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"THE STUDY ON ANALYZING AND EMPHASIZING THE EFFICIENCY OF THE SUPPLY CHAIN IN DAIRY INDUSTRY AT VALSAD, GUJARAT"

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Abstract:

This research paper investigates and emphasizes the efficiency of the supply chain in the dairy industry at Valsad, Gujarat. The study aims to analyze the relationship between supply chain operations and supply chain efficiency in this specific geographical context. To achieve this objective, primary data collection methods were employed, including structured questionnaires targeting dairy product vendors, suppliers, wholesalers, and distributors with expertise in supply chain operations. The research is guided by hypotheses, exploring the significance of the relationship between supply chain operations and efficiency. Statistical analysis, particularly multiple regression analysis using SPSS software, is utilized to examine this relationship. The findings of this study provide valuable insights for industry practitioners and decision-makers, enabling them to optimize supply chain operations in the dairy industry at Valsad, Gujarat, and potentially inform broader strategies for enhancing efficiency in similar contexts.

KEYWORDS: Dairy Industry, Supply Chain Management, Efficiency Analysis, operational Analysis, Supply Chain Efficiency.

Introduction:

In this comprehensive study, we delve into the efficiency of the supply chain in the dairy industry at Valsad, Gujarat. Our primary objective is to analyze and emphasize the crucial role played by the supply chain in ensuring smooth operations and customer satisfaction. By examining various factors and their impact on supply chain efficiency, we aim to provide valuable insights for industry practitioners and decision-makers.

To accomplish our research goals, we have formulated a set of hypotheses. Our null hypothesis (H0) posits that there is no significant relationship between supply chain operations and supply chain efficiency. Conversely, our alternate hypothesis (H1) proposes that a significant relationship does exist between these two variables. By testing these hypotheses, we aim to uncover the true nature of the relationship and its implications for the dairy industry in Valsad, Gujarat.

To gather accurate and reliable data, we have designed a structured questionnaire. This questionnaire serves as our primary data collection tool, allowing us to obtain insights from key stakeholders in the dairy industry. We have reached out to dairy product vendors, suppliers, wholesalers, and distributors who possess firsthand knowledge and experience regarding supply chain operations. Their expertise and understanding of the topic

ensure that we gather accurate and relevant data for our study.

To analyze the collected data, we will utilize the SPSS software and employ multiple regression analysis. This statistical approach enables us to examine the relationship between the dependent variable, efficiency, and the independent variables of transportation, timeliness, and traceability. By conducting this analysis, we aim to uncover the factors that significantly impact supply chain efficiency in the dairy industry. The results of our study will contribute to a deeper understanding of supply chain management practices and provide practical insights for enhancing efficiency in the dairy industry at Valsad, Gujarat.

Objectives:

For this analysis, employees perception and awareness level will be measured in important area such as:

1. To study the impact of transportation on supply chain efficiency.
2. To study the impact of traceability on supply chain efficiency.
3. To study the impact of timeliness on supply chain efficiency.

Review of the Literature:

1. **Muhammad Zubair** in his paper Identification and Assessment of Supply Chain Risks Associated with Dairy Products Sector(2015) of journal Journal of Basic & Applied Sciences describes that The dairy sector in Pakistan faces significant supply chain risks, including disease outbreaks, middlemen inefficiencies, and quality control issues. To mitigate these risks, stakeholders can implement various strategies. Disease management through vaccination programs and community-based veterinary services is crucial for controlling outbreaks. Reducing the role of middlemen and implementing direct farmer-to-consumer channels can enhance supply chain efficiency. Quality control measures, such as supplier selection criteria and rating mechanisms, ensure the integrity of raw materials. Additionally, investments in logistics infrastructure, market diversification, and adoption of technologies like blockchain can further strengthen the resilience of the dairy supply chain, promoting sustainable growth and competitiveness in the sector.
2. **J. Špička** in his paper The Competitive Environment in the Dairy Industry and its Impact on the Food Industry (Number 2, 2013) of journal Agris on-line Papers in Economics and Informatics wrote that The Czech dairy industry faced challenges during the 2008 recession, with profitability declining due to unfavorable price relations. Farmers protested low milk prices, while processors saw improved profits. However, the crisis hastened the decline in milk cow numbers, prompting the need for efficiency enhancements. The industry's competitive landscape is slightly concentrated, with opportunities for small processors. Challenges persist in the supply chain, with farmers lacking bargaining power and supermarkets influencing consumer prices. Strengthening farmers' bargaining power, improving processor-retailer relationships, and consumer education are vital. Further research is needed to enhance technical efficiency and competitiveness.
3. **Dr. Shinde V. H.** in his paper A STUDY ON DAIRY SUPPLY CHAIN MANAGEMENT AND CUSTOMERS PREFERENCE CRITERIA WITH REFERENCE TO DAIRY INDUSTRY IN SATARA DISRICT of journal Think India Journal describes that Dairy products serve as a vital and affordable source of nutrition for millions in India. Due to milk's perishable nature, prompt processing is essential to prevent spoilage. Effective time and quality management are paramount in dairy supply chain management, offering a competitive edge in the market. Customers prioritize factors like product availability, quality, quantity, and price, with quality being particularly crucial. Successfully meeting quality standards is pivotal for the dairy industry's growth prospects. Thus, prioritizing quality management ensures sustained success and future business expansion within the dairy sector
4. **Jairo R. Montoya-Torres** in his paper Sustainable supply chain network design: a study of the Colombian dairy sector of paper Annals of Operations Research describes that This paper introduces a multi-objective optimization model for supply chain network design, incorporating economic, environmental, and social sustainability dimensions. Using a case study in Colombia's dairy sector, it demonstrates strategic and tactical decision-making to minimize costs, CO2e emissions, and enhance societal development. Results reveal trade-offs among sustainability dimensions, highlighting the importance of balancing social objectives while considering environmental impacts. The study aids decision-makers in aligning supply chain configurations with sustainability goals, contributing to sustainable development. However, future research should address

time frames for transitioning to sustainable structures and consider external factors like national emission reduction plans.

5. **A R Daud, U S Putro and M H Basri** in his paper Risks in milk supply chain; a preliminary analysis on smallholder dairy production describes that these initial findings underscore the critical role of risks within the milk supply chain, primarily originating from smallholder farmers in the upstream segment. These actors encounter various risks, leading to risk-minimizing behaviors and potentially impacting the quantity and quality of raw milk produced. Consequently, downstream manufacturers must implement comprehensive risk management strategies to secure their input supply and maintain operational continuity. This highlights the importance of effectively managing chain risks throughout the milk supply chain.
6. **Rajeev Kumar** in his paper Dairy Supply Chain Management (DSCM) Practices: An Imperative Solicitation of journal American Journal of Nutrition and Food Science (2014) says that This literature highlights essential strategies for the dairy industry to achieve its objectives efficiently. It emphasizes the importance of establishing a dedicated supply chain management department, adopting enterprise resource planning (ERP) systems, and fostering reliable supplier relationships. Additionally, it underscores the significance of safe manufacturing practices, outsourcing logistic activities through third-party providers, and implementing effective complaint management platforms to enhance customer satisfaction.
7. **Emanuel Manase Kimaro, Blandina Kisawike and Cesilia Ruoja** in paper Lean Supply Chain Strategy and Performance of Dairy Industry in Iringa Region, Southern Highlands of Tanzania of journal Stratford Peer Reviewed Journals and Book Publishing Journal of Procurement & Supply Chain decribes that this study's findings underscore the substantial impact of lean supply chain strategy on the performance of the dairy industry in the Iringa Region, Southern Highlands of Tanzania. Specifically, it reveals that key components of lean supply chain management, such as customer relationship strategy, demand management strategy, and supplier relationship strategy, exerted a positive and significant influence on industry performance. These results suggest that enhancing these lean supply chain components can lead to improved overall performance within the dairy sector.
8. **Winnie Septian** in paper Framework Model of Sustainable Supply Chain Risk for Dairy Agroindustry Based on Knowledge Base of journal 2014 International Conference on Advanced Computer Science and Information Systems describes that the proposed model for sustainable supply chain risk management in the dairy agroindustry integrates knowledge-based systems to identify and mitigate risks across various sub-systems. Risks include bacterial contamination and productivity issues. Future research aims to refine the model and explore additional components like risk drivers and performance measurement. This highlights the importance of knowledge organization in enhancing supply chain resilience.

Research Methodology:

We conducted a primary data collection to explore the relationship between supply chain operations and efficiency in the dairy industry at Valsad, Gujarat. Guided by hypotheses, we selected efficiency as the dependent variable and transportation, timeliness, and traceability as independent variables. A structured questionnaire was developed to gather data from dairy stakeholders with expertise in supply chain operations. We utilized SPSS software for multiple regression analysis to assess the impact of these variables on supply chain efficiency. The findings will offer valuable insights for industry practitioners, aiding in informed decision-making to optimize supply chain operations..

Research Design:

In this section, we present an overview of the research design and methodology utilized in our study on the efficiency of the supply chain in the dairy industry at Valsad, Gujarat. Employing a quantitative research approach, we focused on explanatory research to investigate the cause-and-effect relationship between variables. To ensure the accuracy and relevance of our findings, we adopted a purposive sampling technique, targeting dairy product vendors, suppliers, wholesalers, and distributors in Valsad, Gujarat, who possess extensive knowledge of the dairy industry's supply chain. By targeting individuals with expertise in our research topic, we aimed to gather precise and valuable data. We developed a structured questionnaire to collect primary data, focusing on variables such as transportation, timeliness, traceability, and efficiency. Using SPSS software, particularly through multiple regression analysis, we analyzed the collected data to

assess the relationship between the independent variables and the dependent variable, offering insights into the efficiency of the dairy industry's supply chain.

Data Collection:

To conduct our comprehensive study on analyzing and emphasizing the efficiency of the dairy industry's supply chain in Valsad, Gujarat, we employed a primary data collection method. Guided by hypotheses, we selected efficiency as the dependent variable and identified transportation, timeliness, and traceability as independent variables. A structured questionnaire was developed to gather data from dairy stakeholders with knowledge of the industry's supply chain. By targeting these specific stakeholders, we aimed to ensure the accuracy and reliability of the collected data. Their expertise allowed us to gather valuable insights for our study. Subsequently, we utilized SPSS software to analyze the collected data, employing multiple regression analysis to examine the relationship between the independent variables and efficiency. This analysis provided valuable insights into the efficiency of the dairy industry's supply chain in Valsad, Gujarat.

Population:

For our study on analyzing and emphasizing the efficiency of the supply chain in the dairy industry at Valsad, Gujarat, the population comprised dairy product vendors, suppliers, wholesalers, and distributors. We specifically targeted individuals with knowledge about the dairy industry's supply chain and a basic understanding of our research topic. By focusing on this population, we aimed to collect accurate and relevant data, considering their crucial roles in the dairy industry's supply chain operations. Their expertise and familiarity with the industry enabled us to gather valuable information contributing to our research findings. This targeted approach ensured that the collected data accurately represented supply chain operations in the dairy industry at Valsad, Gujarat, facilitating a comprehensive understanding of the factors influencing supply chain efficiency and establishing meaningful relationships between the dependent variable (efficiency) and the independent variables (transportation, timeliness, and traceability).

Sampling method:

In this study, our objective was to collect primary data to analyze the relationship between supply chain operations and supply chain efficiency in the dairy industry. To achieve this, we utilized a combination of convenience and stratified sampling methods. Convenience sampling allowed us to select easily accessible participants with knowledge about the dairy industry's supply chain, including vendors, suppliers, wholesalers, and distributors. This approach ensured the collection of accurate data from individuals capable of providing valuable insights into supply chain efficiency. Additionally, we employed stratified sampling to ensure diversity and representation in our sample. By dividing the population into distinct strata based on factors such as age, gender, job status, and dairy product usage frequency, we aimed to capture a comprehensive understanding of supply chain efficiency. Random selection from each stratum ensured a wide range of perspectives in our sample, enhancing the richness of our analysis.

Sampling size:

For the study purpose was taken 132 candidates by questionnaire and Sampling technique Stratified sampling is helpful for guaranteeing representation from each subgroup and improving estimate precision when your population can be split up into subgroups with specific characteristics.

Data analysis:

Fof the collected data was done through use of software named SPSS and Excel . It also includes tests of Anova, Correlations & Multiple Linear Regression method for hypothesis testing. It is assumed that the attitude of employees towards automation is difference other than traditional way may be positive or negative.

Research hypotheses include:

Hypotheses 1:

- **Null Hypothesis (H00**): There is no significant relationship between supply chain operations and supply chain efficiency.

- **The Alternative hypothesis (H10)** There is significant relationship between supply chain operations and supply chain efficiency.

Data Analysis and Interpretation

We have two variables dependent variables and independent variable as described below. The research paper has dependent variable as D1, D2 which is the Efficiency of supply chain and it is co-related to the independent variable. Timeliness of Dairy industry is denoted as A1, A2, A3, A4. Tracebility of Dairy Industry is denoted as B1, B2, B3, B4. And Transportation of Dairy Industry is denoted as C1, C2, C3, C4.This will help us find the efficiency of the Supply Chain of Dairy industry with the dependent variable like timeliess,

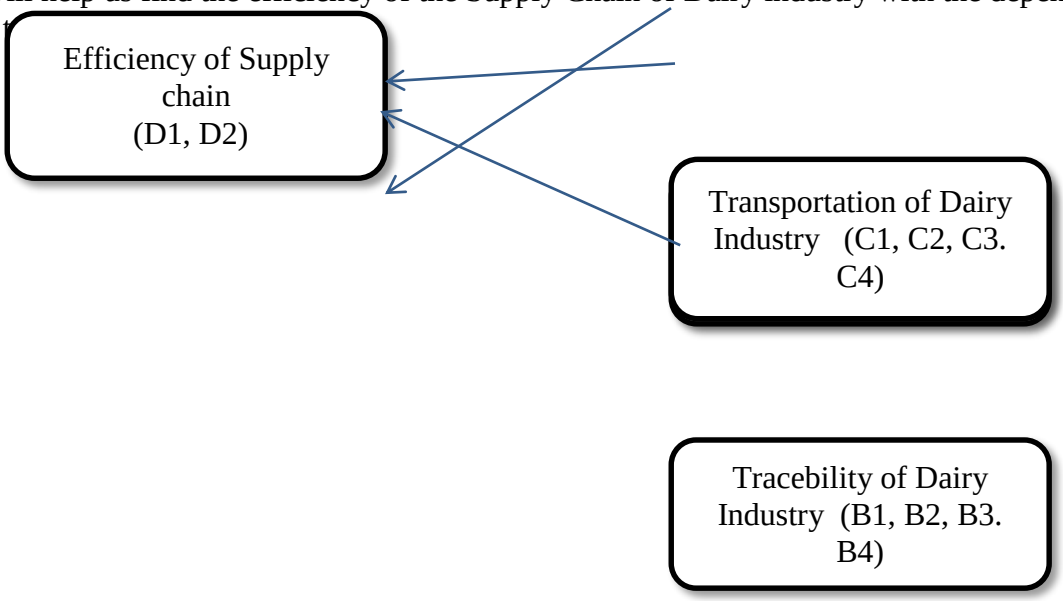

Fig.A (Variable)

Freque

Dependent Variable

We per ysis in our study contrasting the effieciency of dairy industries and conventional supply chain systems to look at the participant's demographics. The purpose of this investigation was to determine how they were distributed throughout various age groups, employment situations.

Variable	Frequency	Population (%)
Gender		
Male	66	50
Female	66	50
Age		
18-23	92	69.7
24-30	33	25
31-40	4	3
41-50	3	2.3
Job Status		
Employed	31	23.5
Unemployed	5	3.8

Student	95	72
Retired	1	0.8

Social and Demographic Information of Respondents

(Source: Authors Analysis)

A total of 132 people, primarily from different financial services-related regions, participated in our study. Our respondents' ages were distributed as follows, as shown in Table 6.1: 92 people (69.7% of the sample) were in the 18–23 age range, 33 in the 24–30 age range (25%), 4 in the 31–40 age range (3%), 3 in the 41–50 age range (2.3%).

About the participants' employed, we discovered that 31 (23.5%) were students, 95 (72%) were professionals, 5 (3.8%) were Unemployed, 1 (0.8%) are retired.

Descriptive Statistics

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Prompt delivery of dairy products to you as a consumer is important.	132	3.67	0.09	0.98
The timeliness of delivery for the dairy products you purchase is satisfied?	132	3.67	0.08	0.87
Dairy products delivered to your doorstep in terms of timeliness are convenience.	132	3.48	0.09	1.06
You can switched to a different brand of dairy products due to more reliable and timely delivery services?	132	3.32	0.09	1.02
Traceability and quality assurance of the dairy products you purchase are always satisfied.	132	3.45	0.08	0.94
The presence of clear information about the source and quality of dairy products influence your purchase decision	132	3.67	0.09	1.02
Transparency in providing online information about traceability and quality assurance practices affect your purchasing decisions	132	3.67	0.08	0.89
You seek additional information online about the traceability and quality assurance of the dairy products you buy.	132	3.48	0.08	0.94
The transportation must be efficient of the dairy products you purchase.	132	3.59	0.09	1.00
Tansportation in delivering dairy products to you as a consumer is efficient.	132	3.54	0.08	0.94
Dairy product deliveries on the expected date and time is relaible.	132	3.64	0.08	0.97

Environmentally friendly transportation practices in the dairy industry, such as reduced carbon emissions is important.	132	3.70	0.09	1.03
Preferred dairy products in local stores is always available	132	3.58	0.09	1.02
Supply chain affects the quality and freshness of the dairy products you purchase.	132	3.70	0.08	0.95

Descriptive Statistics (Source: Authors Analysis)

Table indicates that a mean value of 3 indicates neutrality, while a value of less than 3 indicates disagreement. Based on the information provided, it is evident that the respondents are in agreement with the questions pertaining to customer satisfaction with the efficiency of supply chain in Dairy industry, because the mean value is greater than 3. Respondents disagreed with the questions because the analysis/scenario in question does not apply to the mean value of 3.

Part – 1

Test result by using D1 as dependent variable which represent Eficiency of Supply Chain In Dairy Industry.

Correlations

Correlations by using D1 as Dependent Variable (Source: Authors Analysis)

Pearson Correlation	D1	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D1	1.000	0.427	0.324	0.334	0.363	0.497	0.484	0.292	0.202	0.407	0.357	0.480	0.416
A1	0.427	1.000	0.585	0.509	0.301	0.503	0.561	0.377	0.385	0.281	0.341	0.460	0.420
A2	0.324	0.585	1.000	0.563	0.361	0.443	0.323	0.418	0.253	0.288	0.306	0.390	0.387
A3	0.334	0.509	0.563	1.000	0.437	0.434	0.427	0.430	0.307	0.343	0.355	0.305	0.489
A4	0.363	0.301	0.361	0.437	1.000	0.406	0.429	0.362	0.375	0.418	0.387	0.265	0.324
B1	0.497	0.503	0.443	0.434	0.406	1.000	0.619	0.370	0.430	0.453	0.374	0.430	0.430
B2	0.484	0.561	0.323	0.427	0.429	0.619	1.000	0.468	0.411	0.501	0.336	0.458	0.542
B3	0.292	0.477	0.418	0.430	0.362	0.370	0.468	1.000	0.551	0.308	0.300	0.249	0.355
B4	0.202	0.385	0.253	0.307	0.375	0.430	0.411	0.551	1.000	0.371	0.797	0.151	0.253
C1	0.407	0.281	0.288	0.343	0.418	0.453	0.501	0.308	0.372	1.000	0.553	0.428	0.476
C2	0.357	0.341	0.306	0.355	0.387	0.372	0.336	0.300	0.497	0.553	1.000	0.369	0.304
C3	0.48	0.46	0.39	0.30	0.26	0.43	0.45	0.24	0.15	0.42	0.36	1.00	0.47

	0	0	0	5	5	0	8	9	1	8	9	0	7
C4	0.410	0.420	0.387	0.489	0.324	0.430	0.542	0.355	0.253	0.476	0.304	0.477	1.000
Significance	D1	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D1	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A1	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
A2	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
A3	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A4	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
B1	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B2	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000
B3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.002	0.000
B4	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.042	0.002
C1	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000
C2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000
C3	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.042	0.000	0.000	.	0.000
C4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	.
N	D1	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D1	132	132	132	132	132	132	132	132	132	132	132	132	132
A1	132	132	132	132	132	132	132	132	132	132	132	132	132
A2	132	132	132	132	132	132	132	132	132	132	132	132	132
A3	132	132	132	132	132	132	132	132	132	132	132	132	132
A4	132	132	132	132	132	132	132	132	132	132	132	132	132
B1	132	132	132	132	132	132	132	132	132	132	132	132	132
B2	132	132	132	132	132	132	132	132	132	132	132	132	132
B3	132	132	132	132	132	132	132	132	132	132	132	132	132
B4	132	132	132	132	132	132	132	132	132	132	132	132	132
C1	132	132	132	132	132	132	132	132	132	132	132	132	132
C2	132	132	132	132	132	132	132	132	132	132	132	132	132
C3	132	132	132	132	132	132	132	132	132	132	132	132	132
C4	132	132	132	132	132	132	132	132	132	132	132	132	132

Multi collinearity means that two or sometimes more than two independent variables in multiple regression are very much correlated and can give rise to a collinearity issue. Further, to check the degree of association among the variables, the Pearson Correlation test was performed, and its results are reported in Table. Coefficients of all independent variables (Supply Chain Operations) with Supply chain efficiency are positive and significant at 0.01 level. It implies that firms that have implemented Supply Chain Operations to a more substantial extent demonstrate superior operational performance.

Multiple Linear Regression

Multiple Liner Regression (Source: Authors Analysis)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	dF1	dF2	Sig. F. Change
					0.400	6.615	12	119	0.000

a. Predictors: (Constant), C4, B4, A2,A4, C3,C2,B1,B3C1,A3,A1,A2
b. Dependent Variable: D1

From the values given in Table, the value of R-square is decisive. R-square (coefficient of determination) offers the Degree of influence of Supply Chain Operations (independent variables) over Supply Chain Efficiency (dependent variables). This value shows a 40% influence of Supply Chain Operations taken for this study, and the remaining 60% is due to other factors described by an error term. It shows that specific Supply Chain Operations taken for analysis have an average degree of influence for Supply chain efficiency. R-Square's value from 40 % to 50% range means that model is an average fit.

ANOVA (Analysis of Variance)

ANOVA (Source: Authors Analysis)

Model	Sum of Squares	dF	Mean Square	F	Sig.
Regression	54.452	12	4.538	6.615	0.000
Residual	81.631	119	0.686		
Total	136.083	131			

a. Predictors: (Constant), C4, B4, A2, A4, C3, C2, B1, B3, C1, A3, A1, B2
b. Dependent Variable: D1

From the ANOVA Table, a *p*-value of 0.000, which is less than 0.05, demonstrates that the Supply chain efficiency model is significant at the 5% significance. The *F*-statistic was 6.615 with a *P*-value = 0.000 which is < 0.05. It shows that Supply chain Operations examined for this study have a statistically significant effect on the Supply chain efficiency.

Part – 2

Test result by using D2 as dependent variable which represent Eficiency of Supply Chain In Dairy Industry.

Correlations

Correlations by using D2 as Dependent Variable (Source: Authors Analysis)

Pearson Correlation	D2	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D2	1.000	0.420	0.491	0.431	0.532	0.371	0.507	0.463	0.427	0.514	0.499	0.399	0.524
A1	0.420	1.000	0.585	0.509	0.301	0.503	0.561	0.477	0.385	0.281	0.341	0.460	0.420
A2	0.491	0.585	1.000	0.563	0.361	0.443	0.323	0.418	0.253	0.288	0.306	0.390	0.387
A3	0.431	0.509	0.563	1.000	0.437	0.434	0.427	0.430	0.307	0.343	0.355	0.305	0.489
A4	0.532	0.301	0.361	0.437	1.000	0.406	0.429	0.362	0.375	0.418	0.387	0.265	0.324

B1	0.371	0.503	0.443	0.434	0.406	1.000	0.619	0.370	0.430	0.453	0.374	0.430	0.430
B2	0.507	0.561	0.323	0.427	0.429	0.619	1.000	0.468	0.411	0.501	0.336	0.458	0.542
B3	0.463	0.477	0.418	0.430	0.362	0.370	0.468	1.000	0.551	0.308	0.300	0.249	0.355
B4	0.427	0.385	0.253	0.307	0.375	0.430	0.411	0.551	1.000	0.372	0.497	0.151	0.253
C1	0.514	0.291	0.288	0.343	0.418	0.453	0.501	0.308	0.372	1.000	0.553	0.428	0.476
C2	0.499	0.341	0.306	0.355	0.387	0.374	0.336	0.300	0.497	0.553	1.000	0.369	0.304
C3	0.399	0.460	0.390	0.305	0.265	0.430	0.458	0.249	0.151	0.428	0.369	1.000	0.477
C4	0.524	0.420	0.387	0.489	0.324	0.430	0.542	0.355	0.253	0.476	0.304	0.477	1.000
Significance	D2	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D2	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A1	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
A2	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A3	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A4	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
B1	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B2	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.000	0.000	0.000
B3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000	0.002	0.000
B4	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.042	0.002
C1	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000	0.000
C2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.	0.000	0.000
C3	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.042	0.000	0.000	.	0.000
C4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	.
N	D2	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
D2	132	132	132	132	132	132	132	132	132	132	132	132	132
A1	132	132	132	132	132	132	132	132	132	132	132	132	132
A2	132	132	132	132	132	132	132	132	132	132	132	132	132
A3	132	132	132	132	132	132	132	132	132	132	132	132	132
A4	132	132	132	132	132	132	132	132	132	132	132	132	132
B1	132	132	132	132	132	132	132	132	132	132	132	132	132
B2	132	132	132	132	132	132	132	132	132	132	132	132	132
B3	132	132	132	132	132	132	132	132	132	132	132	132	132

B4	132	132	132	132	132	132	132	132	132	132	132	132	132
C1	132	132	132	132	132	132	132	132	132	132	132	132	132
C2	132	132	132	132	132	132	132	132	132	132	132	132	132
C3	132	132	132	132	132	132	132	132	132	132	132	132	132
C4	132	132	132	132	132	132	132	132	132	132	132	132	132

Multi collinearity means that two or sometimes more than two independent variables in multiple regression are very much correlated and can give rise to a collinearity issue. Further, to check the degree of association among the variables, the Pearson Correlation test was performed, and its results are reported in Table. Coefficients of all independent variables (Supply Chain Operations) with Supply chain efficiency are positive and significant at 0.01 level. It implies that firms that have implemented Supply Chain Operations to a more substantial extent demonstrate superior operational performance.

Multiple Linear Regression

Multiple Linear Regression (Source: Authors Analysis)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	dF1	dF2	Sig. F. Change
					0.565	12.872	12	119	0.000

a. Predictors: (Constant), C4, B4, A2, A4, C3, C2, B1, B3, C1, A3, A1, B2
b. Dependent Variable: D2

From the values given in Table, the value of R-square is decisive. R-square (coefficient of determination) offers the Degree of influence of Supply Chain Operations (independent variables) over Supply Chain Efficiency (dependent variables). This value shows a 56.5% influence of Supply Chain Operations taken for this study, and the remaining 43.5% is due to other factors described by an error term. It shows that specific Supply Chain Operations taken for analysis have a good degree of influence for Supply chain efficiency. R-Square's value from 50 % to 60% range means that model is a good fit.

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ANOVA (Analysis of Variance)

ANOVA (Source: Authors Analysis)

Model	Sum of Squares	dF	Mean Square	F	Sig.
Regression	66.356	12	5.530	12.872	0.000
Residual	51.122	119	0.430		
Total	117.477	131			

a. Dependent Variable: D2
b. Predictors: (Constant), C4, B4, A2, A4, C3, C2, B1, B3, C1, A3, A1, A2

From the ANOVA Table, a *p*-value of 0.000, which is less than 0.05, demonstrates that the Supply chain efficiency model is significant at the 5% significance. The *F*-statistic was 12.872 with a *P*-value = 0.000 which is < 0.05. It shows that Supply chain Operations examined for this study have a statistically significant effect on the Supply chain efficiency.

Alternate Hypothesis (H_1) is thus accepted.

FINDINGS

1. Strong positive correlations between Supply Chain Operations and Supply Chain Efficiency indicate a significant relationship.
2. A high R-square value (56.5%) suggests that Supply Chain Operations have a substantial influence on Supply Chain Efficiency.
3. The ANOVA results indicate that Supply Chain Operations have a statistically significant effect on Supply Chain Efficiency at the 5% significance level ($p < 0.05$).
4. The findings imply that firms with extensive implementation of Supply Chain Operations demonstrate superior operational performance.

LIMITATIONS

1. Limited sample size may restrict the generalizability of the findings.
2. The study focused solely on the dairy industry in Valsad, Gujarat, which may limit the applicability to other regions.
3. The reliance on self-reported data from participants may introduce response bias.
4. The cross-sectional nature of the study prevents establishing causality.
5. The questionnaire may be subject to interpretation bias due to the use of Likert scale responses.
6. The study did not account for external factors that could influence supply chain efficiency.
7. The research was limited to a specific time frame, potentially overlooking long-term trends.
8. The study did not consider the impact of technological advancements on supply chain efficiency.
9. The research did not explore the perspectives of end consumers, which could provide valuable insights.
10. The study did not assess the influence of cultural or social factors on supply chain operations.
11. The data collection process relied on the availability and willingness of participants to respond accurately.
12. The study did not account for potential changes in the dairy industry landscape over time.

CONCLUSION

The positive correlations between Supply Chain Operations and Supply Chain Efficiency indicate a significant relationship, suggesting that as firms implement Supply Chain Operations more extensively, their operational efficiency improves. The high R-square value (56.5%) further emphasizes the substantial influence of Supply Chain Operations on Supply Chain Efficiency, indicating that a large portion of the variability in efficiency can be attributed to the specific operations studied. Additionally, the statistical significance of the ANOVA results confirms that the observed relationship is not due to random chance but is indeed meaningful. This suggests that firms with extensive implementation of Supply Chain Operations demonstrate superior operational performance, highlighting the importance of continued investment and focus on Supply Chain Operations for maintaining a competitive edge in the market amidst today's dynamic business landscape.

SUGGESTION

1. Address research limitations by conducting additional studies to explore potential confounding variables or

alternative methodological approaches.

2. Expand on specific findings by delving deeper into the impact of individual components of Supply Chain Operations, such as transportation, timelessness, and traceability, on Supply Chain Efficiency within the dairy industry context.
3. Re-evaluate the conceptual framework by incorporating additional variables or refining existing constructs to provide a more comprehensive understanding of the complex dynamics underlying supply chain efficiency in the dairy industry at Valsad, Gujarat.
4. Investigate the implications of the research findings for managerial practice by exploring how organizations can leverage insights to optimize their supply chain management strategies and enhance operational performance.
5. Examine the role of emerging technologies, such as blockchain and IoT, in improving supply chain transparency and efficiency within the dairy industry, offering avenues for future research to explore innovative solutions.
6. Assess the impact of external factors, such as regulatory changes or market dynamics, on supply chain efficiency in the dairy industry, to enhance the robustness of the research findings and their applicability in real-world settings.
7. Explore cross-sectional or longitudinal studies to further validate the observed relationships between Supply Chain Operations and Efficiency, providing insights into the sustainability and long-term effectiveness of supply chain management practices.
8. Investigate the potential for collaboration between industry stakeholders, academia, and policymakers to address challenges and drive continuous improvement in supply chain efficiency within the dairy industry, fostering a holistic approach to research and practice.

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