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Bridging The Gap Between System Perception And Ground Reality: An Empirical Investigation Of Inventory Management At JBM Auto Ltd

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ABSTRACT

Automobile component manufacturing thrives on tight material coordination, where even minor inventory disruptions can stall production lines and erode customer trust. This paper presents a field-based empirical analysis of inventory management practices at JBM Auto Ltd — a prominent Indian automotive component supplier and flagship entity of the JBM Group — with the objective of measuring how effectively current systems, processes, and employee behaviors translate into on-ground operational efficiency. Survey data were collected from 110 employees across functional departments including logistics, operations, warehousing, procurement, and allied functions. Four analytical methods were applied: percentage analysis for descriptive profiling, one-way ANOVA to detect variation in efficiency perceptions across opinion groups, Chi-Square testing to examine the relationship between work experience and efficiency ratings, and Pearson correlation to quantify the link between inventory handling frequency and item retrieval speed. Results present a nuanced picture — while 79.1% of employees regard the existing inventory system as capable of curtailing stock errors, nearly two-thirds (65.5%) encounter inventory mismatches on a recurring basis, and 42.7% attribute delays to internal workflow weaknesses rather than external supply disruptions. ANOVA confirms statistically significant divergence in efficiency perceptions ($F = 8.92$, critical $F = 5.19$), Chi-Square analysis ($\chi^2 = 1.82$, $p = 0.61$) finds no meaningful link between seniority and efficiency ratings, and Pearson correlation ($r = -0.248$, $p = 0.009$) reveals that frequent inventory handlers retrieve items measurably faster. The paper concludes with targeted recommendations centered on workflow redesign, technology-led automation, and structured competency development as the most actionable levers for elevating inventory performance.

Keywords: *Inventory management, automotive supply chain, JBM Auto Ltd, stock control, ANOVA, Chi-Square, Pearson correlation, ERP systems, warehouse operations, operational efficiency, Indian automobile industry.*

1. INTRODUCTION

Automobile component manufacturing is one of the most inventory-intensive industrial activities in the world. Unlike consumer product businesses where unsold goods can be reprised and moved through alternate channels, an automotive parts factory carries no such flexibility — a shortage of one critical sub-component can idle an entire assembly line, and an excess of the wrong item ties up capital that could fund capacity or technology investment. The pressure to maintain precisely calibrated inventory levels is therefore not merely an operational preference but a strategic necessity.

Managing this challenge effectively demands more than software deployment or periodic stock audits. It requires a system- level approach that integrates technology, process discipline, storage design, and human capability — all functioning in alignment. When any one of these dimensions falls short, the gap between what the inventory system is theoretically capable of and what it actually delivers in practice widens. Surfacing and closing this gap is the central objective of the present research.

JBM Auto Ltd, a flagship entity of the diversified JBM Group established in 1983, has grown over four decades from a sheet metal fabrication unit into one of India's foremost automotive component suppliers. The company manufactures body panels, structural assemblies, press tools, dies, molds, and integrated electric bus platforms, serving major original equipment manufacturers (OEMs) across passenger vehicles, commercial transport, and two-wheelers. With a combined workforce exceeding 35,000 personnel and manufacturing facilities equipped with contemporary automation and machining technology, the company's operational scale amplifies both the importance and the complexity of managing inventory well.

This study investigates inventory management at JBM Auto Ltd through the lens of employee experience — capturing how workers across departments perceive system effectiveness, where operational failures most commonly occur, and what behavioral and demographic factors shape efficiency outcomes. The findings are intended to inform practical improvements in stock management, process design, storage configuration, and workforce development at both the organizational and functional level.

2. REVIEW OF LITERATURE

The theoretical roots of contemporary inventory management in manufacturing can be traced to the lean production movement of the 1980s and 1990s. Womack, Jones, and Roos (1990) reframed inventory from a protective buffer into a form of operational waste, demonstrating through comparative plant studies that Japanese manufacturers who adopted pull-based replenishment systems carried a fraction of the stock held by Western counterparts while achieving superior quality metrics. Ohno (1988) articulated the mechanical logic of this model through the Toyota Production System, in which Kanban cards physically governed material flow and prevented overproduction at each stage of the value chain. Liker (2004), synthesizing two decades of Toyota scholarship, further identified minimal inventory as both a symptom and a cause of process discipline: plants compelled to operate on lean buffers surface hidden problems more rapidly and resolve them more durably.

From a strategic standpoint, Bowersox, Closs, and Cooper (2013) established that integrated logistics management — encompassing procurement, warehousing, and distribution — is a primary driver of customer service outcomes and cost competitiveness. Chopra and Meindl (2016) elaborated this framework to show that coordination across supply chain stages significantly reduces the bullwhip effect, a phenomenon in which small fluctuations in downstream demand are amplified into large inventory swings upstream, with damaging cost consequences.

Contemporary scholarship has increasingly focused on the role of digital technologies in reshaping inventory dynamics. Yang (2025) examined how inventory classification algorithms — particularly demand-segmentation approaches calibrated to real- time consumption data — outperform fixed-cycle replenishment models across multiple supplier configurations. Ranabhatt et al. (2025) evaluated forecasting architectures in automotive demand planning and found that ensemble machine-learning models reduced forecast error by a statistically significant margin compared to conventional ARIMA and exponential smoothing benchmarks, particularly in the spare-parts segment where demand is inherently erratic. Simchi-Levi, Kaminsky, and Simchi-Levi (2010) demonstrated that Warehouse Management Systems (WMS) integrated with ERP platforms produce measurable improvements in inventory accuracy and order fulfilment rates.

Within the Indian manufacturing context, Nathaji (2020) investigated inventory practices at Maruti Udyog Limited and concluded that ABC stratification, combined with periodic physical reconciliation and digitalised issue records, substantially reduced both stockout frequency and excess-holding costs. Thakre (2021) focused on Just-in-Time (JIT) adoption barriers among Indian automotive suppliers and found that ERP integration quality was the strongest predictor of JIT success — ahead of supplier lead time and floor-space configuration. Sople (2012) contextualised these insights within Indian supply chain imperatives, noting that inventory management in Indian manufacturing environments is complicated by infrastructure variability, supplier fragmentation, and seasonal demand fluctuations that standard Western frameworks do not adequately address.

At the supply chain performance level, Singh, Kumari, and Singh (2023) surveyed Tier-1 and Tier-2 Indian automotive suppliers and documented that firms sharing real-time inventory visibility with upstream and downstream partners experienced fewer production stoppages and maintained lower safety stock requirements. Saranga, Mukherji, and Shah traced a secular decline in inventory-to-revenue ratios across Indian automotive firms over a fifteen-year period, attributing the trend to compound improvements in supplier scheduling accuracy, inter-functional coordination, and lean adoption. Kanoujiya, Agarwal, and Rastogi (2025) provided econometric evidence that inventory turnover ratio is a statistically significant predictor of return on assets in listed Indian automobile companies — confirming that operational inventory discipline translates into measurable financial performance. The present study contributes to this body of knowledge by offering granular, employee-level evidence from an automotive component manufacturer, a segment underrepresented in existing empirical work relative to assemblers and OEMs.

3. RESEARCH METHODOLOGY

3.1 Research Design

The study operates within a quantitative, descriptive-analytical paradigm. Research questions were framed across three dimensions: (i) how employees perceive the adequacy of existing inventory systems and processes; (ii) where operational failures most frequently occur across inventory handling stages; and (iii) whether employee characteristics — specifically experience level and task engagement frequency — predict efficiency outcomes. These dimensions jointly called for a combination of descriptive statistics and hypothesis-driven inferential analysis.

3.2 Data Collection and Sampling

Primary data were gathered using a structured, pre-tested questionnaire comprising 24 items, administered to 110 employees of JBM Auto Ltd during January to April 2026. The questionnaire covered inventory system usage, stock error reduction effectiveness, monitoring system adequacy, delay causation, item retrieval speed, mismatch frequency, stage-wise handling problems, stock availability patterns, efficiency impact perceptions, and damage incidence. Respondents were drawn from logistics, operations, warehouse, procurement, and allied departments using a convenience sampling method that prioritized accessibility and departmental representativeness. Secondary data were sourced from company annual reports, ERP system documentation, industry analyses, and peer-reviewed publications.

3.3 Statistical Tools Applied

Four analytical tools were employed. Percentage analysis constructed descriptive profiles of respondent characteristics and operational perceptions. One-way ANOVA tested whether statistically significant differences existed in efficiency perceptions across respondent opinion groups. The Pearson Chi-Square test examined whether an association could be established between work experience level and overall efficiency ratings. Pearson correlation analysis quantified the directional relationship between inventory handling frequency and item retrieval time — providing a behavioral efficiency measure grounded in task familiarity rather than system design alone.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Respondent Profile

The sample is predominantly young and entry-level: 81.8% of respondents fall within the 20–25 age band, and 69.1% have two or fewer years of professional experience. Male employees constitute 62.7% of the sample. Academically, postgraduates form the largest group (46.4%), followed closely by undergraduates (40.9%). Three-quarters of respondents (76.4%) hold full-time positions, and 63.6% work morning shifts. Operationally, 37.3% of respondents handle inventory on a daily basis and an equal proportion on a weekly basis, confirming broad functional exposure to inventory tasks across the workforce.

Table 1 — Respondent Profile

Characteristic	Category	n	%
Age	20–25 yrs	90	81.8%
	26–30 yrs	10	9.1%
	31–35 yrs	7	6.4%
	Above 35	3	2.7%
Gender	Male	69	62.7%
	Female	41	37.3%
Education	Diploma	5	4.5%
	Undergraduate	45	40.9%
	Postgraduate	51	46.4%
	Others	9	8.2%
Experience	0–2 yrs	76	69.1%
	3–5 yrs	20	18.2%
	6–10 yrs	8	7.3%
	Above 10 yrs	6	5.5%
Employment	Full-time	84	76.4%
	Part-time	21	19.1%
	Contract	5	4.5%

Source: Primary Data

4.2 System Usage and Perceived Adequacy

SAP is the most widely used inventory platform (32.7%), followed by other ERP systems (29.1%), Microsoft Excel (27.3%), and manual records (10.9%). This distribution signals a relatively mature but uneven digital environment — the majority of employees operate within digitized systems, yet a non-trivial minority continue to rely on spreadsheets or paper-based methods. Positively, 79.1% of respondents believe the current system successfully reduces stock errors, and 66.3% confirm that the stock monitoring subsystem enables timely tracking and inventory updates. These perceptions establish a broadly favorable baseline for system adequacy.

However, these positive ratings co-exist with a contradictory operational reality. Despite the high system approval scores, 65.5% of employees encounter inventory mismatches regularly — a figure that exposes a gap between perceived capability and actual performance. The 47.3% of respondents who report experiencing periodic stock shortages, alongside 18.2% who report excess inventory, further indicate that the current system has not yet resolved demand-supply alignment at the operational level. Error detection continues to rely predominantly on physical verification (46.4%), with system alerts (22.7%) and supervisory review (22.7%) playing secondary roles — signaling that the digital infrastructure is underutilized for proactive quality assurance.

Table 2 — Key Operational Indicators

Operational Measure	Finding	%
Primary inventory platform	SAP	32.7%
System reduces stock errors	Yes	79.1%
Stock monitoring aids timely updates	Agree / Strongly Agree	66.3%
Frequent inventory mismatches	Yes	65.5%
Leading cause of delays	Internal process breakdowns	42.7%
Time to locate an item	5–10 minutes (majority)	47.3%
Most problematic stage	Storage	43.6%
Primary damage location	During handling	48.2%
Error identification method	Physical / manual checking	46.4%
Stock availability	Sometimes in shortage	47.3%
Stock verification frequency	Weekly and Monthly (each)	38.2%
Inventory damage — rarely occurs	Rarely damaged	12.7%

Source: Primary Data

4.3 Delay Causation and Stage-Level Vulnerabilities

When respondents were asked to identify the primary cause of inventory delays, internal process failures ranked first by a considerable margin at 42.7%, followed by supplier-side disruptions (26.4%), transportation breakdowns (19.1%), and system-generated errors (11.8%). This distribution carries a constructive implication: because the dominant delay cause lies within organizational boundaries rather than the external supply network, the company retains direct agency to address it through process redesign.

The stage-level analysis sharpens this picture further. Storage is the most operationally problematic phase of the inventory lifecycle, identified by 43.6% of respondents, while picking and issuance follows at 30%, receiving at 18.2%, and dispatch at 8.2%. Inventory damage is concentrated in the handling phase (48.2%), ahead of transport (20%) and storage (19.1%). Together, these findings point to the physical and procedural environment of warehousing — rather than digital system limitations — as the primary operational vulnerability requiring intervention.

4.4 ANOVA — Divergence in Efficiency Perceptions

One-way ANOVA was applied to determine whether statistically significant differences exist in the distribution of respondents across five opinion categories — Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree — regarding the efficiency impact of inventory management practices.

H_0: No significant difference exists between opinion group distributions. | H_1: At least one group differs significantly from the others.

Table 3 — One-Way ANOVA: Inventory Efficiency Perception

Variation Source	SS	df	MS	F-Value	Critical F (5%)
Between Groups	1150.8	4	287.7	8.92	5.19
Within Groups	1613.2	5	322.6	—	—
Total	2764.0	9	—	—	—

Source: Primary Data

With a computed F-statistic of 8.92 exceeding the critical value of 5.19 at the 5% significance level, the null hypothesis is rejected. The result establishes that employees hold meaningfully divergent views about inventory management's contribution to operational efficiency. This heterogeneity of perception carries practical implications: improvement initiatives and communication strategies must be tailored to address differing workforce beliefs about system performance, rather than assuming a uniform receptivity to change.

4.5 Chi-Square — Experience and Efficiency Ratings

The Chi-Square test examined whether an employee's accumulated work experience bears a statistically significant relationship to how they rate overall inventory efficiency.

H_0: Experience level and efficiency ratings are statistically independent. | H_1: Experience is a significant predictor of efficiency ratings.

Table 4 — Chi-Square Test: Experience vs. Efficiency Rating

Test	Value	df	p-value	Decision
Pearson Chi-Square	1.82	3	0.610	Accept H_0
Likelihood Ratio	1.76	3	0.620	Accept H_0
Linear-by-Linear Association	0.95	1	0.330	Accept H_0
N of Valid Cases	110	—	—	—

Source: Primary Data

The p-value of 0.61 comfortably exceeds the 0.05 threshold, confirming statistical independence between experience level and efficiency ratings. This finding is constructive: it suggests that the organization's documented procedures and operating systems are robust enough to enable employees at all seniority levels to engage with and assess inventory performance in broadly comparable ways. Consequently, efficiency improvement efforts need not be directed disproportionately at any one experience cohort — systemic intervention is warranted across the board.

4.6 Pearson Correlation — Handling Frequency and Retrieval Speed

Pearson correlation was applied to determine whether regularity of inventory task engagement predicts how quickly employees can locate required items — a behavioral efficiency measure that reflects accumulated task familiarity rather than formal training alone.

H_0: No significant relationship exists between handling frequency and retrieval time. | H_1: A significant relationship exists
between the two variables.

Table 5 — Pearson Correlation: Handling Frequency vs. Retrieval Time

Variable	Statistic	Handling Frequency	Retrieval Time
Inventory Handling Frequency	Pearson r	1.000	−0.248
	Sig. (2-tailed)	—	0.009
	n	110	110
Item Retrieval Time	Pearson r	−0.248	1.000
	Sig. (2-tailed)	0.009	—
	n	110	110

Source: Primary Data

A statistically significant negative correlation ($r = -0.248$, $p = 0.009$) was confirmed, leading to rejection of the null hypothesis. The inverse relationship indicates that employees who engage with inventory tasks more frequently develop spatial familiarity with storage layouts, habitual item-search routines, and intuitive knowledge of item coding systems — all of which compress retrieval time. This behavioral efficiency gain is not replicated through periodic training alone; it is accumulated through consistent, repeated task engagement. Personnel rotation policies that move employees away from inventory roles may therefore inadvertently forfeit this organizationally valuable efficiency asset.

5. KEY FINDINGS

The following nine findings of particular significance emerge from the analysis:

1. The workforce is predominantly young and inexperienced — 81.8% of respondents are aged 20–25 and 69.1% have two or fewer years of experience — which amplifies the strategic importance of structured onboarding, mentorship, and periodic skill refreshment programmers.

2. A meaningful gap exists between system perception and operational reality: despite 79.1% of employees affirming the system's error-reduction capability, 65.5% simultaneously report recurring inventory mismatches — indicating data discipline or process adherence failures that the system alone cannot resolve.

3. Internal process breakdowns are the dominant cause of inventory delays at 42.7%, surpassing all external factors combined. This locates the primary source of delay within organizational boundaries, where the company retains full agency to intervene.

4. Storage is the most operationally vulnerable handling stage (43.6%), and physical handling is the chief source of inventory damage (48.2%), collectively pointing to the physical and procedural design of warehouse operations as the priority improvement target.

5. Error detection remains heavily reliant on manual physical checking (46.4%), indicating that digital inventory infrastructure — SAP and ERP systems — has not yet been leveraged to its full potential for automated exception alerting and discrepancy identification.

6. ANOVA results (F = 8.92 > critical F = 5.19) confirm significantly divergent efficiency perceptions across employee opinion groups, underscoring the need for participatory process review and structured feedback mechanisms to reconcile differing workforce beliefs.

7. Chi-Square analysis (χ^2 = 1.82, p = 0.61) establishes that seniority does not predict efficiency ratings, affirming that standardized procedures are sufficiently robust to enable consistent performance across experience levels — a structural strength the organization should actively preserve as it scales.

8. Pearson correlation (r = −0.248, p = 0.009) confirms that task familiarity accumulated through frequent inventory engagement measurably reduces retrieval time — a behavioral efficiency dividend that personnel rotation policies risk eroding.

9. Concurrent stock shortages (47.3%) and excess inventory (18.2%) point to demand-supply misalignment in procurement planning, and the absence of predictive inventory tools that can dynamically calibrate reorder points to actual consumption patterns.

6. SUGGESTIONS

Based on the analytical findings, the following targeted recommendations are proposed for JBM Auto Ltd:

Process Re-Engineering: Internal inventory workflows should be systematically mapped using value stream analysis to identify and eliminate handoff delays, redundant approval steps, and ambiguous role ownership — the factors most responsible for the 42.7% of delays rooted in internal breakdowns. Clear ownership matrices and escalation protocols should be defined for each inventory stage.

Automation and Technology Upgrade: Barcode scanning, RFID tagging, and system-generated exception alerts should be deployed across storage and picking stages. Real-time integration between the WMS and ERP should be strengthened so that inventory discrepancies are automatically flagged before they propagate, reducing dependence on physical verification as the primary error detection mechanism.

Warehouse and Storage Redesign: The 5S methodology — Sort, Set in Order, Shine, Standardize, Sustain — should be applied to reconfigure storage layouts, improve item labelling standards, standardize bin locations, and reduce retrieval friction. Dedicated aisles, visual management systems, and ergonomic handling equipment can directly address the finding that 43.6% of respondents identify storage as the most problematic inventory phase.

Predictive Inventory Management: ABC-XYZ classification should be implemented to stratify inventory by value and demand variability. Consumption-based dynamic reorder triggers and seasonal demand buffers should replace static replenishment cycles to resolve the simultaneous stock shortage and excess inventory conditions reported by the workforce.

Structured Competency Development: A formalized quarterly training programmer covering inventory systems, standard operating procedures, safe material handling, and ERP usage should be established — with particular emphasis on logistics and warehouse roles where task-frequency-driven efficiency gains are most pronounced. Onboarding modules for new employees should include hands-on inventory task immersion to accelerate the development of retrieval familiarity.

Cross-Functional Coordination: Regular inter-departmental review meetings between procurement, production planning, logistics, and warehouse management should be institutionalized. Shared digital dashboards displaying real-time inventory levels, shortage alerts, and consumption trends can eliminate the information silos that contribute to stock imbalances and internal process delays.

7. CONCLUSION

This study set out to determine whether inventory management at JBM Auto Ltd reflects its strong system reputation or reveals operational vulnerabilities that formal assessments might obscure. The answer, supported by data from 110 employees and four inferential tests, is that both conditions exist simultaneously. The company has built a digitized, broadly accessible inventory infrastructure that the workforce generally regards as effective. Yet beneath this positive surface, process-level failures — inconsistent workflows, manual error detection, storage inadequacies, and recurring mismatches — measurably diminish the system's real-world impact.

The statistical evidence adds important nuance. Neither seniority nor uniform opinion consensus defines the inventory efficiency experience. Rather, it is the quality of systems, the discipline of processes, and the frequency of task engagement that determine how efficiently inventory is managed in practice. These are all variables within management's direct control
— a finding that is ultimately optimistic in its implications.

By adopting the six recommendations outlined — process re-engineering, automation escalation, warehouse redesign, predictive inventory tools, structured training, and cross-functional coordination — JBM Auto Ltd can close the gap between its digital infrastructure and its operational outcomes. The objective is to transform a system that employees trust conceptually into one that delivers measurable, consistent, and auditable efficiency gains across all departments, experience levels, and operational shifts — strengthening the company's competitive position as a preferred automotive component supplier in both domestic and global markets.

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