International Journal of Research Publication and Reviews

An Impact of Waste Management Practices in Dairy Day Ice Cream Manufacturing Units

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Abstract:

This study examines the impact of waste management practices in Dairy Day ice cream manufacturing units. Effective waste handling is crucial for minimizing environmental harm and improving operational efficiency. The research focuses on methods such as waste reduction, reuse, recycling, and proper disposal techniques implemented within the units. Data was collected through employee surveys and analysis of waste handling procedures. Findings indicate moderate awareness among staff, with practices like segregation and recycling already in place. However, gaps exist in training and advanced waste tracking. Demographic factors such as income and marital status showed no significant influence on awareness levels. The study also highlights the need for more robust monitoring systems. Overall, efficient waste management positively contributes to sustainability and compliance. Recommendations include enhanced training, process optimization, and integration of eco-friendly technologies.

Key words: Waste management, sustainable manufacturing.

Introduction

Waste management has become a critical aspect of sustainable industrial practices, especially in the food processing sector. In recent years, growing environmental concerns and stricter regulatory requirements have driven industries to adopt more responsible and efficient waste management systems. Dairy Day, a prominent player in the Indian ice cream manufacturing industry, produces a wide variety of frozen desserts, and like many other dairy-based production units, it generates significant amounts of organic and packaging waste. Effective handling and disposal of this waste is essential not only for environmental sustainability but also for maintaining hygiene, operational efficiency, and regulatory compliance.

The ice cream manufacturing process involves several stages—such as pasteurization, homogenization, freezing, and packaging—all of which contribute to different types of waste. These include food residues, wastewater, plastic wrappers, and carton packaging. If not managed properly, such waste can lead to pollution, increased operational costs, and potential health hazards. In this context, implementing structured waste management practices is not only a legal obligation but also a strategic necessity for long-term sustainability.

This study explores the waste management practices currently implemented in Dairy Day's manufacturing units, with a focus on how these practices influence both the operational and environmental outcomes of the company. The research investigates the awareness levels of employees, the types of waste generated, and the extent to which reduction, reuse, and recycling are integrated into daily operations. It also examines the effectiveness of training programs, waste tracking systems, and compliance with local environmental regulations.

By evaluating these factors, the study aims to assess the overall impact of current waste management efforts and identify areas for improvement. The findings are expected to contribute to the development of more sustainable and efficient waste management strategies within the dairy processing industry. Furthermore, this study serves as a reference for other food manufacturing units aiming to adopt eco-friendly and economically viable waste handling practices in alignment with sustainable development goals

About company

Dairy Day is a prominent ice cream brand in South India, established in 2002 by industry veterans Balaraju Anantharamu, M.N. Jaganath, and Venkatesh Vittal Rao. Headquartered in Bengaluru, the company operates under Dairy Classic Ice Creams Pvt. Ltd. It has grown to become one of the leading ice cream manufacturers in the region, offering over 30 flavours across more than 200 product variants, including cups, cones, sticks, tubs, and novelties

Dairy Day's manufacturing facilities are state-of-the-art, spanning over 400,000 square feet, with a production capacity of 300,000 litres per day. The company employs around 2,000 individuals and operates in three shifts to meet the high demand. Its products are distributed through a vast network of over 80,000 outlets across eight states in India, making them accessible in both urban and rural markets.

In the fiscal year 2023–24, Dairy Day reported a revenue of ₹680 crore, reflecting its significant presence in the Indian ice cream market. The brand is also available in major retail chains like Reliance Supermarkets, More Supermarkets, Spencers, Spar Hypermarket, and D'Mart, as well as on e-commerce platforms such as Swiggy, Zomato, and Big Basket.

Literature Review

Dave (2021) study deals with Lean Construction along with information and communication systems. Study reveals that by adopting techniques such as process modelling, lean principles and process 26 analysis techniques, the manufacturing industry maintains a well performing process.-process standardization across the industry will be highly effective and efficient.

Roba Salem (2022) studied the level of recognition of lean concepts, principles, tools, and techniques in different industrial sectors in Qatar, to ass's lean awareness and to know the perception about lean benefits and lean challenges. Data were collected from 333 organizations from various sectors like oil nd gas, academic institutions and service sectors through an on- line survey.

Pratik Chikhalikar (2023) study focused on the implementation of the lean in the engine manufacturing unit in India. Research identified the 27 important lean tools and time horizon to implement the same. Study revealed that following factors effects on lean implementation they are 7 Types of waste, Lack of information transmission, Improper inventory management,

Rakesh kumar and vikas kumar (2024) conducted a study to establish the significance of Lean Manufacturing elements related to Indian manufacturing industry, study also list the benefits gained-, major obstacles faced- and identifies the adverse impact such as over cost cutting, exceptionally low inventories,

Azharul Karim (2022) conducted research to develop an effective methodology for implementing lean manufacturing strategies and leanness, following are the methodology adopted for the present study they are Production and process details, Lean team study, Performance variables.

Youssef Larteb (2020) study identified that success parameters of lean implementation are top management engagement, commitment, allocation of time and resources for improvement projects, strong management's leadership, and employee's development program..

Gulshan Chauhan (2021) research depicts about, Elimination of waste, JIT, and CI. Driving parameters towards LM are vertical information system, integration of functions, decentralization, multifunctional teams, CI and Elimination of waste. JIT is top priority, then CI. He follows SPSS correlation method to find the importance of implementation.

Statement of the problem

The rapid growth of ice cream manufacturing has led to increased waste generation, including plastic, organic, and wastewater. In companies like Dairy Day, improper waste handling can cause environmental harm and regulatory issues. Despite some efforts, gaps remain in effective waste segregation, recycling, and employee awareness. These challenges affect both sustainability and operational efficiency. Therefore, evaluating current waste management practices is essential for improvement.

Objective of the study

1. To identify the types and sources of waste generated during ice cream production, packaging, and distribution.
2. To examine the role of employees in maintaining effective waste management practices.
3. To explore the impact of waste on operational efficiency and production costs
4. To suggest suitable recommendations for improving waste handling and promoting sustainability in operations

Scope of the study

The study focuses on the waste management practices followed in Dairy Day ice cream manufacturing units. It includes the identification of various types and sources of waste generated during the production, packaging, and distribution processes. The research evaluates the effectiveness of current waste management strategies implemented within the units and examines the role of employees in maintaining proper waste handling procedures. It also analyzes the impact of waste on operational efficiency, resource utilization, and overall production costs. Finally, the study aims to provide practical and actionable recommendations to improve waste handling processes and promote sustainability within Dairy Day's manufacturing operations.

Limitations of the study

1. The study is based on a limited sample size, which may not represent all Dairy Day manufacturing units across different regions.
2. Data collected through employee surveys and observational methods may introduce potential bias or inaccuracies.
3. A high percentage of missing data (47.6%) may affect the reliability and generalizability of the findings.
4. The scope is limited to Dairy Day, so the results may not be applicable to other ice cream manufacturers or industries with different operational practices.
5. Due to time and resource constraints, the study does not examine the long-term effects of waste management practices or the economic implications of the proposed recommendations.

Research methodology

The present study aims to evaluate the effectiveness of waste management practices and their impact on operational efficiency at Dairy Day ice cream manufacturing units. A descriptive research design was employed, utilizing simple random sampling to select employees from the production, packaging, and distribution departments. The study focuses on identifying the types and sources of waste generated during production and distribution processes, as well as the role of employees in maintaining effective waste management. Statistical tools used in this research include descriptive statistics, chi-square tests, and correlation analysis to examine the relationship between waste management practices and operational efficiency. The survey method applied in the study ensures that a representative sample of employees is included, allowing the research to reflect the current waste handling strategies, the perceived benefits, and challenges faced by employees in the manufacturing units.

Sample Size and Data

The target respondents for this study are employees working at Dairy Day ice cream manufacturing units in the Tirunelveli region. The sample size for this study is 102 employees, selected to represent a cross-section of individuals involved in the production, packaging, and distribution processes.

Primary Data

Primary data will be collected through structured questionnaires and interviews with employees at Dairy Day. The questionnaire will include a mix of multiple-choice questions, Likert scale items, and open-ended questions.

Secondary Data

production schedules, and environmental compliance documentation. Additional data will be sourced from relevant industry publications, market research studies, and academic literature to support the analysis of waste generation patterns and waste management strategies within the manufacturing units.

Sampling Method

The study will use **simple random sampling** to select participants from the employees in the production, packaging, and distribution departments. This method ensures that every employee has an equal chance of being selected, thus providing a representative sample of employee perspectives and practices regarding waste management.

Results and Findings

Descriptive Statistics

Table no: 1 Relationship between Age, Marital Status and Monthly Income in Frequency of Purchase

Statistic	AGE	Marital status	MONTHLY INCOME
N (Valid)	**110**	**110**	**110**
N (Missing)	100	100	100
Mean	1.75	1.46	2.25
Median	2.00	1.00	2.00
Mode	1	1	1
Standard Deviation	0.756	0.501	1.033
Skewness	0.444	0.148	0.251
Std. Error of Skewness	0.230	0.230	0.230

Source: Primary Data

The descriptive statistics reveal that most respondents are young, with a mean age of 1.75 and a mode of 1, indicating a concentration in the youngest age group. Marital status also shows a mean of 1.46 and a mode of 1, suggesting that the majority of participants are unmarried. The average monthly income is 2.25, with the mode being 1, pointing to a large number of respondents in the lowest income category. The standard deviation for age (0.756) and marital status (0.501) indicates low variability in these demographics. Monthly income shows slightly primarily consists of young, unmarried individuals with relatively low income and limited diversity in these characteristics.

Table no: 2 Age of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	48	22.9	43.6	43.6
	31-40	41	19.5	37.3	80.9
	41-50	21	10.0	19.1	100.0
	Total	110	52.4	100.0	
Missing	System	100	47.6		
Total		210	100.0		

Source: Primary Data

The frequency distribution of respondents by age shows that the largest group falls within the 20–30 age range, making up 43.6% of the valid responses. The next most common age group is 31–40, accounting for 37.3%, followed by 41–50 at 19.1%. This indicates that younger individuals are more represented in the sample. A total of 110 valid responses were recorded, which represents 52.4% of the full dataset. The remaining 100 cases (47.6%) were missing system responses. Overall, the data suggests that the survey or study mostly reached individuals between 20 and 40 years old.
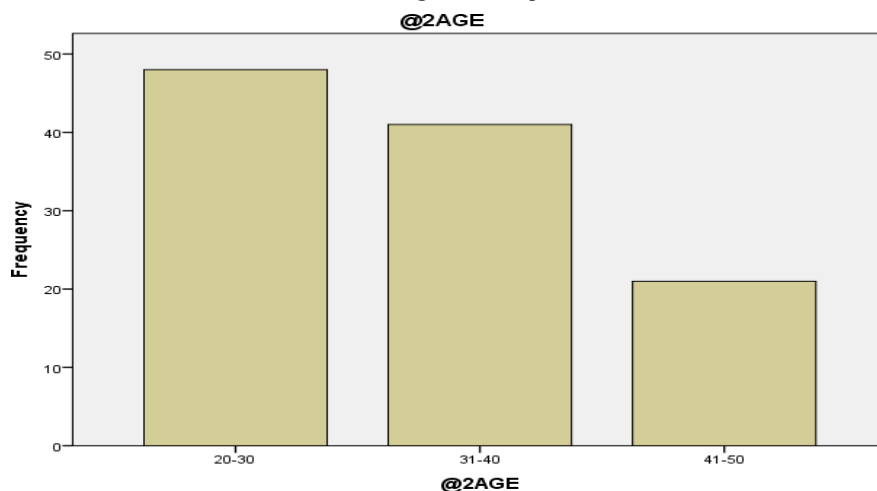
Chart no: 2 Age of the Respondents

Table no: 3 Marital Status of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unmarried	59	28.1	53.6	53.6
	Married	51	24.3	46.4	100.0
	Total	110	52.4	100.0	
Missing	System	100	47.6		
Total		210	100.0		

Source: Primary Data

The marital status distribution shows that 53.6% of valid respondents are unmarried, while 46.4% are married. This indicates a slightly higher proportion of unmarried individuals in the sample. Out of 210 total responses, 110 were valid, making up 52.4%, with 47.6% of responses missing. Overall, the data suggests a fairly balanced marital status distribution, with a slight tilt toward unmarried participants
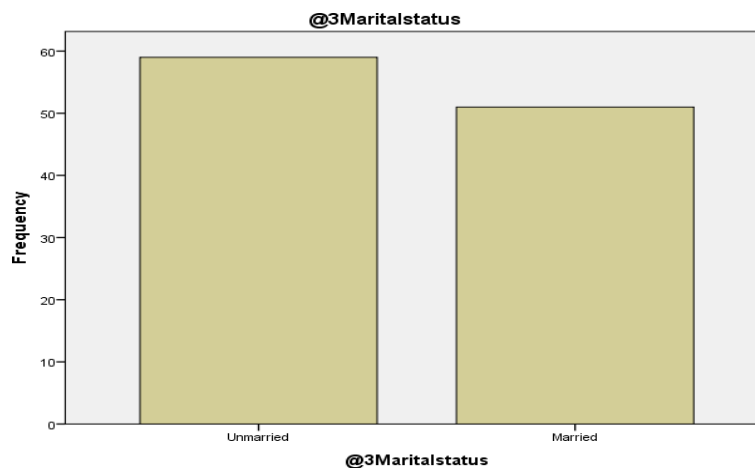
Chart no: 3 Marital Status of the Respondents

Table no: 4 Monthly Income of the Respondents

Monthly Income of the Respondents		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20,000	33	15.7	30.0	30.0
	20000-40000	32	15.2	29.1	59.1
	40000-50000	30	14.3	27.3	86.4
	More than 50,000	15	7.1	13.6	100.0
	Total	110	52.4	100.0	
Missing	System	100	47.6		
Total		210	100.0		

Source: Primary Data Interpretation

The majority of respondents fall within the income ranges of less than 20,000 (30%) and 20,000-40,000 (29.1%), indicating a concentration in lower-middle income groups. The highest income bracket (more than 50,000) represents the smallest group, with just 13.6%. A total of 110 valid responses were recorded, representing 52.4% of the total sample. The remaining 47.6% of responses were missing, affecting the overall data completeness.

Chart no: 4 Monthly Income of the Respondents
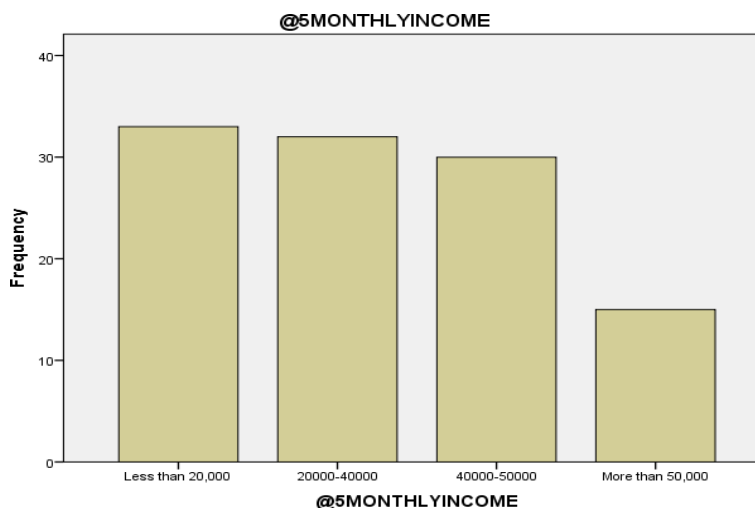
Hypothesis

Null Hypothesis (H₀):

There is no significant relationship between an individual's monthly income and their identification of a major source of plastic waste.

Interpretation

The Pearson correlation coefficient between monthly income and the identification of a major source of plastic waste is -0.007, which indicates a very weak and negative linear relationship. However, the p-value is 0.946, which is much greater than the significance level of 0.05.

Therefore, we fail to reject the null hypothesis. This implies that there is no statistically significant relationship between monthly income and the way individuals identify major sources of plastic waste. In other words, a person's income does not appear to influence their perception regarding plastic waste sources.

Hypothesis

Null Hypothesis (H₀)

There is no significant association between marital status and the understanding of principles of effective waste management.

Interpretation

The cross-tabulation shows that both married and unmarried respondents had an equal number (4 each) who incorrectly selected "Reproduce" as a principle of effective waste management. This indicates that the misunderstanding is not influenced by marital status. The majority in both groups correctly chose from "Reduce," "Reuse," and "Recycle." Therefore, awareness of waste management principles appears similar across marital statuses. There is no significant association between marital status and knowledge of effective waste management principles.

Chi-Square Tests

Table no: 5 Marital Status Influence of the Perception of Ice Cream Waste materials of the Respondents

Chi-Square tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.593ᵃ	3	.898
Likelihood Ratio	.594	3	.898
Linear-by-Linear Association	.104	1	.747
N of Valid Cases	110		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.71.			

**Source: Primary Data Hypothesis**

Null Hypothesis (H₀)

There is no significant association between marital status and the understanding of effective waste management principles.

Alternative Hypothesis (H₁)

There is a significant association between marital status and the understanding of effective waste management principles.

Interpretation

The Pearson Chi-Square value is **0.593** with a **p-value of 0.898**, which is much higher than the standard significance level of 0.05. This indicates that there is **no statistically significant association** between marital status and the understanding of waste management principles. The responses appear to be **independent of marital status**. Additionally, some expected cell counts are below 5, which may slightly affect the test's reliability. Overall, we **fail to reject the null hypothesis**.

Chart no:5 Marital Status Influence of the Perception of Ice Cream Waste materials of the Respondents
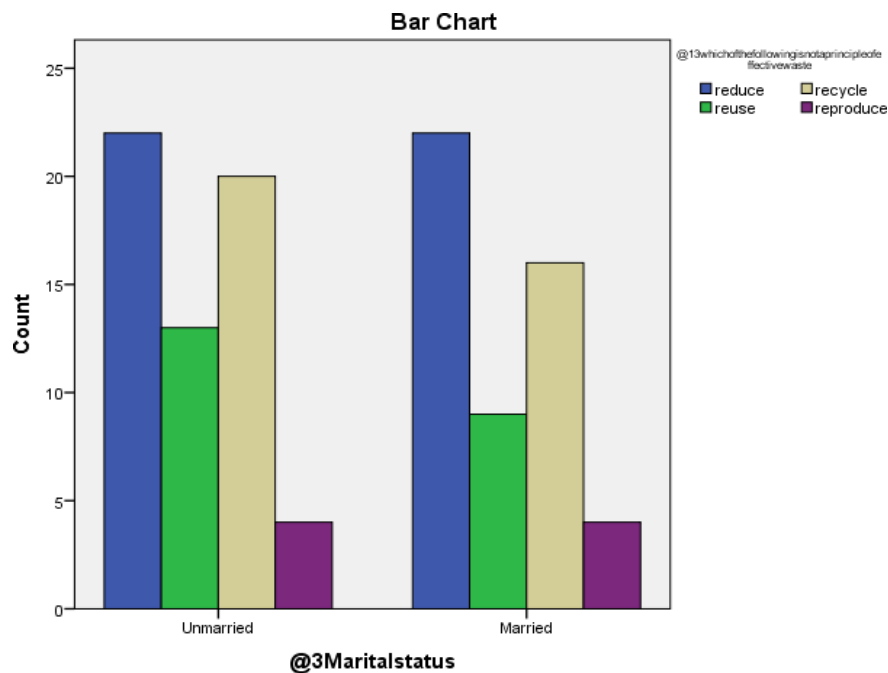
Conclusion

This study emphasizes the importance of effective waste management practices at Dairy Day Ice Cream Manufacturing Units. While the company has implemented waste management strategies, employee awareness and involvement need improvement. Training programs and better waste segregation can enhance operational efficiency and reduce costs. The study suggests adopting advanced technologies and regular monitoring for better waste reduction. Overall, fostering a sustainability- focused culture is essential for long-term success. Improving waste management practices will lead to better environmental and operational outcomes for Dairy Day.

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