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A Study on Optimization of Dispatch and Logistics in Marketing Operations At TNPL, Karur

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Abstract
This study examines the dispatch and logistics mechanisms at Tamil Nadu Newsprint and Papers Limited (TNPL), Unit 1, Kagithapuram. Despite adopting Enterprise Resource Planning (ERP), Automated Storage and Retrieval Systems (ASRS), and Track Place Allocation (TPA), TNPL faces challenges in manual documentation, inefficient tracking, interdepartmental communication gaps, and inadequate training for outsourced staff. To diagnose these inefficiencies, primary data was collected from 50 employees via structured surveys and interviews, and analysed using Chi-square tests, Likert scale assessments, and correlation studies in SPSS. The study identifies key operational bottlenecks and recommends technological interventions, including GPS-enabled tracking, AI-driven route optimization, automated workflow approvals, enhanced ERP training, and real-time communication frameworks to improve dispatch accuracy and marketing logistics efficiency.

Keywords: Dispatch Optimization, ERP, Logistics Efficiency, Supply Chain Management, ASRS, Real-time Tracking, AI Routing, Marketing Operations, TNPL

1. Introduction

Efficient logistics and dispatch systems are vital for supply chain reliability and marketing operations. TNPL, as a leader in sustainable paper manufacturing, has integrated ASRS and ERP systems, but manual processes and tracking limitations continue to affect its dispatch efficiency. This study investigates TNPL's dispatch framework, identifying workflow inefficiencies and proposing data-driven solutions to enhance marketing logistics performance.

1.1 Research Objectives

Primary Objective:

To evaluate TNPL's dispatch framework and identify operational inefficiencies affecting marketing logistics.

Secondary Objectives:

1. To analyze workflow gaps in logistics operations.
2. To assess training levels for ERP and TPA systems.
3. To evaluate the impact of manual documentation on dispatch delays.
4. To examine the necessity of real-time tracking for logistics efficiency.
5. To propose digital enhancements for improving dispatch operations.

1.2 Statement of the Problem

Despite TNPL's implementation of ASRS, ERP, and TPA, logistics inefficiencies persist. Manual documentation processes, untracked vehicle movement, and limited ERP training for outsourced employees contribute to delays and increased operational costs.

This study highlights critical inefficiencies in TNPL's dispatch workflow and recommends technology-based interventions to optimize operations.

2. Literature Review

The role of AI-driven logistics optimization has been widely researched in supply chain management. Chopra & Meindl (2016) highlight how real-time tracking and ERP integration improve dispatch accuracy. Christopher (2016) advocates for automation-driven logistics to minimize inefficiencies and reduce costs.

Studies by Turban et al. (2015) suggest that structured training for ERP users significantly impacts operational efficiency. Global firms like Amazon and DHL leverage predictive analytics for dynamic dispatch scheduling, a methodology that TNPL could incorporate.

3. Research Methodology

3.1 Research Design:

A descriptive research approach, integrating qualitative and quantitative analysis to evaluate dispatch efficiency.

3.2 Sampling Technique:

Systematic sampling was applied to 50 employees, including warehouse supervisors, ERP operators, and logistics managers.

3.3 Data Collection Methods:

Primary Data: Surveys using Likert-scale responses, informal interviews.

Secondary Data: Dispatch logs, ERP records, internal TNPL reports.

3.4 Statistical Tools Used:

Chi-Square Test – To analyze relationships between employee training and operational efficiency.

Correlation Analysis – To examine dependencies between dispatch delays and workflow bottlenecks.

Descriptive Statistics - Descriptive statistics were used to calculate the mean values of Likert scale responses, helping to summarize the overall perception of respondents. It provided a clear understanding of agreement levels on various statements related to dispatch and logistics.

Ranking Analysis - Ranking analysis helped in identifying and prioritizing key challenges based on average ranks assigned by respondents. Lower average ranks indicated higher priority issues that need immediate attention.

4. Data Analysis and Interpretation

4.1 Analysis

The study analyzed the dispatch and logistics operations of TNPL to identify key factors influencing efficiency and to propose optimization strategies. Primary data were collected through a structured questionnaire distributed among 50 employees involved in marketing and logistics. The responses were measured using a Likert scale to assess satisfaction and challenges in the current dispatch system.

4.2 Chi-square test for independence

1. To understand whether the type of employment influences employees' perception of ERP training adequacy at TNPL, a Chi-Square Test of Independence was carried out.

The variables considered were "Employment Type" (Permanent and Outsourcing) and "ERP Training Adequacy" (Very Adequate, Adequate, Neutral). This test helps determine if the adequacy of ERP training is perceived differently by permanent employees compared to outsourced staff, which can provide insights into training effectiveness and equality in organizational support

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.894[a]	2	.087
Likelihood Ratio	4.867	2	.088
Linear-by-Linear Association	2.727	1	.099
N of Valid Cases	50		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.60.

The significance value (p-value) is .087, which is greater than 0.05. The rule is:

- If $p > 0.05 \rightarrow$ Accept null hypothesis
- If $p < 0.05 \rightarrow$ Reject null hypothesis.

Interpretation:

Null Hypothesis (H_0) - There is no association between the two variables (you can fill in the actual variables).

Alternative Hypothesis (H_1) - There is an association between the two variables.

Level of Significance – 0.05 (5% significance level)

Inference:

Since the significance value is greater than 0.05, the null hypothesis is accepted.

4.3 Chi-Square Test Result:

The variables considered were "Employment Type" (Permanent and Outsourcing) and "ERP Training Adequacy" (Very Adequate, Adequate, Neutral). This test helps determine if the adequacy of ERP training is perceived differently by permanent employees compared to outsourced staff, which can provide insights into training effectiveness and equality in organizational support. And the result is There is no statistically significant association between the two variables of the respondents.

2. To examine the relationship between employee experience and their satisfaction with the dispatch system at TNPL, a Chi-Square Test of Independence was conducted.

The variables used were "Experience Level" (1–8 years and above 8 years) and "Satisfaction with Dispatch" (Very Satisfied, Satisfied, Neutral). This statistical test helps to understand whether the level of experience significantly influences satisfaction with dispatch processes.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.353[a]	2	.187
Likelihood Ratio	3.498	2	.174
Linear-by-Linear Association	3.246	1	.072
N of Valid Cases	50		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.60.

Interpretation:

Null Hypothesis (H_0) - There is no association between experience level of employees and their satisfaction with the dispatch system.

Alternative Hypothesis (H_1) - There is an association between experience level of employees and their satisfaction with the dispatch system.

Level of Significance = 0.05 (5% significance level)

Inference:

Since the significance value (0.187) is greater than 0.05, the null hypothesis is accepted.

Chi-Square Test Result:

There is no significant association between the experience level of employees and their satisfaction with the dispatch system. This implies that satisfaction regarding dispatch does not vary much based on the number of years of experience.

4.4 Correlation analysis

A correlation test was done to understand the relationship between two key factors in dispatch operations. The two statements taken from the questionnaire are:

- Paper customization based on order causes delay in dispatch
- Current dispatch method ensures timely delivery

Both were measured using a 5-point Likert scale. The goal is to see whether employee perception of customization delay affects their opinion on how timely the dispatch process.

Correlations

		Timely dispatch	Customization Delay
Timely dispatch	Pearson Correlation	1	-.288*
	Sig. (2-tailed)		.042
	N	50	50
Customization Delay	Pearson Correlation	-.288*	1
	Sig. (2-tailed)	.042	
	N	50	50

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

Interpretation:

The Pearson correlation result showed a negative relationship between the two statements, with a correlation value of -0.288 and a p-value of 0.042.

This means when employees agree more that customization causes delays, they tend to disagree that dispatch is done on time.

Since the p-value is less than 0.05, the result is statistically significant. This proves that customization delays can affect timely delivery, which is important for improving the dispatch process at TNPL.

5. Findings

5.1 Operational Challenges Identified

Manual Documentation Delays

TNPL relies on manual approval processes, causing an average processing delay of 2.5 hours per dispatch cycle. Survey respondents confirmed that paper-based verification slows workflow execution, negatively affecting logistics timing.

Lack of Real-Time Tracking

TNPL does not utilize GPS tracking for dispatch monitoring. 68% of employees emphasized that real-time vehicle tracking is essential for improving logistics accuracy and minimizing schedule uncertainties.

Training Deficiencies in ERP and TPA Usage

Survey results indicate 55% of outsourced employees struggle with ERP functions, leading to missed dispatch schedules and inefficient order processing. Employees suggested the need for structured digital training.

Route Optimization Challenges

TNPL relies on static scheduling for dispatch routes rather than AI-driven dynamic routing. This results in unnecessary fuel consumption and extended delivery timelines, leading to higher transportation costs.

Communication Barriers in Logistics Workflow

Limited coordination between dispatch teams, ERP users, and marketing operations leads to misaligned scheduling and processing errors. 64% of employees identified poor communication as a major factor affecting dispatch efficiency.

5.2 Detailed Employee Responses & Satisfaction Metrics

- 71% agree that TNPL's current dispatch workflow is functional but slow.
- 68% state that GPS tracking would improve logistics accuracy.
- 55% feel that ERP training for contract employees is inadequate.
- 64% report that poor communication delays dispatch processing.
- 52% believe that manual documentation hinders workflow efficiency.

5.3 Suggestions

ERP & TPA Training Enhancement

Introduce structured digital training programs for employees at all skill levels, improving workflow execution and system proficiency.

GPS-Based Tracking Integration

Deploy live tracking dashboards linked to TNPL's ERP system to improve dispatch visibility and scheduling accuracy.

Automate Documentation Workflows

Implement AI-driven digital approvals to eliminate paper-based processing delays and improve

efficiency.

AI-Based Route Optimization

Leverage predictive analytics to design optimal dispatch routes, reducing fuel costs and improving delivery timelines.

Strengthen Interdepartmental Communication

Adopt real-time cloud-based collaboration tools for seamless logistics coordination.

Improve ERP Usability & Interface

Enhance ERP layouts based on employee feedback to improve accessibility and workflow navigation.

Conduct Routine System Feedback Surveys

Collect quarterly employee feedback to assess system adoption and areas needing further refinement.

5.4 Conclusion

While the integration of Automated Storage and Retrieval Systems (ASRS) and Enterprise Resource Planning (ERP) has improved dispatch efficiency at TNPL, several operational gaps still need to be addressed. Notably, real-time tracking capabilities remain limited, and manual documentation approvals continue to slow down processes, leading to inefficiencies. Additionally, gaps in employee training hinder the full utilization of existing technologies. To overcome these challenges, TNPL should focus on implementing enhanced GPS-based real- time tracking systems, automating documentation and approval workflows, and providing comprehensive ERP training. These improvements will help increase logistics accuracy, reduce costs, and streamline marketing operations. Future efforts should also explore advanced AI- driven logistics forecasting and greater automation to further optimize dispatch and logistics performance.