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IMPACT OF ERP (SAP) DATA ANALYTICS ON MANUFACTURING EFFICIENCY REFERENCE TO NILKAMAL LIMITED IN SHOOLAGIRI.

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ABSTRACT

The research adopts a descriptive and analytical design using a case study approach. Primary data was collected through structured questionnaires from 80 respondents across various functional areas, including production, IT, quality control, and supply chain, while secondary data was gathered from company reports and existing literature. Statistical tools such as percentage analysis, mean scores, and Likert scale analysis were employed to interpret the data.The findings reveal that SAP ERP significantly improves production planning accuracy, inventory visibility, resource utilization, and supply chain coordination, with over 70% of respondents expressing positive agreement. The system also contributes to cost reduction, minimizes manual errors, and enhances product quality consistency. However, challenges such as system complexity, lack of training, and technical issues persist, limiting the full utilization of ERP capabilities.The study concludes that while SAP ERP has a substantial positive impact on manufacturing efficiency, its effectiveness depends on proper training, user adoption, and continuous system optimization. The research provides practical recommendations for improving ERP utilization and contributes to the existing literature on ERP-driven manufacturing performance in the Indian context.

KEYWORDS: ERP, SAP, Data Analytics, Manufacturing Efficiency, Operational Performance, Production Planning, Decision Making.

1. INTRODUCTION

ERP systems facilitate seamless coordination across functional areas such as production, inventory, procurement, finance, and human resources. By providing a unified database and real-time information flow, these systems enable organizations to improve decision-making, reduce operational delays, and optimize resource utilization. With the integration of advanced data analytics, ERP systems have evolved beyond mere transactional platforms into strategic tools that support predictive analysis, performance monitoring, and process optimization.Manufacturing efficiency is a key determinant of organizational success, as it directly influences productivity, cost management, product quality, and customer satisfaction. In this context, SAP ERP systems equipped with analytics capabilities play a crucial role in enhancing efficiency by offering real-time insights into production processes, identifying bottlenecks, and enabling data-driven decision-making.This study focuses on Nilkamal Limited, one of India's leading manufacturers of molded plastic furniture and material handling products. The company operates on a large scale with multiple manufacturing units, extensive distribution networks, and diverse product lines. To manage its complex operations, Nilkamal has implemented SAP ERP systems integrated with data analytics tools, enabling real-time monitoring, improved coordination, and efficient resource management.

2. REVIEW OF LITERATURE

1. **Gupta (2018)** found that ERP implementation significantly improves operational efficiency in Indian manufacturing firms by integrating various business functions.
2. **Sharma and Patel (2019)** highlighted that SAP ERP systems enhance production planning and inventory management through real-time data availability.
3. Research by **Kumar (2020)** emphasized the role of data analytics in ERP systems for improving decision-making and forecasting accuracy.
4. **Reddy (2017)** observed that ERP adoption in Indian industries reduces operational costs and improves resource utilization.
5. A study by **Singh and Kaur (2021)** revealed that ERP systems contribute to better supply chain coordination and reduced lead time.
6. **Mehta (2019)** identified that data-driven ERP systems improve quality control and minimize production errors.
7. **Agarwal (2020)** discussed the challenges of ERP implementation, including high cost and resistance to change among employees.

8. **Nair (2018)** found that ERP systems enhance transparency and accountability in manufacturing operations.
9. **Joshi (2021)** highlighted the importance of training and user involvement in successful ERP implementation.
10. **Verma and Sinha (2020)** emphasized that SAP ERP systems support real-time monitoring and performance evaluation.

RESEARCH GAP

The Research Gap is the "missing piece of the puzzle." It is the justification for your study—proving that while others have studied ERP or Manufacturing, no one has quite looked at the specific intersection of SAP Data Analytics and Nilkamal Limited's unique business model.

1. The Contextual Gap (Industry Specifics)
2. The Technological Gap (Transition to Intelligence)
3. The Functional Gap (B2B vs. B2C Integration)
4. The Methodological Gap (Qualitative vs. Quantitative)
5. The Geographical/Regional Gap (Indian Manufacturing Context)

3. OBJECTIVES OF THE STUDY

The main objective is to analyze the impact of ERP (SAP) data analytics on manufacturing efficiency in Nilkamal Limited. Specific objectives include:

- To assess how real-time data and analytics improve productivity and operational control.
- To evaluate the efficiency and effectiveness of ERP implementation in plant manufacturing.
- To evaluate the impact of ERP on inventory management processes.
- To investigate the influence of ERP on supply chain optimisation.
- To examine the effects of ERP integration on quality control measures.
- To analyze the financial implications of ERP adoption in plant operations.

4. RESEARCH METHODOLOGY

A . RESEARCH DESIGN

- Quantitative Methods — Analysis of SAP-generated data (production reports, inventory levels, KPIs); statistical tools to measure efficiency and performance.
- Qualitative Methods — Interviews with managers and employees; observations of ERP system usage; understanding practical challenges and user experiences.

B. SAMPLE SIZE

A Total of 25 questionaries were distributed and 70 responses were collected.

C.SAMPLING METHOD

Random sampling method was used.

D.DATA COLLECTION

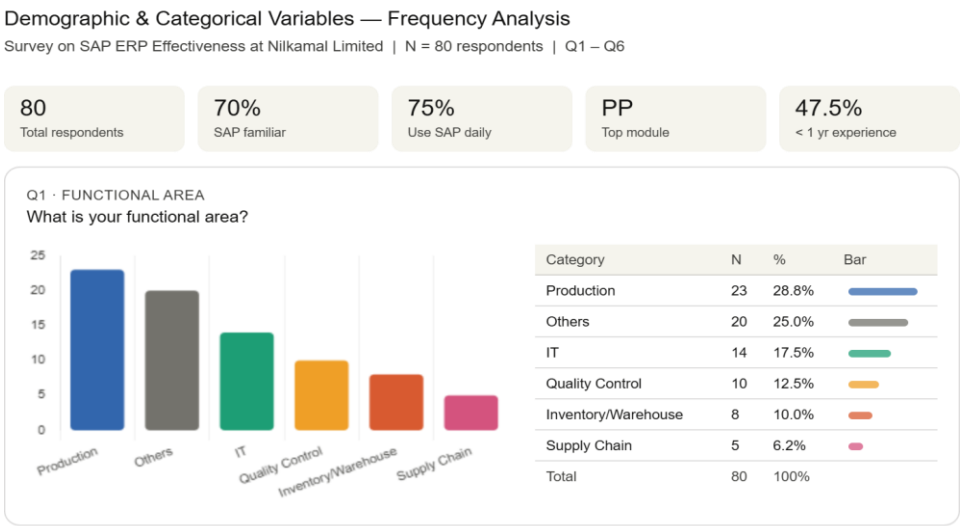
Data were collected using a structured questionaries administered through google form.

E.TOOLS USED

- Percentage Analysis.
- Mean (Average) Analysis.
- Likert Scale Analysis.
- Comparative Analysis.
- Tabulation & Graphical Representation.

5. RESULTS AND DISCUSSION

5.1 FUNCTIONAL AREA.



INTERPRETATION:

The Production department dominates the sample (28.8%, N=23), which is expected given Nilkamal's manufacturing orientation. "Others" (25%) represents miscellaneous departments, while IT (17.5%) and Quality Control (12.5%)

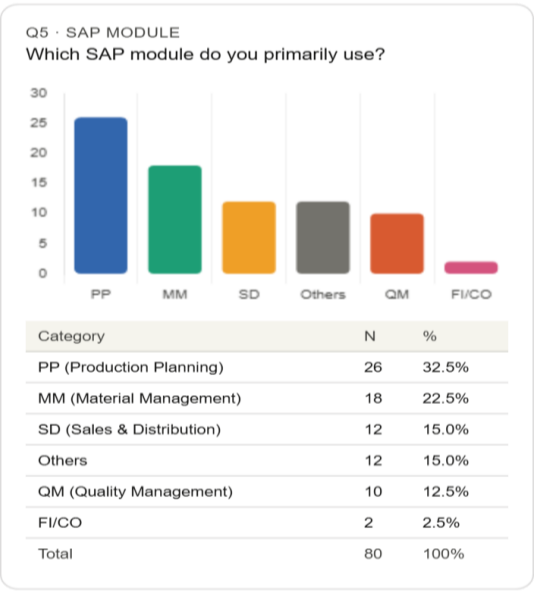
5.2 Experience in Company.

Category	N	%
Less than 1 year	38	47.5%
1 – 3 years	28	35.0%
3 – 5 years	10	12.5%
More than 5 years	4	5.0%
Total	80	100%

INTERPRETATION:

A striking 47.5% of respondents have less than 1 year of experience, and another 35% have 1–3 years, meaning 82.5% are relatively new employees**.** Only 5% have more than 5 years of tenure. This heavily skewed distribution has critical implications — newer employees are more likely to struggle with SAP navigation and are more dependent on training.

5.3 SAP Module Used.

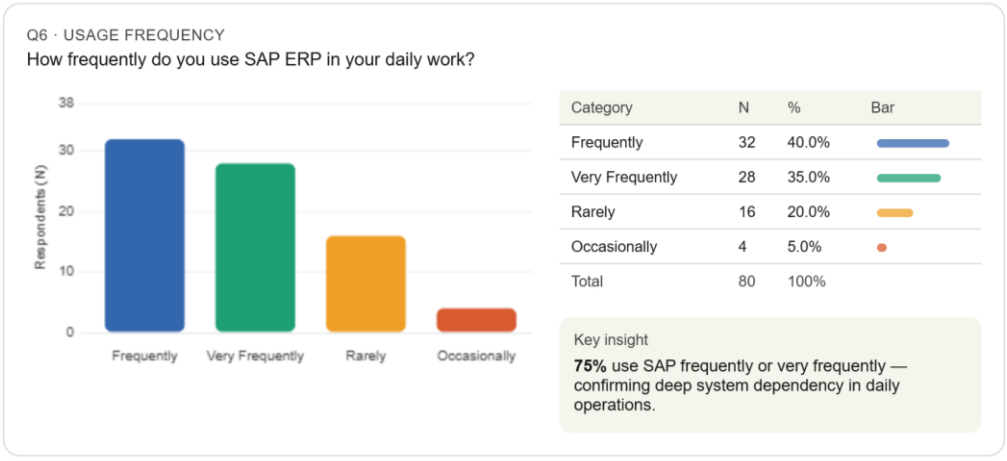


Category	N	%
PP (Production Planning)	26	32.5%
MM (Material Management)	18	22.5%
SD (Sales & Distribution)	12	15.0%
Others	12	15.0%
QM (Quality Management)	10	12.5%
FI/CO	2	2.5%
Total	80	100%

INTERPRETATION:

PP (Production Planning) is the most used module at 32.5%, reflecting the company's manufacturing core. MM (Material Management) follows at 22.5%, consistent with active procurement and stock management activities. SD (15%), Others (15%), and QM (12.5%) form the middle layer, while FI/CO has the lowest representation (2.5%)**,** suggesting that financial module usage is confined to a very small specialist group. This distribution confirms that manufacturing-side modules dominate SAP usage at Nilkamal.

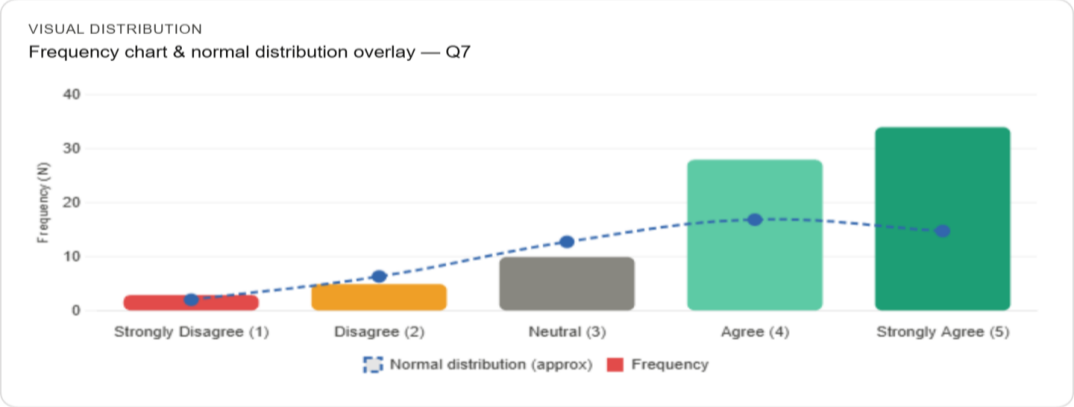
5.4 Frequency of SAP ERP Usage.



INTERPRETATION:

A combined 75% of respondents use SAP frequently (40%) or very frequently (35%) in their daily work — a strong indicator that SAP is mission-critical and not a peripheral tool. Only 5% use it occasionally and 20% rarely.

5.5 SAP ERP has improved production planning accuracy.



INTERPRETATION:

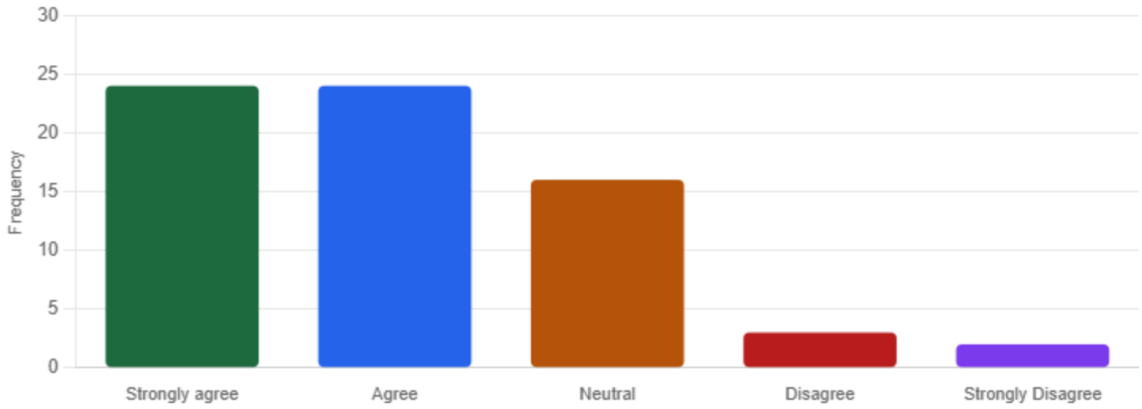
The mean score for Q7 is 4.06, indicating that most respondents agree that SAP ERP improves production planning accuracy**.** The value is well above the midpoint (3), showing a strong positive perception**.**The standard deviation **(**1.02**)** indicates moderate variation, meaning while most responses are positive, a few respondents have differing opinions.The distribution is negatively skewed, with the majority of responses concentrated in **"**Agree" and "Strongly Agree**"** categories.

5.6 SAP ERP has improved product quality consistency

FREQUENCY DISTRIBUTION TABLE

Response	Scale (x)	Freq (f)	f × x	Rel. freq (%)	Cum. freq	Cum. rel. (%)	$x - \bar{x}$	$(x-\bar{x})^2$	$f(x-\bar{x})^2$
Strongly agree	5	24	120	34.78	24	34.78	1.0580	1.1194	26.8656
Agree	4	24	96	34.78	48	69.57	0.0580	0.0034	0.0816
Neutral	3	16	48	23.19	64	92.75	-0.9420	0.8874	14.1984
Disagree	2	3	6	4.35	67	97.10	-1.9420	3.7714	11.3142
Strongly Disagree	1	2	2	2.90	69	100.00	-2.9420	8.6554	17.3108
Total		**69**	**272**	**100.00**					**69.7706**

BAR CHART — FREQUENCY DISTRIBUTION



INTERPRETATION:

The mean (3.94) indicates overall positive agreement that SAP improves product quality consistency. The median (4) and bimodal values (4 & 5) show responses are concentrated at the higher end. A moderate standard deviation (1.01) suggests limited variation. The negative skewness (−0.84) confirms most responses are positive, while kurtosis (+0.45) indicates a slightly peaked distribution with responses clustered near the mean.

6. FINDINGS

- Production department (28.8%) forms the largest respondent group, ensuring manufacturing-centric insights.
- 52.5% of respondents are Operators and Supervisors, providing ground-level operational feedback.
- 47.5% of employees have less than 1 year of experience, highlighting a need for stronger onboarding and SAP training programs.
- 70% of respondents are familiar with SAP ERP, reflecting good system penetration across the organisation.
- 77.5% agree SAP improves production planning accuracy (Mean: 4.06) and scheduling efficiency (Mean: 4.08).
- 78.8% agree SAP improves inventory visibility and inter-departmental coordination.
- 76.3% believe SAP reduces stock shortages and overstocking, contributing to cost savings.
- 78.8% agree SAP provides real-time monitoring, enabling rapid operational responses.
- 82.5% of respondents are satisfied or very satisfied with the SAP implementation — a strong indicator of overall success.
- System complexity (32.5%) is the top challenge, followed by technical issues (22.5%) and lack of training (20.0%).

7. SUGGESTIONS

- Introduce comprehensive and role-specific SAP training programs, particularly for new recruits and operational staff.
- Simplify the SAP interface by adopting user-friendly dashboards to reduce system complexity and improve navigation.
- Establish a dedicated technical support team to address system errors, downtime, and user queries promptly.
- Implement regular system upgrades and performance optimisation to reduce lag and enhance operational speed.
- Deploy data validation mechanisms to minimise input errors and improve the reliability of SAP-generated reports.
- Leverage advanced SAP analytics features — real-time dashboards and predictive analytics — to strengthen decision-making capabilities.

- Conduct periodic audits of data consistency and integrity across all departments.
- Promote greater cross-functional integration to ensure seamless data flow between procurement, production, and distribution.
- Collect regular user feedback to identify system challenges and implement timely improvements.
- Invest in developing in-house SAP expertise through certification programs and advanced training initiatives.
- Align SAP functionalities with evolving business needs by adopting a culture of continuous improvement.

8. CONCLUSION

This research journal documents the comprehensive study titled "Impact of ERP (SAP) Data Analytics on Manufacturing Efficiency with Reference to Nilkamal Limited." The findings reveal that SAP ERP has a significant and measurable positive impact on the overall functioning of manufacturing processes within the organisation.A strong majority of respondents demonstrated favourable perceptions of SAP ERP across all key dimensions — production planning, scheduling, resource utilisation, inventory management, quality control, and supply chain coordination. Most agreement levels exceeded 70%, with overall satisfaction at 82.5%, confirming that SAP is a mission-critical, value-generating system within Nilkamal's manufacturing ecosystem.

The study also identified areas requiring improvement, particularly around system complexity, user training, and the gap between ERP availability and advanced analytics adoption.

9. REFERENCES

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4. Reddy (2017) — ERP adoption in Indian industries reduces operational costs and improves resource utilisation.

5. Singh and Kaur (2021) — ERP systems contribute to better supply chain coordination and reduced lead time.
6. Mehta (2019) — Data-driven ERP systems improve quality control and minimise production errors.
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