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The Role of Inventory Management in Improving Supply Chain Efficiency: An Illustrative Empirical Study of Manufacturing and Distribution Firms

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ABSTRACT

This article explores the role of inventory management in enhancing supply chain efficiency in manufacturing, logistics, wholesale and retail organizations. A fictional cross-sectional dataset of 120 respondents (warehouse personnel, production managers, supply chain managers, inventory managers and others) who received a 20-item questionnaire was analysed to demonstrate a complete research process including problem identification, literature review, objectives and hypotheses, methodology, statistical analysis, results and recommendations. The descriptive statistics, Cronbach's alpha, a Chi-square test of independence, one-way ANOVA (with a Kruskal-Wallis robustness test), and Spearman's correlation were used. Respondents viewed inventory management positively: 70.0% believed it contributes to supply chain efficiency to a great or very great extent (mean 3.96 on a five-point Likert scale), and 70.0-82.5% agreed that inventory management practice benefits costs, service and coordination. However, the results of the inferential statistical analysis did not reveal significant effects. The use of a computerized inventory management system was not related to high perceived supply chain efficiency ($\chi^2=0.169$, $df=1$, $p=0.681$), and the mean perceived supply chain efficiency scores did not differ significantly between low, medium and high inventory-management-practice groups ($F(2, 117)=2.854$, $p=0.062$; $\eta^2=0.047$), although the medium group had the highest mean score. Due to very low Cronbach's Alpha ($\alpha=0.12$), the benefit items were analysed individually. Since the data were fictional, the current article discusses the analytical process and provides recommendations. Thus, the current study highlights the importance of integrated inventory management policies, accurate stock records, and collaborative approaches with suppliers supported by technology.

Keywords: Inventory Management; Supply Chain Efficiency; Demand Forecasting; Inventory Control; Warehouse Management; ERP; Manufacturing and Distribution; ANOVA; Chi-Square.

1. Introduction

Inventory constitutes the backbone of any supply chain. It serves as the critical link between procurement, production, and distribution functions, and it balances the uncertainty of demand with the limitations of supply. On the one hand, inadequate stocks result in stock-outs, loss of revenue, and customer dissatisfaction; on the other hand, excessive stocks increase holding, handling, and storage costs and tie up working capital. Thus, supply chain efficiency, defined as the ability to deliver products at a required level of service at the lowest possible cost and with the shortest possible lead time, relies on the inventory management practices used in the firm. Recent supply chain literature also highlights the role of digital technologies and data analytics in supporting demand forecasting and replenishment decisions.

The current research explores the student's thesis question, deemed appropriate for an undergraduate study, namely, do respondents who use computerized inventory management systems and report high inventory-management practices also report that inventory management significantly contributes to supply chain efficiency? Recent supply chain management literature uses the term 'inventory management' to embrace a wide range of practices, from demand forecasting to warehouse management, from reducing stock-outs to maintaining safety stocks (Gaur et al., 2005; DeHoratius & Raman, 2008). Inventory management practices require collaboration with suppliers, accurate demand records, and the use of appropriate inventory-management technologies and approaches such as radio-frequency identification (RFID) and enterprise resource planning (ERP).

2. Review of Literature

Harris (1913) developed the economic order quantity model that minimizes the cost of inventory management by determining the reorder interval and order quantity. It remains the foundation of modern inventory management practices.

Lee, Padmanabhan and Whang (1997) identified the bullwhip effect, i.e., the distortion of demand information from retailers to wholesalers and manufacturers, and offered reasons why it occurs. They also suggested ways to improve coordination between supply chain partners

Cachon and Fisher (2000) evaluated the impact of information sharing, lead time reduction, and order batching on supply chains and demonstrated that these factors determine inventory management policies and reduce logistics costs.

Mentzer et al. (2001) definition of supply chain management that emphasizes the need for a systems-thinking approach to managing supply chains. As such, inventory management falls under the purview of supply chain management, with inventory management policies shaping the strategies of manufacturing and distribution firms.

Gaur, Fisher and Raman (2005) examined inventory turnover in the US retail sector and established that it is closely linked to gross margin, capital intensity, and sales surprise.

DeHoratius and Raman (2008) in their analysis of retail store inventory management, concluded that inventory inaccuracies are frequent and significantly impact inventory management decisions.

Eroglu and Hofer (2011) re-examined the connection between inventory-related variables and firm performance and found that the influence of inventory levels was conditional upon firm and industry characteristics.

Choi, Wallace and Wang (2018) reviewed the role of big data analytics in operations management and showed how data analytics can help firms in demand sensing, forecasting, and inventory optimization.

Toorajipour et al. (2021) assessed the role of artificial intelligence in supply chain management and examined how AI helps supply chains in demand planning, production, warehousing, and distribution. They note that AI is a powerful tool for supply chain management but requires overcoming challenges related to its adoption.

3. Research Gap

Despite the amount of research on inventory management and supply chain efficiency, several aspects remain unexplored. First, while many researchers focus on analyzing inventory management using analytical or financial models (inventory turnover, economic order quantity, etc.), the practitioner's perspective on inventory management is understudied. Second, many researchers emphasize the role of computerized inventory systems and software in inventory management but do not sufficiently consider the interplay between inventory-management practices and supply chain efficiency. Third, the extent to which inventory management impacts supply chain efficiency varies depending on the industry and functional area. Thus, the current article attempts to demonstrate the research process by analyzing the role of inventory management practices and computerized inventory systems in improving supply chain efficiency in manufacturing and distribution firms.

4. Objectives of the Study

1. Describe the respondent profile, the level of inventory-management practices (methods, frequency of monitoring, software use) and the use of computerized inventory systems in the sample.
2. Assess the level of perceived supply chain efficiency, its cost, service and coordination components, and stock-out frequency using descriptive statistics.
3. Explore if there is an association between the use of a computerized inventory management system and high perceived supply chain efficiency.
4. Test if there are significant differences in the mean perceived supply chain efficiency across low, moderate and high inventory-management practice groups.
5. Provide recommendations for effective, technology-driven and collaborative inventory management.

5. Conceptual Framework of the Study

Inventory management influences supply chain performance by shaping demand planning and fulfillment, stock control, and collaboration with suppliers. In turn, effective supply chain management leads to improved supply chain performance. Thus, the framework below shows the relationship between inventory management practices, the use of inventory-management software, and supply chain efficiency.

Figure 1. Conceptual Framework of the Study

6. Hypotheses of the Study

H01: There is no significant association between the use of a computerized inventory management system and high perceived supply chain efficiency.

H11: There is a significant association between the use of a computerized inventory management system and high perceived supply chain efficiency.

H02: There is no significant difference in mean perceived supply chain efficiency across low, moderate and high inventory-management-practice groups.

H12: There is a significant difference in mean perceived supply chain efficiency across low, moderate and high inventory-management-practice groups.

7. Research Methodology

Research methodology refers to the systematic plan used to answer the research questions and test the hypotheses. In this study, research approach, design, population, sample, sampling technique, data source, measurement, analysis tools and ethical considerations are covered.

7.1 Research Approach

A quantitative approach is adopted because the study expresses practitioner perceptions numerically and uses statistical techniques to examine patterns, associations and group differences.

7.2 Research Design

The study follows a descriptive and analytical, cross-sectional research design. The descriptive component summarises respondent characteristics and key study variables; the analytical component tests the proposed hypotheses using the Chi-square test and one-way ANOVA, supported by non-parametric and correlation checks.

7.3 Population of the Study

The conceptual target population consists of supply chain, procurement, warehouse, production and distribution professionals working in manufacturing and distribution organizations where inventory is a significant operating asset. The dataset represents respondents in five job-position groups (warehouse staff, production managers, supply chain managers, inventory managers and others) working in five organization types (manufacturing, logistics and distribution, wholesale, retail and other).

7.4 Sample of the Study

The sample consists of 120 simulated respondent records, each flagged in the data file as simulated and not a real respondent. No records had missing values. The sample size is adequate for demonstrating descriptive analysis, cross-tabulation, Chi-square testing and one-way ANOVA.

7.5 Sampling Technique

A non-probability convenience-sampling approach is assumed for the demonstration model. In a publishable field study, the researcher should define the sampling frame (for example, a list of manufacturing and distribution firms in a region) and, wherever feasible, use probability or stratified sampling to improve representativeness.

7.6 Sources and Instrument of Data Collection

A structured 20-item questionnaire is the data-collection instrument. Q1–Q3 capture job position, years of experience and organization type; Q4–Q8 capture inventory practices (use of an inventory system, inventory method, monitoring frequency, inventory software and the importance of demand forecasting); Q9–Q11 and Q13–Q18 are statements on the benefits of inventory management, rated on a five-point agreement scale (1 = strongly disagree, 5 = strongly agree); Q12 records stock-out frequency (1 = never, 5 = always); Q19 asks for the major inventory challenge; and Q20 asks to what extent inventory management contributes to supply chain efficiency (1 = not at all, 5 = to a very great extent). The item mapping is given in Appendix B.

7.7 Variables and Measurement

The main outcome variable is Perceived Supply Chain Efficiency, measured by the single item Q20. Supporting indicators are three descriptive dimension scores computed as item means: Cost Reduction (Q9–Q11), Service and Responsiveness (Q13, Q14, Q16, Q18) and Coordination and Information (Q15, Q17), together with Stock-out Frequency (Q12). Explanatory variables are (i) use of a computerised inventory system (Q4: Yes, Under implementation, No) and (ii) an Inventory Management Practice Level derived from a practice score of 0–7, which adds the inventory method (Q5: manual control = 0; EOQ, ABC or JIT = 1; software-based = 2), monitoring frequency (Q6: occasionally = 0, monthly = 1, weekly = 2, daily = 3) and inventory software (Q7: no = 0, planning to implement = 1, yes = 2). Scores of 0–3 are classed as Low, 4–5 as Moderate and 6–7 as High. Reliability was checked with Cronbach's alpha: $\alpha=0.12$ for all nine benefit items and 0.13 (cost), 0.21 (service) and -0.18 (coordination) for the three dimensions. These values are far below the usual 0.70 benchmark, so the items do not form coherent scales; the dimension scores are therefore reported only descriptively, and hypothesis tests use the single outcome item Q20. For an actual journal submission, validated multi-item scales should be used.

7.8 Statistical Tools Used

Percentages, mean, median, standard deviation, minimum and maximum are used for descriptive analysis. Bar charts provide visual summaries. The Chi-square test of independence (with Yates' continuity correction for a 2×2 table, checked against Fisher's exact test) is used for categorical association, and one-way ANOVA is used to compare mean perceived efficiency across the three practice groups, with Levene's test, Tukey's post-hoc test, η^2 as the effect size and the Kruskal–Wallis test as a robustness check, because Q20 is an ordinal, left-skewed item. One-sample Wilcoxon signed-rank tests compare item scores with the neutral midpoint of 3, and Spearman correlations relate the benefit items to Q20. High perceived supply chain efficiency is defined as a Q20 response of 4 or above (to a great or very great extent). All tests use a 5% significance level.

7.9 Ethical Considerations

A real study should obtain informed consent, protect respondent and company confidentiality, avoid collecting unnecessary commercially sensitive information and explain how the data will be used. The present dataset is synthetic and contains no real respondent identity.

8. Data Analysis and Interpretation

Job Position	Frequency	Percentage
Warehouse Staff	33	27.5%
Production Manager	27	22.5%
Supply Chain Manager	23	19.2%
Inventory Manager	20	16.7%
Other	17	14.2%
Total	120	100.0%

Table 1. Job Position-wise Distribution of Respondents

Interpretation: The sample includes respondents from five job-position groups, reducing dependence on a single role and making the classroom dataset suitable for cross-functional analysis. Warehouse staff (27.5%) and production managers (22.5%) are the largest groups (percentages may not sum to exactly 100 because of rounding). By organization type, 43.3% of respondents work in manufacturing, 20.0% in logistics and distribution, 17.5% in wholesale, 14.2% in retail and 5.0% in other organizations. By experience, 31.7% have 1–3 years, 30.8% have 4–6 years, 25.8% have more than 6 years and 11.7% have less than 1 year.

Inventory Practice Level	Frequency	Percentage	Mean Perceived Efficiency (Q20)
Low	23	19.2%	3.739
Moderate	61	50.8%	4.164
High	36	30.0%	3.750
Total	120	100.0%	—

Table 2. Inventory Management Practice Level and Mean Perceived Supply Chain Efficiency

Interpretation: Moderate practice level represents the largest group (50.8%). The practice level is built from the inventory method, monitoring frequency and software use: 30.8% of respondents mainly use software-based inventory management, 22.5% ABC analysis, 20.0% EOQ, 14.2% manual control and 12.5% JIT; 44.2% monitor inventory daily, 30.0% weekly, 17.5% monthly and 8.3% only occasionally; and 58.3% use inventory software, with 20.8% planning to implement it. Mean perceived efficiency is 3.739 in the low-practice group, 4.164 in the moderate group and 3.750 in the high group. The pattern is therefore not a steady rise: the moderate group scores highest and the high group is no higher than the low group, so the descriptive evidence does not indicate a progressive positive relationship.

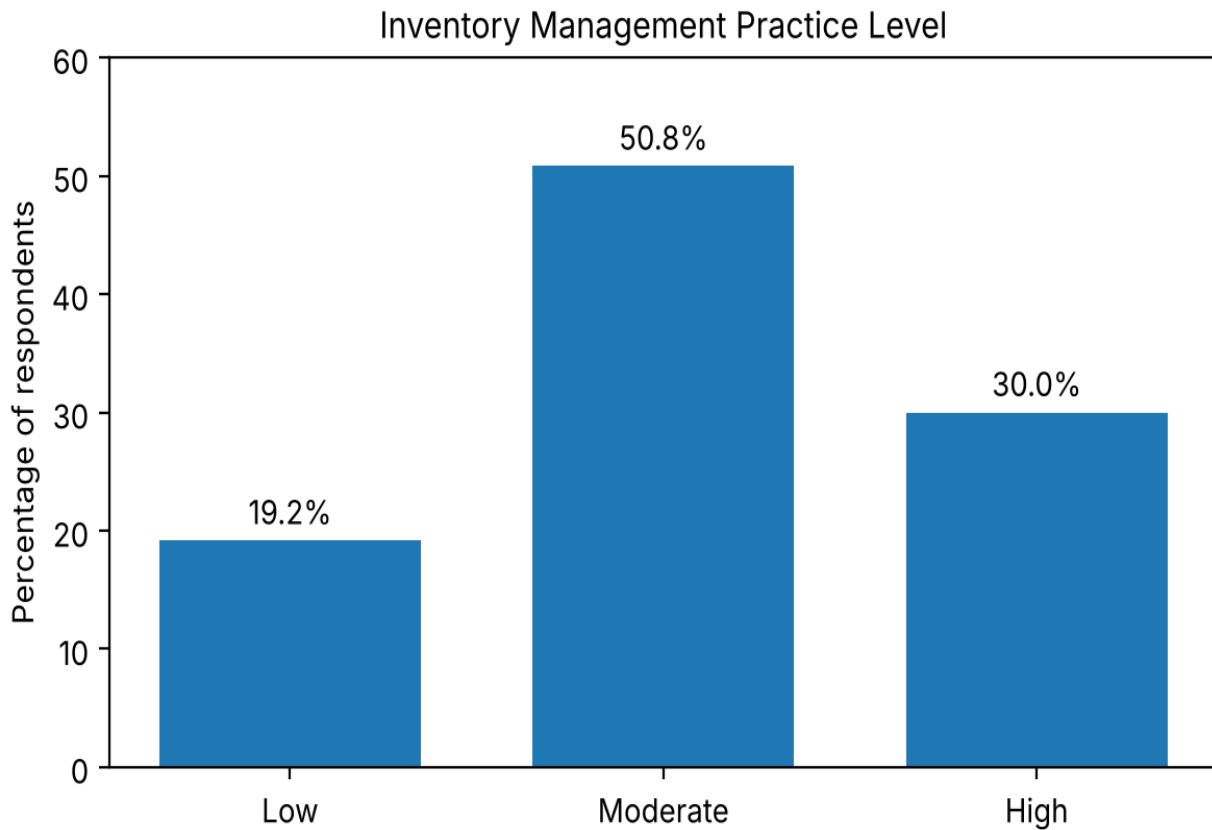


Figure 3. Percentage of Respondents by Inventory Management Practice Level

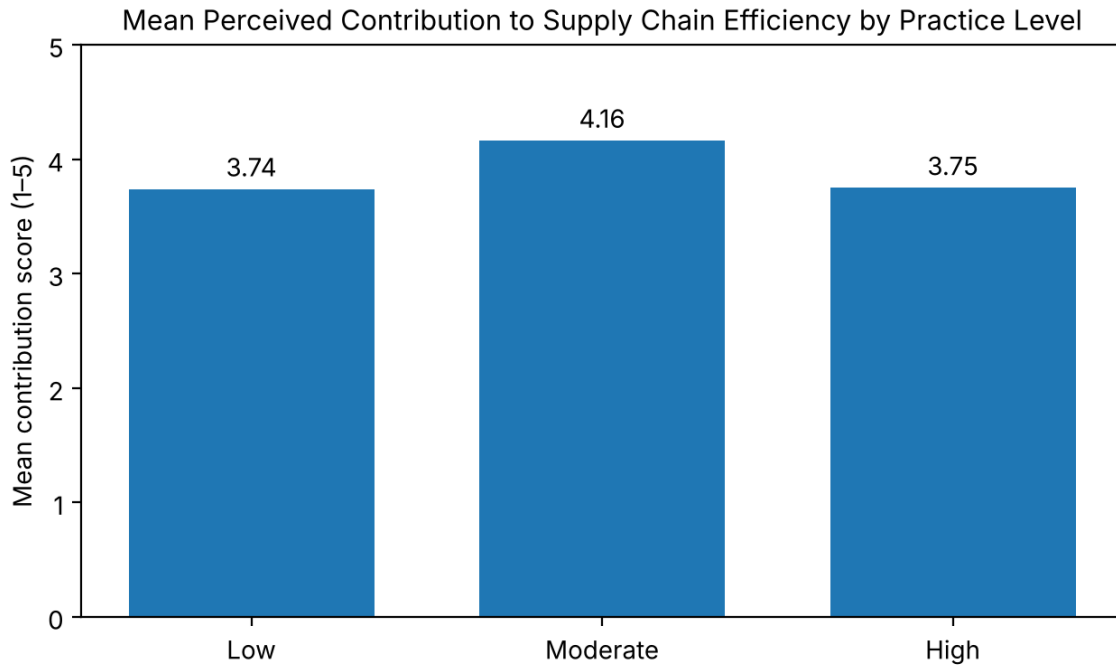


Figure 4. Mean Perceived Supply Chain Efficiency by Inventory Management Practice Level

Inventory System Use (Q4)	Frequency	Percentage
Yes	75	62.5%
Under implementation	20	16.7%
No	25	20.8%
Total	120	100.0%

Table 3. Use of a Computerised Inventory Management System

Interpretation: A clear majority of the illustrative respondents (62.5%) work in units that use a computerised inventory management system, 16.7% are implementing one and 20.8% do not use one. For the Chi-square test, respondents whose units are still implementing a system are grouped with non-users (45 respondents), because the system is not yet fully in use; this gives a 75 versus 45 split for testing whether system use is associated with high perceived supply chain efficiency.

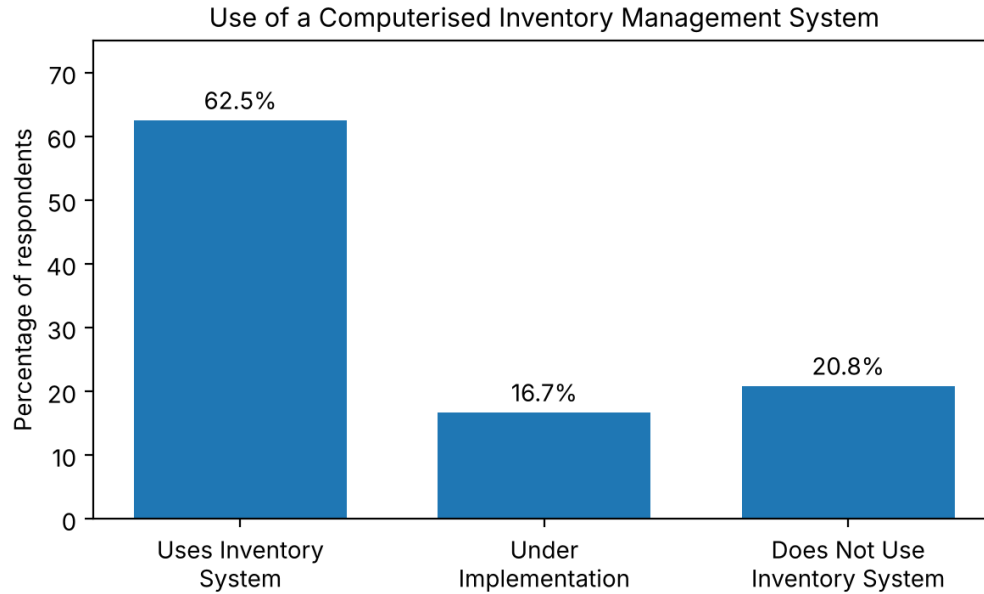


Figure 5. Use of a Computerised Inventory Management System

Variable	Mean	Median	Std. Deviation	Minimum	Maximum
Perceived Supply Chain Efficiency (Q20)	3.958	4.00	0.974	1.00	5.00
Cost Reduction (Q9–Q11)	3.986	4.00	0.639	2.33	5.00
Service and Responsiveness (Q13, Q14, Q16, Q18)	3.994	4.00	0.555	2.25	5.00
Coordination and Information (Q15, Q17)	3.892	4.00	0.708	1.50	5.00
Stock-out Frequency (Q12; 1 = never, 5 = always)	2.542	2.00	0.925	1.00	5.00
Importance of Demand Forecasting (Q8; 1–4)	3.150	3.00	0.895	1.00	4.00

Table 4. Descriptive Statistics of Key Study Variables

Interpretation: Perceived supply chain efficiency has a mean of 3.958 and a median of 4.00, indicating a positive overall view: 70.0% of respondents answer 'to a great extent' or 'to a very great extent' and only one respondent answers 'not at all'. The three dimension scores are similar (3.89 to 3.99). Stock-out frequency has a mean of 2.542, between 'rarely' and 'sometimes' (43.3% rarely, 31.7% sometimes, 12.5% often, 10.0% never, 2.5% always). Demand forecasting is rated important or very important by 78.3% of respondents. The standard deviation of the efficiency item (0.974) is close to one point, so responses are less tightly clustered than the dimension scores. The dimension scores have very low reliability (α between -0.18 and 0.21), so they are summaries of separate items and not measures of a single construct.

Efficiency Classification (Q20)	Frequency	Percentage
High Efficiency ($Q20 \geq 4$)	84	70.0%
Not High Efficiency ($Q20 \leq 3$)	36	30.0%
Total	120	100.0%

Table 5. Classification of High Perceived Supply Chain Efficiency

Interpretation: Seven in ten respondents (70.0%) are classified as high-efficiency and 30.0% as not high. The split is uneven but still leaves enough cases in every cell for association testing (the smallest expected cell count is 13.5, above the usual minimum of 5).

Inventory System	Not High Efficiency	High Efficiency	Row Total
No System / Under Implementation	12	33	45
Uses System	24	51	75
Column Total	36	84	120

Table 6. Cross-Tabulation: Inventory System Use and High Perceived Supply Chain Efficiency

Statistic	Value
Chi-square (χ^2), Yates-corrected	0.169
Degrees of freedom	1
p-value	0.681
Decision at 5% level	Fail to reject H01

Table 7. Chi-Square Test Results

Interpretation: The Chi-square statistic is $\chi^2=0.169$ with 1 degree of freedom and $p=0.681$ (Fisher's exact test gives $p=0.681$ as well). Because the p-value is above 0.05, the null hypothesis is not rejected. In this illustrative dataset, use of a computerised inventory management system is not significantly associated with high perceived supply chain efficiency: 68.0% of respondents whose units use a system are classified as high-efficiency, compared with 73.3% of those whose units do not, so the observed difference is, if anything, in the opposite direction. The association is negligible (Cramér's $V=0.06$). Treating the three Q4 categories separately gives the same conclusion ($\chi^2(2)=0.429$, $p=0.807$). System use was also unrelated to stock-out frequency: 18.7% of system users report stock-outs often or always, compared with 8.9% of non-users, a difference that is not significant (Fisher's exact $p=0.191$).

Inventory Practice Group	N	Mean Efficiency	Std. Deviation
Low	23	3.739	0.964
Moderate	61	4.164	0.860
High	36	3.750	1.105

Table 8. Group Descriptives for One-Way ANOVA (Perceived Supply Chain Efficiency, Q20)

Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	5.246	2	2.623	2.854	0.062
Within Groups	107.545	117	0.919	—	—
Total	112.792	119	—	—	—

Table 9. One-Way ANOVA: Perceived Supply Chain Efficiency by Inventory Management Practice Level

Interpretation: One-way ANOVA produces $F(2, 117)=2.854$, $p=0.062$. The p-value is above 0.05; therefore H02 is not rejected at the 5% level, although the result is close to the threshold. The effect size is small to moderate ($\eta^2 = 0.02$). Levene's test ($\eta^2 = 0.01$) supports equal variances, and the Kruskal–Wallis test, which suits the ordinal and skewed outcome, agrees ($H(2)=4.964$, $\eta^2 = 0.02$). Tukey's post-hoc comparisons show no significant pair: moderate versus low differ by 0.425 points ($\eta^2 = 0.03$) and moderate versus high by 0.414 points ($\eta^2 = 0.04$), while low and high are virtually identical ($\eta^2 = 0.05$). The result also depends on how the practice score is divided: alternative cut-points give p-values of 0.088, 0.310 and 0.743. There is therefore no robust evidence that mean perceived efficiency differs by practice level, and the moderate group's higher mean should not be read as a trend.

Supplementary analysis: Because the benefit items do not form reliable scales, they are also examined one by one.

Table 10. reports each statement's mean, standard deviation and percentage agreeing, together with its Spearman correlation with the overall efficiency item Q20.

Benefit statement	Mean	SD	% Agree / Strongly agree	ρ with Q20	p (p)
Q9 Reduces storage costs	4.16	0.88	82.5%	0.165	0.072
Q10 Reduces excess stock and wastage	3.88	1.20	70.8%	-0.023	0.803
Q11 Reduces ordering costs	3.92	1.07	73.3%	0.168	0.067
Q13 Safety stock prevents shortages	4.01	0.98	80.0%	0.028	0.761
Q14 Right stock at the right time	3.96	1.06	76.7%	0.022	0.810
Q15 Improves coordination	3.96	1.04	73.3%	0.262	0.004
Q16 Reduces processing and delivery time	3.88	1.09	72.5%	0.091	0.324
Q17 Accurate information improves decisions	3.82	1.05	70.0%	0.084	0.363
Q18 Improves customer satisfaction	4.12	0.94	82.5%	-0.028	0.764

Table 10. Item-Level Perceptions of Inventory Management Benefits

Interpretation: All nine statements have means above the neutral midpoint, between 3.82 and 4.16, and every one differs significantly from 3 (Wilcoxon signed-rank tests, all $no = 06$). Agreement is highest for lower storage costs (82.5%) and improved customer satisfaction (82.5%), and lowest for accurate information improving decisions (70.0%). Respondents therefore hold a consistently favourable view of inventory management. Only one item, improved coordination (Q15), is significantly correlated with the overall efficiency item ($no = 07$, $no = 08$); this would still be significant after a Bonferroni correction for nine tests ($no = 09$), but it is an exploratory result from a simulated dataset and should be treated cautiously. The largest inventory challenges named by respondents are overstocking or stock-outs (27.5%), inaccurate demand forecasting (21.7%), high storage costs (19.2%), lack of technology (18.3%) and supplier delays (13.3%).

Group comparisons: Table 11 compares Q20 across the other grouping variables in the questionnaire as an exploratory check.

Grouping variable (outcome: Q20)	Groups	Kruskal–Wallis H	p	ANOVA F	p
Job position (Q1)	5	3.516	0.475	0.801	0.527
Years of experience (Q2)	4	6.873	0.076	2.178	0.094
Organization type (Q3)	5	4.368	0.359	0.741	0.566
Inventory method (Q5)	5	2.379	0.666	0.587	0.673
Monitoring frequency (Q6)	4	3.023	0.388	0.902	0.442
Inventory software (Q7)	3	0.212	0.899	0.167	0.847
Importance of forecasting (Q8)	4	2.652	0.448	0.507	0.678
Major challenge (Q19)	5	3.688	0.450	1.177	0.325

Table 11. Exploratory Comparisons of Perceived Supply Chain Efficiency (Q20) Across Respondent and Practice Groups

Interpretation: None of the eight comparisons is significant at the 5% level. Years of experience comes closest (Kruskal–Wallis $\alpha=0.120$; respondents with less than one year of experience give the highest mean, 4.43). With eight comparisons, one or two results near the threshold would be expected by chance alone, so none of these differences is interpreted as a finding.

9. Major Findings

- Moderate inventory-management-practice level is the largest category in the illustrative sample (50.8%); 30.0% are classed as high and 19.2% as low.
- 62.5% of respondents work in units that use a computerised inventory management system, 16.7% are implementing one and 20.8% do not use one; 58.3% use inventory software.
- Respondents view the contribution of inventory management to supply chain efficiency favourably (Mean=3.958; Median=4.00), with 70.0% answering to a great or very great extent.
- Each of nine benefit statements is endorsed by 70.0% to 82.5% of respondents (means 3.82 to 4.16), and all differ significantly from the neutral midpoint. Stock-outs are reported as rare to occasional (mean 2.54 on a five-point scale).
- The Chi-square test shows no significant association between inventory system use and high perceived supply chain efficiency ($\alpha=0.121$ __, $\alpha=0.122$ __); 68.0% of system users and 73.3% of non-users are classified as high-efficiency.
- The one-way ANOVA shows no significant difference in mean perceived efficiency across low, moderate and high practice groups ($F(2, 117)=2.854$, $\alpha=0.123$ __; $\alpha=0.124$ __). The moderate group has the highest mean (4.164), but the pattern is not progressive and is sensitive to how practice levels are defined.
- Only the coordination benefit (Q15) is significantly correlated with perceived efficiency ($\alpha=0.125$ __, $\alpha=0.126$ __), an exploratory result; none of the eight respondent-profile and practice comparisons is significant.
- The benefit items have very low internal consistency ($\alpha=0.127$ __), so a composite efficiency scale is not justified for this dataset.
- Taken together, the illustrative results show a strongly favourable perception of inventory management, but they do not show that system use or practice level is associated with higher perceived efficiency. The managerial message remains that technology should be combined with sound inventory policies, accurate records and supplier collaboration rather than relied on alone

10. Findings & Suggestions

1. Set differentiated inventory policies (for example ABC/XYZ classification) to concentrate control effort and safety stock where they matter most; only 22.5% of respondents mainly use ABC analysis, while 14.2% still rely on manual control.
2. Improve demand forecasting and share demand information with key suppliers and customers to dampen the bullwhip effect; inaccurate demand forecasting is the second most common challenge (21.7%) and 78.3% rate forecasting as important or very important.
3. Maintain accurate inventory records via cycle counting, barcode/RFID capture and regular reconciliation between system and physical stock; accurate information is the least strongly endorsed benefit (70.0% agree), which suggests the information link is the weakest part of current practice.
4. Adopt an integrated inventory management system (ERP/WMS) and ensure that users receive adequate training and data-governance support. System use alone was not associated with higher perceived efficiency here, so adoption needs to be accompanied by a change of process and evaluated rather than assumed to pay off.
5. Build collaborative arrangements such as vendor-managed inventory and shorter lead times with reliable suppliers; supplier delays are a major challenge for 13.3% of respondents, and coordination is the benefit most closely related to perceived efficiency.
6. Monitor inventory turnover, fill rate, stock-out frequency and carrying cost together, so that cost reduction does not damage service levels; 15.0% of respondents report stock-outs often or always.

11. Limitations and Scope for Future Research

The most important limitation is that the dataset is synthetic, and therefore cannot establish real-world empirical evidence. Perceived supply chain efficiency is measured by a single item (Q20), and the benefit items have very low internal consistency ($\alpha=0.12$), so no reliable multi-item efficiency scale could be built. The practice-level groups are based on a researcher-defined scoring rule and cut-points, and the ANOVA result changes with alternative cut-points. Responses are ordinal and concentrated at the favourable end of the scale, which limits variation, and the group comparisons involve many tests on a modest sample, so small differences may reflect chance. A journal submission should gather original data from a clearly defined population, utilise validated multi-item scales, report reliability and validity, address common-method bias where relevant, and use an appropriate sampling strategy. The cross-sectional design cannot establish causality, and perceptual efficiency scores should ideally be complemented by objective indicators such as inventory turnover, days of inventory, fill rate and total logistics cost. Future research may look at mediators such as forecast accuracy or supplier integration and moderators such as industry, firm size, demand volatility or the adoption of AI-based forecasting. Longitudinal studies can also test if efficiency changes after an inventory system is implemented.

12. Conclusion

This illustrative study shows a complete research process for examining the role of inventory management in improving supply chain efficiency. The descriptive results demonstrate that respondents hold a strongly favourable view of inventory management: 70.0% say it contributes to supply chain efficiency to a great or very great extent, and 70.0% to 82.5% agree with each of the cost, service and coordination benefit statements. The inferential analyses, however, do not show significant relationships involving inventory system use ($p=0.681$) or practice level ($p=0.062$) in the synthetic dataset, so the earlier expectation that stronger practices and computerised systems go with higher perceived efficiency is not supported by these data. The broader implication is that inventory management should not be seen as a narrow stock-keeping task, and that favourable perceptions do not by themselves demonstrate that any one lever, such as a computerised system, raises efficiency. Demand forecasting, accurate records, supplier collaboration, appropriate technology and trained people together determine whether inventory acts as a strategic buffer or as a costly burden. For BBA students, the article also shows why a non-significant result should be reported honestly rather than adjusted, and how a research problem can be converted into objectives, hypotheses, a conceptual framework, methodology, data analysis, interpretations, findings and recommendations in a systematic journal-style format.

13. References

- Cachon, G. P., & Fisher, M. (2000). Supply chain inventory management and the value of shared information. *Management Science*, 46(8), 1032–1048.
- Choi, T.-M., Wallace, S. W., & Wang, Y. (2018). Big data analytics in operations management. *Production and Operations Management*, 27(10), 1868–1883.
- DeHoratius, N., & Raman, A. (2008). Inventory record inaccuracy: An empirical analysis. *Management Science*, 54(4), 627–641.
- Eroglu, C., & Hofer, C. (2011). Lean, leaner, too lean? The inventory–performance link revisited. *Journal of Operations Management*, 29(4), 356–369.
- Gaur, V., Fisher, M. L., & Raman, A. (2005). An econometric analysis of inventory turnover performance in retail services. *Management Science*, 51(2), 181–194. <https://doi.org/10.1287/mnsc.1040.0298>
- Harris, F. W. (1913). How many parts to make at once. *Factory, The Magazine of Management*, 10(2), 135–136, 152.
- Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: The bullwhip effect. *Management Science*, 43(4), 546–558. <https://doi.org/10.1287/mnsc.43.4.546>
- Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business Logistics*, 22(2), 1–25.
- Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P., & Fischl, M. (2021). Artificial intelligence in supply chain management: A systematic literature review. *Journal of Business Research*, 122, 502–517. <https://doi.org/10.1016/j.jbusres.2020.09.009>