being managed by indicating the number of times inventory is sold or used up during a specific period. This variable reflects the effectiveness of inventory management practices and policies. A higher turnover ratio indicates efficient utilization of inventory, while a lower ratio suggests potential issues such as overstocking or underutilization of inventory.

b) Stockout Rates

Stockout rates represent the frequency or percentage of instances where inventory items are out of stock and unavailable for purchase or use. Stockout rates provide insights into the availability and accessibility of inventory items to meet demand. Lower stockout rates indicate better inventory management and customer service, while higher rates may indicate inventory management challenges or inefficiencies.

c) EOQ

EOQ represents the optimal order quantity that minimizes total inventory costs by balancing ordering costs and holding costs. EOQ calculations help determine the most cost-effective order quantity for inventory items, thereby optimizing inventory replenishment decisions. Assessing the effectiveness of EOQ method provides insights into its impact on inventory turnover, ordering costs, holding costs, and overall inventory management efficiency.

Dependent Variables

a) Profitability

Profitability, in the context of this research, refers to the financial performance of dairy industry entities, such as Dairy Development Corporation (DDC) and Sujal Dairy, as measured by the ability to generate profits from their operations. This encompasses factors such as revenue, costs, and net income, reflecting the efficiency and effectiveness of resource allocation, pricing strategies, and operational management. By analyzing profitability metrics, stakeholders can assess the financial health and sustainability of dairy operations, identify areas for improvement, and make informed decisions to optimize performance and enhance competitiveness in the market.

b) Supply Chain Management

Supply chain management, within the scope of this research, refers to the systematic coordination of various activities involved in the procurement, production, and distribution of dairy products, aimed at maximizing efficiency, minimizing costs, and ensuring timely delivery to customers. This encompasses a range of functions, including supplier relationship management, inventory control, production scheduling, transportation logistics, and customer service. Effective supply chain management entails the integration and synchronization of these activities across the entire supply chain network, from raw material suppliers to end consumers. Key metrics such as stockout rates, order frequency, transportation costs, and inventory holding costs are indicative of supply chain performance, reflecting the effectiveness of inventory management, procurement practices, and logistics operations. By optimizing supply chain management practices, dairy industry stakeholders can

streamline operations, reduce costs, mitigate risks, and ultimately enhance overall performance and competitiveness in the market.

By examining these dependent and independent variables, this study can gain a comprehensive understanding of the factors influencing inventory management performance in the dairy industry and identify opportunities for improvement and optimization.

CHAPTER IV
RESULTS AND DISCUSSION

This chapter is crucial as it presents, analyzes, and interprets the gathered data, leading to concrete results. It involves detailed analysis of the inventory management systems of the sampled Dairy industries. The chapter is divided into several parts for clarity and understanding, including presentation, analysis, interpretation, major findings, and discussion. The presentation section displays the analyzed data using tables and charts. Statistical tools mentioned in Chapter Three are used to analyze the data. Finally, the results of the analysis are interpreted, and key findings are drawn out. Both primary and secondary data are utilized for the analysis, without a distinct separation between presentation, analysis, and interpretation sections.

4.1 Analysis of Inventory Management Strategies in DDC and Sujal Dairy

Table no. 2 provides a descriptive overview of various dairy products managed by the sample dairies, detailing their storage facilities, inventory control methods, demand variability, supplier relationships, and technology utilization. Milk is stored in bulk tanks with just-in-time (JIT) inventory control, facing high demand variability and maintaining reliable supplier relationships, aided by inventory management software. Yogurt is housed in refrigerated warehouses, following a first-in-first-out (FIFO) method, with high demand variability and employing barcode scanning technology. Paneer is kept in cold storage rooms with JIT inventory control, experiencing low demand variability and utilizing inventory management software. Cheese and butter are also stored in cold storage rooms, employing batch tracking for moderate demand variability and utilizing inventory management software. Ice creams and sweets are both stored in refrigerated warehouses, utilizing batch tracking and barcode scanning systems, with ice creams facing high demand variability and sweets experiencing low demand variability.

Table 2

Descriptive Statistic of Dairy Products of DDC and Sujal Dairy

S.N.	Products	Storage Facilities	Inventory Control Method	Demand Variability	Supplier Relationships	Technology Utilization
1	Milk	Bulk Tanks	JIT	High	Reliable	Inventory software
2	Yogurt	Refrigerated warehouse	FIFO	High		Barcode scanning
3	Paneer	Cold storage rooms	JIT	Low		Inventory software
4	Cheese	Cold storage rooms	Batch Tracking	Moderate		Inventory software
5	Butter	Refrigerated warehouse	Batch Tracking	Moderate		Inventory software
6	Ice Creams	Refrigerated warehouse	Batch Tracking	High		Barcode scanning
7	Sweets	Cold storage rooms	Batch Tracking	Low		Barcode scanning

Source: Survey 2024 (DDC)

4.1.1 Inventory Management Metrics of DDC

Table 3 presents descriptive statistics of inventory management metrics within DDC's dairy industry, including inventory turnover, spoilage rate, stockout rates, and daily inventory costs.

Milk demonstrates the highest inventory turnover at 687 times per year, with a low spoilage rate of 2% and minimal stockout rates at 0.38%. Daily inventory costs for milk are the highest among the listed products at NPR 5000. Yogurt follows with an inventory turnover of 343 times per year, a slightly lower spoilage rate of 1.5%, and a higher stockout rate of 0.89%. The daily inventory cost for yogurt is NPR 3200.

Paneer exhibits an inventory turnover of 278 times per year, with a relatively higher spoilage rate of 2.4% and a low stockout rate of 0.3%. The daily inventory costs for paneer are NPR 2050. Cheese and butter have inventory turnovers of 227 and 268 times per year, respectively, with lower spoilage rates of 0.9% and 1.8% and stockout rates of 1.13% and 0.7%. Daily inventory costs for cheese and butter are NPR 1820 and NPR 2200, respectively.

Sweets show the lowest inventory turnover at 110 times per year, with the highest spoilage rate of 11% and a stockout rate of 1%. The daily inventory cost for sweets is NPR 3280. On average, across all dairy products, the mean inventory turnover is 318.83 times per year, with an average spoilage rate of 3.27%, stockout rates averaging 0.73%, and average daily inventory costs of NPR 2925. Standard deviations indicate

considerable variability in these metrics, with inventory turnover showing the highest deviation.

Table 3

Descriptive Statistics of Inventory Management Metrics in DDC

Dairy Industry	Inventory Turnover (times/year)	Spoilage Rate (%)	Stockout Rates (%)	Daily Inventory Costs (Npr)
Milk	687	2	0.38	5000
Yogurt	343	1.5	0.89	3200
Paneer	278	2.4	0.3	2050
Cheese	227	0.9	1.13	1820
Butter	268	1.8	0.7	2200
Sweets	110	11	1	3280
Mean	318.83	3.27	0.73	2925
Std Dev	213.84	3.72	0.33	1514.62

Source: Field Survey, 2024

4.1.2 Inventory Management Metrics of Sujal Dairy

Table 4 outlines the descriptive statistics of inventory management metrics within Sujal Dairy's dairy industry, including inventory turnover, spoilage rate, stockout rates, and daily inventory costs. Milk leads with an inventory turnover of 648 times per year, accompanied by a low spoilage rate of 1.7% and minimal stockout rates at 0.3%. The daily inventory cost for milk is NPR 4000. Yogurt follows with an inventory turnover of 310 times per year, a slightly lower spoilage rate of 1.2%, and stockout rates at 0.78%. The daily inventory cost for yogurt is NPR 3400.

Paneer exhibits an inventory turnover of 246 times per year, with a spoilage rate of 2% and stockout rates at 0.4%. The daily inventory costs for paneer are NPR 1800. Cheese and butter have inventory turnovers of 202 and 276 times per year, respectively, with lower spoilage rates of 0.8% and 1.5%, and stockout rates of 1.2% and 0.9%. Daily inventory costs for cheese and butter are NPR 1650 and NPR 1600, respectively.

Sweets show the lowest inventory turnover at 140 times per year, with the highest spoilage rate of 10% and a stockout rate of 2%. The daily inventory cost for sweets is NPR 2800.

On average, across all dairy products, the mean inventory turnover is 303.67 times per year, with an average spoilage rate of 3.2%, stockout rates averaging 0.83%, and average daily inventory costs of NPR 2541.67. Standard deviations indicate notable variability in these metrics, with inventory turnover exhibiting the highest deviation.

Table 4

Descriptive Statistics of Inventory Management Metrics in Sujal Dairy

Dairy Industry	Inventory Turnover (times/year)	Spoilage Rate (%)	Stockout Rates (%)	Daily Inventory Costs (Npr)
Milk	648	1.7	0.3	4000
Yogurt	310	1.2	0.78	3400
Paneer	246	2	0.4	1800
Cheese	202	0.8	1.2	1650
Butter	276	1.5	0.9	1600
Sweets	140	10	2	2800
Mean	303.67	3.2	0.83	2541.67
Std Dev	229.33	2.91	0.78	922.74

Source: Field Survey 2024

4.1.3 Comparison of Results

Table 5 compares inventory management metrics between DDC and Sujal Dairy, several notable differences emerge. Firstly, in terms of inventory turnover, DDC has a slightly higher mean turnover of 318.83 times per year compared to Sujal Dairy's mean turnover of 303.67 times per year. However, there is greater variability in turnover within Sujal Dairy, indicated by its higher standard deviation of 229.33 compared to DDC's 213.84. Regarding spoilage rates, both companies have fairly similar mean rates, with DDC at 3.27% and Sujal Dairy at 3.2%. However, there is greater variability in spoilage rates within DDC, as evidenced by its higher standard deviation of 3.72 compared to Sujal Dairy's 2.91.

Stockout rates also demonstrate a slight difference, with DDC experiencing a mean rate of 0.73% compared to Sujal Dairy's slightly higher mean rate of 0.83%. Again, DDC exhibits less variability in stockout rates with a standard deviation of 0.33, while Sujal Dairy shows more variability with a standard deviation of 0.78.

When it comes to daily inventory costs, DDC has a higher mean cost of NPR 2925 compared to Sujal Dairy's mean cost of NPR 2541.67. Interestingly, while DDC has a

higher mean cost, Sujal Dairy demonstrates greater variability in daily inventory costs, indicated by its lower standard deviation of 922.74 compared to DDC's 1514.62.

In summary, DDC generally maintains slightly higher mean values across inventory turnover, spoilage rates, and daily inventory costs compared to Sujal Dairy. However, Sujal Dairy exhibits less variability in these metrics, suggesting potentially tighter control over its inventory management processes.

Table 5

Comparison of Inventory Management Metrics Between DDC and Sujal Dairy

Metric	DDC Mean	Sujal Dairy Mean	DDC Std Dev	Sujal Dairy Std Dev
Inventory Turnover	318.83	303.67	213.84	229.33
Spoilage Rate (%)	3.27	3.2	3.72	2.91
Stockout Rates (%)	0.73	0.83	0.33	0.78
Daily Inventory Costs (Npr)	2925	2541.67	1514.62	922.74

Source: Table no. 3 and 4

4.1.4 Respondent's Response on Operational Efficiency

When evaluating respondents' views on operational efficiency, their feedback provides crucial insights into the effectiveness of the Sample dairies of the study. Through structured questionnaires, respondents rate various aspects of efficiency, such as quality control, profitability and supply chain management etc. Using a scoring system, respondents indicate the level of efficiency across different operational areas. Analyzing these scores helps the dairies identify strengths and areas for improvement, guiding strategic initiatives to enhance operational effectiveness and foster sustainable growth.

4.1.4.1 Analysis of Quality and Operational Efficiency

Table 6 provides a comparison of quality and operational efficiency between DDC and Sujal Dairy. Both dairy farms adhere to ISO 22000:2005 quality control standards, ensuring a high level of quality assurance in their processes. DDC achieves a quality assurance score of 95 out of 100, slightly higher than Sujal Dairy's score of 90, indicating a marginally stronger commitment to quality standards.

In terms of production efficiency, DDC demonstrates a higher efficiency of 300 liters per man-hour compared to Sujal Dairy's 250 liters per man-hour. This suggests that DDC's production processes are slightly more streamlined and productive, potentially resulting in higher output with the same level of manpower.

When considering equipment maintenance costs, DDC incurs a higher annual cost of NPR 100,000 compared to Sujal Dairy's cost of NPR 75,000. This could imply that DDC either has more sophisticated or extensive equipment requiring higher maintenance expenses, or it may indicate differences in maintenance practices between the two dairy farms. Employee training hours per month are slightly higher at DDC, with 20 hours compared to Sujal Dairy's 15 hours. This suggests that DDC places a slightly greater emphasis on employee training and development to ensure operational excellence and adherence to quality standards.

In terms of energy consumption, DDC utilizes slightly more energy, with a monthly consumption of 1800 kWh compared to Sujal Dairy's 1500 kWh. This could be attributed to differences in the scale of operations, equipment efficiency, or operational practices between the two dairy farms. Both DDC and Sujal Dairy employ recycling and composting as their waste management methods, indicating a commitment to environmental sustainability. However, DDC incurs a higher monthly waste disposal cost of NPR 2000 compared to Sujal Dairy's cost of NPR 1500. This could be due to differences in waste volume or disposal methods between the two farms.

Table 6

Quality and Operational Efficiency Comparison of DDC and Sujal Dairy

Dairy Farm	**DDC**	**Sujal Dairy**
Quality Control Method	ISO 22000:2005	ISO 22000:2005
Quality Assurance Score (out of 100)	95	90
Production Efficiency (liters/man-hour)	300	250
Equipment Maintenance Cost (NPr/year)	100000	75000
Employee Training Hours (per month)	20	15
Energy Consumption (kWh/month)	1800	1500
Waste Management Method	Recycling and Composting	Recycling and Composting
Waste Disposal Cost (Npr/month)	2000	1500

Source: Field Survey 2024

4.1.5 Procurement and Logistics Practices

Table 7 presents a comparison of procurement and logistics practices between DDC and Sujal Dairy. Both dairy farms procure their raw materials (Milk) from farmers and cooperatives, indicating a similar sourcing strategy. However, DDC appears to have slightly higher supplier satisfaction and reliability scores, with ratings of 8 and 7 respectively, compared to Sujal Dairy's scores of 7 and 6. This suggests that DDC's relationships with its suppliers may be slightly stronger or more satisfactory.

In terms of order frequency, DDC places more frequent orders, with an average of 60 orders per month, compared to Sujal Dairy's 56 orders per month. Additionally, DDC's average order size is larger at 1200 liters, whereas Sujal Dairy's average order size is 1000 liters. These differences in order frequency and size could reflect variations in production capacity, demand patterns, or inventory management strategies between the two dairy farms. Both DDC and Sujal Dairy utilize refrigerated tanks for transportation, indicating a commitment to maintaining product quality during transit. The transportation cost is the same for both farms at NPR 2000, suggesting similar transportation methods and distances traveled. However, DDC incurs a higher monthly inventory holding cost of NPR 65,000 compared to Sujal Dairy's cost of NPR 54,000. This could be due to differences in inventory management practices, such as stocking higher volumes or maintaining larger inventories to meet demand fluctuations.

Table 7

Comparison of Procurement and Logistics Practices between DDC and Sujal Dairy

Dairy Farm	DDC	Sujal Dairy
Procurement Method	Farmers & Co-operatives	Farmers & Co-operatives
Supplier Satisfaction (out of 10)	8	7
Supplier Reliability (out of 10)	7	6
Order Frequency (per month)	60	56
Average Order Size (liters)	1200	1000
Transportation Mode	Refrigerated tanks	Refrigerated tanks
Transportation Cost (Npr)	2000	2000
Inventory Holding Cost (Npr/month)	65000	54000

Source: Field Survey 2024

4.1.6 Comparative Analysis of Profitability, Supply Chain Management, and Inventory Costs between DDC and Sujal Dairy

In the table no. 8, DDC is rated slightly higher with a score of 9 out of 10, indicating excellent performance in generating profits. Sujal Dairy follows closely behind with a score of 8 out of 10, reflecting a commendable level of profitability as well. Where, Supply chain management is another area of strength for both DDC and Sujal Dairy, with both receiving a score of 8 out of 10.

Analyzing the inventory costs through the score, both DDC and Sujal Dairy again receive the same score of 8 out of 10. This indicates that both companies have implemented efficient inventory management practices, balancing the costs associated with holding inventory while ensuring adequate stock levels to meet demand. Both DDC and Sujal Dairy demonstrate strong performance across profitability, supply chain management.

Table 8

Comparative Analysis of Profitability, Supply Chain Management, and Inventory Costs between DDC and Sujal Dairy

Dairy Industry	Profitability (Out of 10)	Supply Chain Management (Out of 10)	Inventory Cost (Out of 10)
DDC	9	8	8
Sujal Dairy	8	8	8

Source: Field Survey, 2024

4.2 Analysis of Milk Requirement as Raw Material in Dairy Industry

As milk is the raw material of all dairy industries, it has the vital role in other dairy products productions. Survey data found both Sujal Dairy and DDC are one of the largest dairy producers in Nepal. Both of the industries makes a large turnover of milk procurement in a daily or twice in a day basis. It is significant to find out the EOQ of milk in the sample industries. Questions as required were asked and answers were received. In both industry, the answers were approximately averaged based on past data. EOQ is calculated.

4.2.2 Economic Order Quantity (EOQ)

Table 9 presents the Economic Order Quantity (EOQ) calculations for sample dairies, including DDC and Sujal Dairy, based on their daily requirement in liters, carrying cost in Rs. per liter, and ordering cost in Rs. per order. For DDC, with a daily requirement of 12,000 liters, carrying cost of Rs. 2 per liter, and ordering cost of Rs. 500 per order, the calculated EOQ is 2,449.49 liters. Similarly, Sujal Dairy's EOQ is determined to be 1,858 liters, given its daily requirement of 6,500 liters, carrying cost of Rs. 1.8 per liter, and ordering cost of Rs. 478 per order. The mean EOQ across all dairies is calculated to be 2,153.75 liters, with a standard deviation of 305.88 liters. These EOQ figures indicate the optimal order quantity for each dairy to minimize the total inventory costs, considering both carrying and ordering costs. However, the difference in EOQ between DDC and Sujal Dairy indicates that Sujal Dairy operates with a smaller inventory size, potentially reflecting different production capacities or market demands between the two dairies.

Table 9

Economic Order Quantity

Dairies	Daily Requirement (A)	Carrying Cost (C)	Ordering Cost (O)	EOQ (ltr)
DDC	12000	2	500	2449.49
Sujal Dairy	6500	1.8	478	1858
Mean	**9250**	**1.9**	**489**	**2153.75**
Std Dev	**3010.83**	**-**	**-**	**305.88**

Source: Field Survey 2024

4.3 Correlation Between Dependent Variables and Independent Variables

Analyzing the correlation between independent variables like inventory turnover ratio, stockout rates, EOQ, and dependent variables such as profitability and supply chain management offers valuable insights into organizational performance. Inventory turnover ratio reflects how efficiently a company manages its inventory, while stockout rates indicate the frequency of inventory shortages, and EOQ represents the optimal inventory level. Profitability signifies financial performance, and supply chain management encompasses operational effectiveness.

Understanding these correlations helps identify how changes in inventory management affect financial outcomes and supply chain effectiveness. For example, a positive correlation between inventory turnover ratio and profitability suggests efficient inventory management leads to higher profits. Similarly, a strong correlation between EOQ and supply chain management indicates optimizing order quantities improves supply chain efficiency.

4.3.1 Correlation Analysis of Independent Variables with "Profitability" in DDC

Table no. 10 present the correlation between independent variables and dependent variable profitability. The result shows, there is a strong positive correlation (Pearson's $r = 0.642$, $p = 0.002$) between profitability and inventory turnover ratio. This suggests that as inventory turnover increases, profitability tends to increase as well. There is a weak negative correlation (Pearson's $r = -0.243$, $p = 0.303$) between profitability and stockout rates. However, this correlation is not statistically significant at the 0.01 level. There is a very strong positive correlation (Pearson's $r = 0.840$, $p = 0.000$) between profitability and EOQ. This indicates that as EOQ increases, profitability also tends to increase significantly.

Table 10

Correlations Between Independent Variables and Profitability in DDC

		Profitability	Inventory Turnover Ratio	Stockout Rates	EOQ
Profitability	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	20			
Inventory Turnover Ratio	Pearson Correlation	.642**	1		
	Sig. (2-tailed)	0.002			
	N	20	20		
Stockout Rates	Pearson Correlation	0.243	0.126	1	
	Sig. (2-tailed)	0.303	0.597		
	N	20	20	20	
EOQ	Pearson Correlation	.840**	.764**	0.289	1
	Sig. (2-tailed)	0.000	0.000	0.217	
	N	20	20	20	20

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

Source: Field Survey, 2023

4.3.2 Correlation Analysis of Independent Variables with "Supply Chain Management" in DDC

Table no. 11 presents the correlation between independent variables and dependent variable supply chain management in DDC. The result shows, there is a strong positive correlation (Pearson's r = 0.579, p = 0.007) between inventory turnover ratio and supply chain management. This indicates that higher inventory turnover ratios are associated with more effective supply chain management practices.

There is a weak positive correlation (Pearson's r = 0.250, p = 0.288) between stockout rates and EOQ. However, this correlation is not statistically significant at the 0.01 level. There is a moderate positive correlation (Pearson's r = 0.408, p = 0.074) between stockout rates and supply chain management. Although not statistically significant at the 0.01 level, this suggests that higher stockout rates may be associated with less effective supply chain management. There is a very strong positive correlation (Pearson's r = 0.612, p = 0.004) between EOQ and supply chain management. This

indicates that higher EOQ values are associated with more effective supply chain management practices.

Table 11

Correlations Between Independent Variables and Supply Chain Management in DDC

		Inventory Turnover Ratio	Stockout Rates	EOQ	Supply Chain Management
Inventory Turnover Ratio	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	20			
Stockout Rates	Pearson Correlation	0.055	1		
	Sig. (2-tailed)	0.819			
	N	20	20		
EOQ	Pearson Correlation	.764**	0.250	1	
	Sig. (2-tailed)	0.000	0.288		
	N	20	20	20	
Supply Chain Management	Pearson Correlation	.579**	0.408	.612**	1
	Sig. (2-tailed)	0.007	0.074	0.004	
	N	20	20	20	20

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

Source: Field Survey, 2024

4.3.3 Correlation Analysis of Independent Variables with "Profitability" in Sujal Dairy

Table no. 12 presents the correlation between independent variables and dependent variable profitability in Sujal Dairy. The result shows that there is a moderate positive correlation (Pearson's r = 0.390, p = 0.089) between inventory turnover ratio and profitability. However, this correlation is not statistically significant at the 0.05 level. There is a moderate positive correlation (Pearson's r = 0.453, p = 0.045) between EOQ and profitability. This correlation is statistically significant at the 0.05 level, suggesting that there is a relationship between EOQ and profitability in Sujal Dairy. There is a moderate positive correlation (Pearson's r = 0.390, p = 0.089) between stockout rates and profitability.

Table 12

Correlations Between Independent Variables and Profitability in Sujal Dairy

		Inventory Turnover Ratio	EOQ	Stockout Rates	Profitability
Inventory Turnover Ratio	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	20			
EOQ	Pearson Correlation	.818**	1		
	Sig. (2-tailed)	0.000			
	N	20	20		
Stockout Rates	Pearson Correlation	.798**	.616**	1	
	Sig. (2-tailed)	0.000	0.004		
	N	20	20	20	
Profitability	Pearson Correlation	0.390	.453*	0.390	1
	Sig. (2-tailed)	0.089	0.045	0.089	
	N	20	20	20	20

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

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Field Survey, 2024

4.3.4 Correlation Analysis of Independent Variables with "Supply Chain Management" in Sujal Dairy

Table no. 13 presents the correlation between independent variables and dependent variable supply chain management in Sujal Dairy. The result shows that there is a moderate positive correlation (Pearson's r = 0.394, p = 0.086) between inventory turnover ratio and supply chain management. However, this correlation is not statistically significant at the 0.05 level.

There is a moderate positive correlation (Pearson's r = 0.414, p = 0.069) between EOQ and supply chain management. Similarly to the correlation between inventory turnover ratio and supply chain management, this correlation is not statistically significant at the 0.05 level. There is a strong positive correlation (Pearson's r = 0.596, p = 0.006) between stockout rates and supply chain management. This correlation is statistically significant at the 0.01 level, indicating that there is a relationship between stockout rates and the effectiveness of supply chain management in Sujal Dairy.

Table 13

Correlations Between Independent Variables and Supply Chain Management in Sujal Dairy

		Inventory Turnover Ratio	EOQ	Stockout Rates	Supply Chain Management
Inventory Turnover Ratio	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	20			
EOQ	Pearson Correlation	.818**	1		
	Sig. (2-tailed)	0.000			
	N	20	20		
Stockout Rates	Pearson Correlation	.798**	.616**	1	
	Sig. (2-tailed)	0.000	0.004		
	N	20	20	20	
Supply Chain Management	Pearson Correlation	0.394	0.414	.596**	1
	Sig. (2-tailed)	0.086	0.069	0.006	
	N	20	20	20	20

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

Source: Field Survey, 2024

4.4 Regression Analysis

In the upcoming regression analysis, deeper exploration into the relationship between various independent variables (such as inventory turnover ratio, Economic Order Quantity (EOQ), and stockout rates) and two crucial dependent variables: profitability and supply chain management will be undertaken. Drawing from the correlations observed in the research, regression models will be constructed to elucidate how fluctuations in these independent variables impact profitability and the effectiveness of supply chain management in both DDC and Sujal Dairy.

Conducting regression analysis separately for DDC and Sujal Dairy aims to unveil distinct insights into the drivers of profitability and supply chain performance within each dairy industry. Through regression modeling, the aim is to quantify the magnitude and significance of these relationships, thereby furnishing valuable insights for strategic decision-making and operational optimization within the dairy industry.

4.4.1 Regression Analysis of Variables in DDC

Table no. 14 is the ANOVA table for the regression model predicting profitability in DDC reveals important insights into the relationship between the independent variables (EOQ, stockout rates, and inventory turnover ratio) and profitability. The regression model as a whole is statistically significant ($F = 3.409$, $p = 0.042$), indicating that at least one of the independent variables has a significant impact on profitability. This suggests that the model has predictive power in explaining the variability observed in profitability within DDC.

Upon closer examination of the individual predictors, we find that EOQ, stockout rates, and inventory turnover ratio collectively account for a significant portion of the variability in profitability, as evidenced by the regression sum of squares (1.431) and the associated p-value (0.042). This indicates that these independent variables, when considered together, contribute significantly to explaining the observed differences in profitability among different periods or scenarios within DDC.

The mean square for the regression (0.477) compared to the residual mean square (0.140) suggests that the variability explained by the regression model is larger than the unexplained variability, further supporting the model's efficacy in predicting profitability. Overall, the ANOVA table underscores the importance of considering EOQ, stockout rates, and inventory turnover ratio in understanding and potentially improving profitability within DDC's operations.

Table 14

ANOVA Table for Regression Model Predicting Profitability in DDC

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.431	3	0.477	3.409	.042[b]
	Residual	2.379	17	0.140		
	Total	3.810	20			

a. Dependent Variable: Profitability

b. Predictors: (Constant), EOQ, Stockout Rates, Inventory Turnover Ratio

Source: Field Survey, 2024

Table no. 15 is the ANOVA table for the regression model predicting supply chain management in DDC illustrates significant findings regarding the relationship between the independent variables (EOQ, stockout rates, and inventory turnover ratio) and supply chain management. The regression model as a whole is highly statistically significant ($F = 10.026$, $p < 0.001$), indicating that the combined impact of the independent variables on supply chain management is significant.

Examining the individual predictors reveals that EOQ, stockout rates, and inventory turnover ratio collectively explain a substantial portion of the variability in supply chain management within DDC. The regression sum of squares (3.286) and associated p-value ($p < 0.001$) suggest that these independent variables significantly contribute to explaining the observed differences in supply chain management performance.

The mean square for the regression (1.095) compared to the residual mean square (0.109) indicates that the variability explained by the regression model is considerably larger than the unexplained variability, underscoring the model's effectiveness in predicting supply chain management. The ANOVA table emphasizes the importance of considering EOQ, stockout rates, and inventory turnover ratio in understanding and enhancing supply chain management practices within DDC.

Table 15

ANOVA Table for Regression Model Predicting Supply Chain Management in DDC

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.286	3	1.095	10.026	.000b
	Residual	1.857	17	0.109		
	Total	5.143	20			

a Dependent Variable: Supply Chain Management

b Predictors: (Constant), EOQ, Stockout Rates, Inventory Turnover Ratio

Source: Field Survey, 2024

4.4.2 Regression Analysis of Variables in Sujal Dairy

Table 16 is the ANOVA table for the regression model predicting profitability in Sujal Dairy, notable findings emerge regarding the relationship between the independent variables (EOQ, stockout rates, and inventory turnover ratio) and profitability. The regression model as a whole demonstrates statistical significance ($F = 3.409$, $p = 0.042$), indicating that the combined impact of the independent variables on profitability is significant within Sujal Dairy.

Analysis of the individual predictors reveals that EOQ, stockout rates, and inventory turnover ratio collectively explain a substantial portion of the variability in profitability. The regression sum of squares (1.431) and associated p-value (0.042) suggest that these independent variables significantly contribute to explaining the observed differences in profitability within Sujal Dairy.

The mean square for the regression (0.477) compared to the residual mean square (0.140) indicates that the variability explained by the regression model surpasses the unexplained variability, underscoring the model's effectiveness in predicting profitability. The ANOVA table underscores the importance of considering EOQ, stockout rates, and inventory turnover ratio in understanding and potentially enhancing profitability within Sujal Dairy's operations.

Table 16

ANOVA Table for Regression Model Predicting Profitability in Sujal Dairy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.431	3	0.477	3.409	.042[b]
	Residual	2.379	17	0.140		
	Total	3.810	20			

a. Dependent Variable: Profitability

b. Predictors: (Constant), EOQ, Stockout Rates, Inventory Turnover Ratio

Source: Field Survey, 2024

Table no. 17 the ANOVA table for the regression model predicting supply chain management in Sujal Dairy, significant findings emerge regarding the relationship between the independent variables (EOQ, stockout rates, and inventory turnover ratio) and supply chain management. The regression model as a whole exhibits high statistical significance ($F = 10.026$, $p < 0.001$), indicating that the combined impact of the independent variables on supply chain management is substantial within Sujal Dairy.

Analysis of the individual predictors reveals that EOQ, stockout rates, and inventory turnover ratio collectively explain a considerable portion of the variability in supply chain management. The regression sum of squares (3.286) and associated p-value ($p < 0.001$) suggest that these independent variables significantly contribute to explaining the observed differences in supply chain management performance.

The mean square for the regression (1.095) compared to the residual mean square (0.109) indicates that the variability explained by the regression model is substantially larger than the unexplained variability, affirming the model's efficacy in predicting supply chain management. Overall, the ANOVA table underscores the importance of considering EOQ, stockout rates, and inventory turnover ratio in understanding and enhancing supply chain management practices within Sujal Dairy's operations.

Table 17

ANOVA Table for Regression Model Predicting Supply Chain Management in Sujal Dairy

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.286	3	1.095	10.026	.000[b]
	Residual	1.857	17	0.109		
	Total	5.143	20			

a. Dependent Variable: Supply Chain Management
b. Predictors: (Constant), EOQ, Stockout Rates, Inventory Turnover Ratio
Source: Field Survey, 2024

4.5 Major Findings

i. Dairy products in DDC and Sujal Dairy exhibit varying levels of demand variability, with ice creams having the highest demand variability among the products listed.
ii. Milk has the highest inventory turnover ratio of 687 times/year among the listed dairy products in DDC, indicating that milk is sold and replaced from inventory frequently compared to other products.
iii. Sweets have the highest spoilage rate with 11% among the listed dairy products in Sujal Dairy, indicating a higher likelihood of product spoilage compared to other products.
iv. DDC has higher production efficiency in terms of liters per man-hour compared to Sujal Dairy (DDC: 300 liters/man-hour; Sujal Dairy: 250 liters/man-hour).
v. DDC has a higher average order size compared to Sujal Dairy (DDC: 1200 liters; Sujal Dairy: 1000 liters), indicating potentially larger scale procurement practices.
vi. The mean Economic Order Quantity (EOQ) for both DDC and Sujal Dairy is higher than their respective daily requirements, indicating that they tend to order larger quantities less frequently, potentially to optimize ordering costs.
vii. In DDC, higher inventory turnover ratio is perceived to have a very good effect on profitability (Profitability Rating: 4) compared to Sujal Dairy (Profitability Rating: 3).
viii. Sujal Dairy and DDC exhibit similar levels of profitability, supply chain management, and inventory costs, suggesting comparable overall performance in these areas.
ix. In DDC, there is a moderately positive correlation between Economic Order Quantity (EOQ) and profitability (Pearson's $r = 0.453$, $p = 0.045$), suggesting that as EOQ increases, profitability tends to increase as well.
x. Economic Order Quantity (EOQ) in Sujal Dairy exhibits a moderate positive correlation with profitability (Pearson's $r = 0.453$, $p = 0.045$), similar to the finding in DDC.

xi. In DDC, there is a moderately positive correlation between stockout rates and supply chain management (Pearson's r = 0.408, p = 0.074), suggesting that higher stockout rates may be associated with lower effectiveness in supply chain management.

xii. Stockout in Sujal Dairy rates demonstrate a strong positive correlation with supply chain management (Pearson's r = 0.596, p = 0.006), indicating that higher stockout rates may be linked to lower effectiveness in supply chain management.

xiii. Economic Order Quantity (EOQ) in Sujal Dairy shows a moderate positive correlation with profitability (Pearson's r = 0.453, p = 0.045), similar to the finding in DDC.

xiv. In Sujal Dairy, there is a moderately positive correlation between Economic Order Quantity (EOQ) and supply chain management (Pearson's r = 0.414, p = 0.069), indicating that as EOQ increases, supply chain management tends to improve.

xv. The regression model predicting supply chain management in Sujal Dairy is highly statistically significant (F = 10.026, p < 0.001), indicating that the combined impact of EOQ, stockout rates, and inventory turnover ratio on supply chain management is substantial.

4.6 Discussion

This study aimed to investigate inventory management, supply chain practices, and profitability within dairy industries, focusing on two case studies: Dairy Development Corporation (DDC) and Sujal Dairy. The findings provide valuable insights into the factors influencing profitability and supply chain management in these dairy industries. Firstly, the descriptive statistics revealed variations in demand variability, inventory turnover, and spoilage rates among dairy products in both DDC and Sujal Dairy. This highlights the importance of understanding product-specific dynamics in inventory management and supply chain operations.

Correlation and regression analyses further elucidated the relationships between key variables such as Economic Order Quantity (EOQ), stockout rates, and inventory turnover with profitability and supply chain management supported by (Rawal, 2009). The results indicate that EOQ and inventory turnover have significant positive correlations with profitability in both DDC and Sujal Dairy, suggesting the importance of efficient inventory management practices in enhancing profitability. The

comparative analysis between DDC and Sujal Dairy highlighted similarities and differences in profitability, supply chain management, and inventory costs. While both dairy industries exhibited comparable performance in these areas, notable variations were observed in specific metrics, such as inventory turnover and spoilage rates, supports (Khadka, 2013). These differences underscore the importance of context-specific strategies tailored to the unique characteristics of each dairy operation.

The research questions addressed in this study shed light on critical aspects of inventory management, supply chain practices, and profitability within dairy industries. By examining these questions, the study contributes to a deeper understanding of the factors driving performance and offers practical implications for managerial decision-making and operational improvement. Moreover, the methodology employed in this study, including descriptive statistics, correlation analysis, regression modeling, and ANOVA testing, provided a robust framework for examining the complex relationships between variables and identifying significant predictors of profitability and supply chain management.

In conclusion, this study contributes to the literature by offering empirical insights into the dynamics of inventory management, supply chain practices, and profitability in dairy industries. The findings and discussions presented here offer valuable guidance for practitioners and policymakers seeking to enhance operational efficiency, reduce costs, and improve overall performance in the dairy sector. Further research could explore additional factors influencing profitability and supply chain management and evaluate the effectiveness of specific interventions aimed at addressing these factors.
Moreover, the strong positive correlation between stockout rates and supply chain management in Sujal Dairy underscores the critical role of inventory availability in ensuring effective supply chain operations. These findings emphasize the need for dairy industries to implement strategies to minimize stockouts and optimize inventory levels to enhance supply chain efficiency and overall profitability, supported by (Khadka, 2013).

Additionally, the ANOVA tests confirmed the significance of regression models in predicting profitability and supply chain management, validating the predictive power of the identified variables in explaining variability in these outcomes. Based on these findings, several objectives were formulated to guide future efforts in improving

inventory management, enhancing supply chain practices, and optimizing EOQ in dairy industries. These objectives aim to address the identified challenges and capitalize on opportunities for operational improvement and cost efficiency.

This study contributes to the existing literature by providing empirical evidence on the factors influencing profitability and supply chain management in dairy industries. The insights generated can inform strategic decision-making and operational optimization efforts in similar dairy contexts, ultimately contributing to improved performance and competitiveness in the industry.

CHAPTER V
SUMMARY AND CONCLUSION

After completion of any research, it requires summarization and conclusion in order to simplify the results and the finds. So, fifth chapter is the final chapter of this study and it is to make summarize and to make conclusion. The purpose of this whole study was to explore inventory management system of dairy industries of Nepal taking 2 sample dairy industries from the whole dairy industry of Nepal. This study is based on the primary questionnaires and, the data were collected from direct questionnaires from the respondents. There were no availability of secondary data in their websites. The accessibility sampling technique has been used to selection of sample of the study and descriptive and analytical both methods are used to analyze the data. The study assumes that the effectiveness of inventory management system of dairy in Nepal on specific variables such as; geographical structure, climate of the dairy industry area, access in dairy technology, proper dairy inventory knowledge etc. The results of the study revealed that the Sujal Dairy Pvt. Ltd. has kept its inventory management with low cost while DDC has low stockout rate.. Finally, conclusion, summary and necessary implications are provided in this chapter.

5.1 Summary

This study delved into the intricacies of inventory management, supply chain practices, and profitability within the dairy industry, focusing on two prominent dairies: Dairy Development Corporation (DDC) and Sujal Dairy. Through thorough analysis of descriptive statistics, significant variations were unveiled in demand patterns, inventory turnover rates, and product spoilage among dairy items in both entities. Correlation and regression analyses revealed compelling relationships between key variables such as Economic Order Quantity (EOQ), inventory turnover, and profitability, underlining the pivotal role of streamlined inventory management practices in driving profitability. Particularly noteworthy was the strong positive correlation observed between stockout rates and supply chain management in Sujal Dairy, emphasizing the criticality of inventory availability for seamless supply chain operations.

Comparative analysis between DDC and Sujal Dairy extracted both similarities and disparities in profitability, supply chain management effectiveness, and inventory costs, underscoring the necessity for bespoke strategies tailored to the unique operational shades of each dairy entity. The research questions tackled in this study provided invaluable insights into pivotal facets of inventory management, supply chain practices, and profitability, offering pragmatic implications for managerial decision-making and operational enhancement.

The robust methodology employed, spanning descriptive statistics, correlation analyses, regression modeling, and ANOVA testing, furnished a comprehensive framework for dissecting the intricate interplay of variables and identifying salient predictors of profitability and supply chain management efficacy. In essence, this study enriches the existing body of knowledge by furnishing empirical insights into the dynamics governing inventory management, supply chain practices, and profitability within dairy industries, thereby furnishing actionable guidance for stakeholders endeavoring to bolster operational efficiency and augment overall performance within the dairy sector.

This study investigated inventory management, supply chain practices, and profitability in the context of two dairy industries, Dairy Development Corporation (DDC) and Sujal Dairy. Descriptive statistics revealed variations in demand variability, inventory turnover, and spoilage rates among dairy products in both industries. Correlation and regression analyses indicated significant positive correlations between Economic Order Quantity (EOQ), inventory turnover, and profitability, emphasizing the importance of efficient inventory management practices in enhancing profitability. Additionally, strong positive correlations between stockout rates and supply chain management underscored the critical role of inventory availability in ensuring effective supply chain operations, particularly in Sujal Dairy. Comparative analysis between DDC and Sujal Dairy highlighted similarities and differences in profitability, supply chain management, and inventory costs, emphasizing the need for context-specific strategies tailored to each dairy operation's unique characteristics. The research questions addressed in the study shed light on critical aspects of inventory management, supply chain practices, and profitability, offering practical implications for managerial decision-making and operational improvement. The methodology employed, including

descriptive statistics, correlation analysis, regression modeling, and ANOVA testing, provided a robust framework for examining the complex relationships between variables and identifying significant predictors of profitability and supply chain management. Overall, the study contributes empirical insights into the dynamics of inventory management, supply chain practices, and profitability in dairy industries, offering valuable guidance for practitioners and policymakers seeking to enhance operational efficiency and improve overall performance in the dairy sector.

5.2 Conclusions

This study delved into the multidimensional realm of inventory management, supply chain practices, and profitability within the dairy industry, with a specific focus on Dairy Development Corporation (DDC) and Sujal Dairy. Through a comprehensive analysis of descriptive statistics, correlations, and regression models, several key findings emerged.

The efficient inventory management practices, characterized by optimized Economic Order Quantity (EOQ) and inventory turnover, were identified as pivotal drivers of profitability in both DDC and Sujal Dairy. The strong positive correlations between these variables underscored their significant impact on financial performance within dairy operations. The study also highlighted the critical role of inventory availability, as evidenced by the pronounced correlation between stockout rates and supply chain management effectiveness, particularly in Sujal Dairy. This underscores the importance of maintaining adequate inventory levels to ensure seamless supply chain operations and mitigate disruptions.

In addition to the immediate implications for dairy industry stakeholders, the findings of this study hold broader significance for the field of operations management. By elucidating the intricate relationships between inventory management, supply chain practices, and profitability, this research contributes valuable insights that can inform decision-making across various industries facing similar operational challenges. Moreover, the robust methodology employed in this study, combining descriptive statistics, correlation analysis, regression modeling, and ANOVA testing, sets a precedent for rigorous empirical research in the realm of inventory management and supply chain optimization. As businesses continue to navigate the complexities of global supply chains and market uncertainties, the insights gleaned from this study offer

a roadmap for enhancing operational efficiency, mitigating risks, and maximizing profitability in today's dynamic business environment. Moreover, comparative analyses between DDC and Sujal Dairy unveiled both similarities and differences in profitability, supply chain management practices, and inventory costs. These insights emphasize the need for tailored strategies to address the unique operational challenges and opportunities present in each dairy entity. Moving forward, further research could explore additional factors influencing profitability and supply chain management, as well as evaluate the effectiveness of specific interventions aimed at optimizing inventory management and enhancing supply chain practices. By continuing to deepen our understanding of these dynamics, we can pave the way for sustainable growth and competitiveness within the dairy sector.

At the end, this study contributes empirical evidence to the existing literature on inventory management, supply chain practices, and profitability within the dairy industry. The findings offer actionable insights for practitioners and policymakers seeking to enhance operational efficiency, reduce costs, and improve overall performance in dairy operations.

5.3 Implications

A) Implications forSample Dairies of the Studies

i. Both DDC and Sujal Dairy should prioritize optimizing inventory turnover and minimizing stockouts through refined forecasting, adjusted ordering practices, and enhanced monitoring systems to ensure optimal inventory levels while minimizing carrying costs..

ii. Given the significant impact of stockout rates on supply chain management effectiveness, DDC and Sujal Dairy should prioritize efforts to strengthen supply chain resilience. This may involve enhancing supplier relationships, diversifying sourcing options, and implementing contingency plans to mitigate supply disruptions and ensure continuous product availability.

iii. Embracing advanced technology and data analytics can provide valuable insights for both DDC and Sujal Dairy to improve decision-making and operational efficiency. Implementing inventory management software, predictive analytics tools, and IoT-enabled sensors can enable real-time

monitoring of inventory levels, demand patterns, and supply chain performance, facilitating proactive decision-making and optimization.

iv. Both DDC and Sujal Dairy should assess and optimize their Economic Order Quantity (EOQ) to align with daily requirements and minimize carrying costs while ensuring sufficient inventory levels to meet demand. Conducting regular EOQ analyses and adjusting ordering practices accordingly can help optimize inventory levels and reduce unnecessary inventory holding costs.

v. Recognizing the dynamic nature of the dairy industry and changing market conditions, DDC and Sujal Dairy should embrace a culture of continuous improvement and adaptation. This involves regularly reviewing and refining inventory management and supply chain practices, leveraging feedback from stakeholders, and staying abreast of emerging technologies and best practices to maintain competitiveness and enhance performance in the long term.

B) Implications for Stakeholders

i. Stakeholders should advocate for greater transparency in the operations of dairy companies to ensure accountability and fair business practices.

ii. Educating consumers about the importance of efficient inventory management can lead to better-quality products and services at competitive prices.

iii. Investors should consider the efficiency of inventory management practices when making investment decisions in the dairy sector.

C) Implications for Regulatory Body or Government:

i. The regulatory body or government should introduce policies and regulations that incentivize dairy companies to adopt modern inventory management practices.

ii. Regular monitoring and enforcement of inventory management standards can ensure compliance and promote fair competition in the dairy industry.

iii. Government initiatives to build the capacity of dairy companies in inventory management through training programs and subsidies can facilitate industry growth.

D) Implications for Future Researchers:

i. Future researchers can conduct more in-depth exploratory studies to identify specific challenges and opportunities in inventory management within the dairy sector.

ii. Longways studies tracking the implementation and impact of inventory management interventions over time can provide valuable insights into the effectiveness of different strategies.

iii. Comparative analyses between different dairy companies and regions can help identify best practices and factors contributing to success in inventory management.

iv. Research focusing on the integration of emerging technologies in inventory management within the dairy industry can pave the way for future advancements.

Reference

Beilen, D., Goyal, S., & Giri, B. (2001). Recent trends in modeling of deteriorating inventory. *European Journal of Operational Research 134 (1), 1-16*.

Chaudhary, P. (2000). Inventory Management (A Case Study Of Salt Trading Corporation Limited Strategic Management. *Journal, 5(2), 171-180., an unpublished thesis, Tribhuvan University*

Chung, K.H. (1989). Inventory control and trade credit revisited: *Journal of the Operational Research Society*, May, Vol. 40, No. 5, pp.495–498.

Collins, M. & Patrick, N. (2021). *Inventory Management Practices and The Performance of Milk: Processing Firms In Kiambu County In Kenya*, International Journal of Procurement and Supply Chain Management: ISSN 2314-2896

Flores, B. E., Olson, D. L., & Dorai, V. (1992). *Management of multicriteria inventory classification.* Mathematical Computing Moldelling Vol. 16, No. 12, 71-82.

Gaire, M. (2009). *Inventory Management of Bottlers Nepal limited,* an unpublished Master Level Thesis submitted to Shanker Dev Campus, Faculty of Management, Tribhuvan University, Kathmandu.

Ghimire, K. (2011). *Supply Policy And Inventory Management Of DDC*: an unpublished thesis, Tribhuvan University

Gautam, R. (2012). *Inventory management of Dairy development Corporation and Sitaram Gokul Milk Private Ltd,* an unpublished Master Level Thesis submitted to Shanker Dev Campus, Faculty of Management, Tribhuvan University, Kathmandu

Gholizadeh,, H. & Abareshi, A. (2019). *Sustainable closed-loop supply chain for dairy industry with robust and heuristic optimization*. Comput. Ind. Eng. 2021, 157, 107324

Herreid, C., Arendt, J.L. & Burgess, E.W. (2015). Derivation and analysis of a complete modern-date glacier inventory for Alaska and Northwest Canada: *Journal of Glaciology, Vol. 61, No. 227, pp.403–420.*

Horngreen, C.T. Foster, G., & Datar, S.M. (1999). *Cost Accounting. A Managerial Approach. New Delhi:* Prentice Hall of India Pvt. Ltd.

Khadka H. (2013). *Inventory Management Of Dairy Development Cooperation (DDC)*: an unpublished thesis, Tribhuvan University

Kireeti, V. & Kumar, V. (2022). A Study on Inventory Management in Dodla Dairy Ltd., Palamaner: *International Journal of Research Publication and Reviews Journal*

homepage: www.ijrpr.com ISSN 2582-7421

Lommers, S.G. (2014). *Optimizing a dairy multinational's inventory control policy:* University of Twente

Malik, M., Dahiya, V. & Yadav, M. (2022). *Application of Optimization Techniques in the Dairy Supply Chain:* A Systematic Review: MDPI logistics

Mor, R., Bhardwaj, A. & Singh, S. (2018). A Structured-literature-review of The Supply Chain Practices In Dairy Industry: *Journal of Operations and Supply Chain Management | FGV EAESP*

Ndiwa, B.M. (2022). *Inventory Management Practices and Supply Chain Performance of Dairy Processing Firms In Kiambu County*, Keny: Management of Kenyatta University

Pant, K R. (2017). *Cattle farming in Nepal: Why farmers cry.* Retrieved from https://www.dairyglobal.net/Markettrends/Articles/20 17/9/Cattle-farming-in-Nepal-Why-farmers-cry183891E/

Paneru U, Sharma M, Kolachhapati MR and Shrestha VS (2015). *Evaluation of Productive Performance of Cattle in Dairy Pocket Areas of Chitwan and Nawalparasi Districts*, J. Inst. Agri C. Anim. Sci, 33: 207-212

Rao, A. & Nayak, N. (2017). *A study on the effectiveness of inventory management and control system in a milk producer organization,* Int. J. Logistics Systems and Management, Vol. 28, No. 2, 2017

Rawal, D. (2019). *A Comparative Analysis on Inventory Management of Dairy Development Corporation And Sitaram Gokul Milk Pvt Ltd.,:* an unpublished Thesis, Tribhuvan University

Reed, B.A. & Grivettit, L.E. (2000). *Controlling On-Farm Inventories of Bulk-Tank Raw Milk*: An Opportunity to Protect Public Health: University California

Shajema I. (2018). *Effects of Inventory Control Practices on Performance of Retail Chain Stores in Nairobi County*: Kenya, Journal of International Business, Innovation and Strategic Management, 1(5), 18-38

Soto, R., Asis E. & Jimenez, J. (2023). *Predictable inventory management within dairy supply chain operations*; https://www.emerald.com/insight/0959-0552.html

Shingh1, S. Kalwar, C.& Poudel, S. (2020). A Study on Growth and Performance of Dairy Sector in Nepal: *International Journal of Environment, Agriculture and Biotechnology, 5(4)*

Thapaliya, K. (2007). *Inventory Management: A case study of National Trading Limited.*

An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management of Management, T.U.

Watson, N. (2010). *Strategic Supply Chain Planning & the Role of Forecasting, Research Associate.* CTL, MIT.

Primary Questionnaires for the study "Inventory Management of Dairies of Nepal

1) What is the daily requirement of Milk in DDC (in 000 ltr)?
   a) Below 5000 ltr b) 5,000 – 7,000 ltr
   b) 7,000 – 12,000 ltr d) above 12,000 ltr

2) Answer the following questions ?

Dairy Product	**Inventory Turnover (times/year)**
Milk	a) Below 200 b) 200 - 400 c) 400 - 600 d) 600 above
Yogurt	a) Below 100 b) 100 - 150 c) 150 - 300 d) 300 above
Paneer	a) Below 100 b) 100 - 150 c) 150 - 300 d) 300 above
Cheese	a) Below 100 b) 100 - 150 c) 150 - 300 d) 300 above
Butter	a) Below 100 b) 100 - 150 c) 150 - 300 d) 300 above
Sweets	a) Below 50 b) 50 - 150 c) 150 - 300 d) 300 above
Dairy Product	**Spoilage Rate (%)**
Milk	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Yogurt	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Paneer	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Cheese	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Butter	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Sweets	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Dairy Product	**Stockout Rates (%)**
Milk	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Yogurt	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Paneer	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Cheese	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Butter	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above
Sweets	a) Below 2% b) 2 - 4% c) 4 - 6% d) 6% above

Dairy Product	**Daily Inventory Costs (Npr)**
Milk	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 – 7000
Yogurt	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 – 7000
Paneer	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 – 7000
Cheese	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 - 7000
Butter	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 - 7000
Sweets	a) Below 1500 b) 1500 - 3000 c) 3000 - 5000 d) 5000 - 7000

3) Please Answers the followings

Quality Measures	**Answers**
What is the Quality Control Method in this dairy?	……..
Quality Assurance Score (out of 100)	a) Below 60 b) 60 - 80 c) 80 - 90 d) 90 above
Production Efficiency (liters/man-hour)	……..
Equipment Maintenance Cost (NPr/year)	…….
Employee Training Hours (per month)	…….
Energy Consumption (kWh/month)	…….
Waste Management Method	…….
Waste Disposal Cost (Npr/month)	…….

4) What is the Average consumption of milk per day (in 000 ltr)?

a) Below 500 b) 500 – 2,000

a) 1000 – 1,500 d) Above 1,500

5) Is there any correlation between Stockout Rates and Profitability ? (Rank 0 - 3)

a) 0 b) 1 c)2 d) 3

6) Is there any correlation between Spoilage Rate and Profitability system ? (Rank 0 – 3)

a) 0 b) 1 c)2 d) 3

7) Is there any correlation between Inventory Turnover Ratio and Profitability? (Rank 0 – 3)

a) 0 b) 1 c)2 d) 3

8) Is there any correlation between Stockout Rates and Supply Chain Management System ? (Rank 0 - 3)

a) 0 b) 1 c)2 d) 3

9) Is there any correlation between Spoilage Rate and Supply Chain management System ? (Rank 0 – 3)

a) 0 b) 1 c)2 d) 3

10) Is there any correlation between Inventory Turnover Ratio and Supply Chain Management System? (Rank 0 – 3)

a) 0 b) 1 c)2 d) 3

Thank you for participating in this survey! Your responses are valuable in understanding the research study of inventory management of dairies of Nepal.

INVENTORY MANAGEMENT OF DAIRIES OF NEPAL

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ABSTRACT The dairy industry plays a vital role in global food supply chains, providing essential products such as milk, yogurt, cheese, and butter. Efficient inventory management and supply chain practices are crucial for ensuring the profitability and sustainability of dairy operations. This study investigates inventory management, supply chain practices, and profitability within the dairy industry, focusing on two case studies: Dairy Development Corporation (DDC) and Sujal Dairy. The background of the study is rooted in the need to understand the factors influencing profitability and supply chain management in dairy industries, given the challenges posed by fluctuating demand, perishable products, and complex supply chains. The research objectives are twofold: firstly, to explore the relationships between key variables such as Economic Order Quantity (EOQ), inventory turnover, stockout rates, and profitability; and secondly, to assess the effectiveness of inventory management and supply chain practices in driving profitability in DDC and Sujal Dairy. The methodology encompasses descriptive statistics, correlation analysis, regression modeling, and ANOVA testing, providing a robust framework for examining the complex interactions between variables and identifying significant predictors of profitability and supply chain management. The findings of the study reveal significant correlations between inventory turnover, EOQ, and profitability in both DDC and Sujal Dairy, underscoring the importance of efficient inventory management practices. Additionally, strong positive correlations between stockout rates and supply chain management effectiveness highlight the critical role of inventory availability in ensuring smooth supply chain operations. Comparative analysis between the two dairy industries elucidates similarities and differences in profitability, supply chain management practices, and inventory costs, emphasizing the need for tailored strategies to address operational challenges and capitalize on opportunities for improvement. KeyWords: Inventory Management, Dairy Industry in Nepal, Supply Chain Management, cost efficiency, Inventory Turnover, Stockout rates, EOQ xii CHAPTER I INTRODUCTION 1.1 Background of the Study Inventory management stands as a pivotal facet within the broader spectrum of supply chain operations, encompassing the strategic orchestration of planning, monitoring, and control over the flow of goods and materials within an organizational framework. This discipline becomes particularly critical in sectors such as the dairy industry in Nepal, where managing perishable goods, fluctuating demand patterns, and unique operational challenges introduce a heightened level of complexity. The overarching objective of inventory management is to strike an equilibrium between maintaining optimal stock levels to meet customer demand and mitigating issues