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Enhancing Company Productivity through Information Sharing in Supply Chain Implementation

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ABSTRACT

The lack of accuracy and slow information flow within the supply chain poses significant challenges to the sustainability of the manufacturing process. Effective information management is essential for enhancing supply chain competitiveness, encompassing increased product yield, improved product quality, cost reduction, and enhanced productivity for quicker product distribution. This research investigates the impact of information sharing on supply chain management to bolster company productivity. Additionally, it delves into the detrimental consequences of insufficient information sharing and offers solutions to ensure efficient information exchange within the organization. To achieve these research objectives, we employ a quantitative approach utilizing the Structural Equation Model (SEM)-Amos and six questionnaire variables: information sharing, information quality, information technology, supply chain management implementation, productivity, and customer satisfaction. Our findings underscore the adverse effects of limited information sharing on supply chain management performance, leading to reduced productivity. The enhancement of supply chain management hinges on effective and transparent information sharing, facilitated by disseminating clear and sustainable information throughout the company. Furthermore, ensuring employees understand supply chain management practices comprehensively is crucial. These measures are poised to contribute to increased productivity and the achievement of customer satisfaction goals.

1. Introduction

Information sharing plays a pivotal role in the manufacturing industry, exerting a profound influence on production and distribution [1, 2]. Companies are in perpetual pursuit of refining their operations, boosting efficiency, delivering prompt service, and meeting customer demands, all while upholding stringent product quality standards [3, 4]. Companies must devise competitive strategies to surmount challenges posed by both external and internal competitors. It makes effective supply chain management

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indispensable for competitiveness and superior performance [5-8]. Furthermore, organizations must exhibit nimbleness in adapting to evolving circumstances and technologies. The information-sharing strategy adopted within a company is instrumental in preserving its market position, with an unwavering commitment to delivering high-quality products to consumers [9]. This dedication must be consistently upheld to cultivate and sustain consumer trust and loyalty [10].

In raw material procurement and product distribution, delays can give rise to significant production predicaments, particularly during periods of heightened consumer demand and volatile raw material availability. It often leads to grievances about delivery timelines, quality, and quantity accuracy [9]. Therefore, it is imperative to prioritize establishing partnerships and creating cohesive information-sharing networks that facilitate the seamless supply of consumer products [11]. The supply chain serves as a linchpin for companies, offering solutions to challenges such as competitiveness, high-quality production, performance optimization, revenue maximization, cost efficiency, process precision, timely service, and competitive pricing. It ensures that companies operate with efficiency, agility, quality, adaptability, responsiveness, and innovation [3, 12].

TPPI is a company in Indonesia that leverages supply chain management to meet its operational requisites. Despite the potential for enhanced productivity through uniform information dissemination across all production departments, there are still constraints in the information relayed from planners to the production team. It includes critical details regarding raw material availability, arrival schedules, required product quantities, time constraints, and the designated recipients of this information. Consequently, the production process is plagued by uncertainties, resulting in scheduling discrepancies, delays, and consumer product shortages. Recognizing the importance of raw material availability is essential in meeting customer demands within supply chain management. A prior study by Huda and Hartati [3] affirmed that implementing supply chain management strategies positively impacts a company's performance. Hence, the meticulous execution of strategies within supply chain management is of utmost significance.

Furthermore, Fata [13] underscored the considerable influence of information sharing and information quality on company productivity, emphasizing that a well-functioning information system profoundly impacts SCM performance [4]. Consequently, integrating information technology into a company's information-sharing practices catalyzes an improved and efficient information flow within the supply chain [14, 15]. This integrated utilization of information technology as a communication tool in supply chain implementation can potentially augment customer satisfaction [14, 16].

When confronted with incomplete information, processing must convert it into a more actionable and meaningful form for the recipient [17]. The quality of information hinges on attributes like accuracy, timeliness, and relevance [18]. In a well-optimized supply chain, access to current information proves invaluable for inventory and production planning [19, 20]. Given these considerations, sharing information to enhance company productivity is also intricately linked with the implementation of SCM and technology, thereby contributing to the effective implementation of the supply chain [21, 22]. Consequently, this research accentuates the critical role of information sharing in augmenting company productivity within supply chain performance. Additionally, this study delves into the repercussions of information sharing on companies, underscoring the significance of providing dependable and valuable information as a cornerstone for manufacturing enterprises.

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2. Methods

The study utilized a quantitative research methodology and was conducted in a manufacturing company in Batam, Indonesia. It explored the variables of information sharing, information quality, and information technology in implementing the supply chain to improve productivity and enhance customer satisfaction. The research encompassed all units involved in the manufacturing process and product distribution. Each variable is defined in Table 1.

Table 1. Variables and Indicators

Variables	Indicators	Code
Information Sharing (IS)	Continuous distribution of information	IS1
	Production Planning is easy to understand	IS2
	Easy and fast speed of information	IS3
	Information can be used to make decisions	IS4
Information Quality (IQ)	Information on the time of receipt of Goods	IQ1
	Item accuracy information	IQ2
	Reliable information	IQ3
	Information can be accessed easily	IQ4
Information Technology (IT)	Services, Infrastructure and applications	IT1
	People, expertise and competence	IT2
	Culture, ethics and behavior	IT3
	Principles, rules and frameworks	IT4
Supply Chain Management Implementation (SCM)	According to the Delivery Schedule	SCM1
	Quality of information	SCM2
	According to the target	SCM3
	Lean Production	SCM4
Productivity (PR)	Labor Quality	PR1
	Product Quality on request	PR2
	Tools	PR3
	Timely arrival of Materials	SRW
Customer Satisfaction (KP)	Checking sampling of product quality every time it will be delivered to consumers	KP1
	Guaranteed product quality	KP2
	Comparison of results Similar products with similar companies	KP3
	Certainty of punctuality of delivery	KP4
	Cost difference or difference from competitors	KP5

Sampling was carried out across all departments in the company, and consumers were selected randomly. Data was gathered using a Likert scale, ranging from 5 (strongly agree) to 1 (strongly disagree). The sample size was calculated using the Solvin method, with a confidence level of 95% and a margin of error 0.05. The number of respondents who received the questionnaire was 320 individuals. n = 320 / (1 + (320 x 0.052)). n = 320 / (1 + (320 x 0.0025)). n = 177.77 (178). Therefore, the research required a minimum sample size of 178 individuals, accounting for a 5% margin of error. To mitigate information gaps, a complete sample was chosen for this study.

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The data processing for this study involved several essential stages. The initial step involved the selection of a targeted population for sampling. Subsequently, the study assessed the validity and reliability of the measurements by employing scoring calculations based on a Likert scale with a range of 1 to 5. A Conceptual Model was formulated, encompassing eight hypotheses delineated in Fig. 1. The hypotheses encompassed various relationships. H1: Information Sharing has a significant positive effect on Supply Chain Management, H2: Information Quality has a significant positive effect on Supply Chain Management, H3: SCM implementation has a significant positive effect on Productivity, H4: Productivity has a significant positive effect on customer satisfaction, H5: Information Sharing significant positive effect on customer satisfaction, H6: Implementation of Supply Chain Management has a positive effect on customer satisfaction, H7: Information Quality has a positive effect on customer satisfaction [13], H8: Information Technology affects Information Sharing, H9: Information Technology affects Information Quality, H10: Information Technology affects the implementation of supply chain management.

The subsequent phase in the research process involved conducting a Data Analysis, which included the development of a variable index and its subsequent evaluation using Structural Equation Modeling (SEM) techniques. The utilization of Confirmatory Factor Analysis (CFA) and regression weights facilitated the execution of the analysis, thereby unveiling the magnitude of the relationships among the variables. The process ultimately culminated in Model Development, which encompassed the generation of Theoretical Models and the formulation of Flow Diagrams (also known as Path Diagrams). Additionally, the provision of recommendations sheds light on the potential consequences of sharing information on the impacts that have been identified.

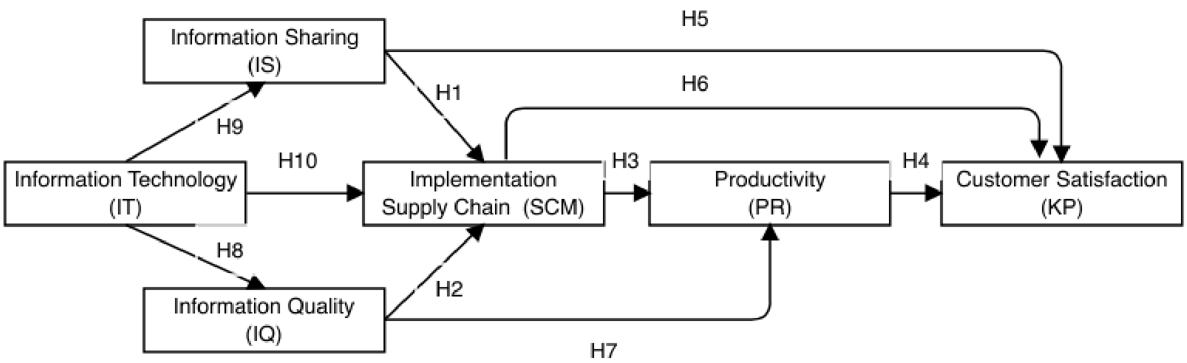

Fig. 1. Research Conceptual Model

The research process initiates with preliminary preparations, involving a thorough review of prior studies on information sharing, information quality, and information technology, as well as conducting field observations during the supply chain implementation process. Subsequently, specific problems are identified and formulated by the company, focusing on opportunities for improvement in supply chain application. The research aims to gauge the impact of information sharing, and an initial research model is designed with hypotheses derived from this model. Variables and research samples are then determined, and questionnaires are created for distribution. Prior to distribution, validity and reliability tests are performed. Once collected, the data is processed using SPSS and inputted into the SEM-AMOS model. Finally, the study imparts recommendations for enhancing the company's implementation of supply chain management.

3. Results and Discussion

The data processing in this study involved selecting a random sample of employees from various departments within the company. Validation and reliability tests were administered to ensure the reliability and consistency of the questionnaire, resulting in Cronbach alpha values surpassing 0.60. A validity test was conducted to further validate the individual questionnaire items by comparing corrected item values with total correlation, utilizing r-table values at an Alpha (α) level of 0.05. With a substantial sample size of 320 respondents, the r-table value was determined as 0.109 (computed using Excel) for degrees of freedom (df) equal to 320. Decisions were made based on whether the corrected item-total correlation value exceeded or fell below the r-table value. Notably, all indicators exhibited valid values, with r-count consistently surpassing the r-table value of 0.109, affirming the robustness of the data collected in this study [23].

Table 2. Pre-Test Questionnaire Reliability Test Results

Case Processing Summary			
		N	%
Cases	Valid	320	100
	Excluded	0	0
	Total	320	100
Reliability Statistics			
Cronbach's Alpha		N of Item	
0.875		25	

The study employed Cronbach's Alpha in SPSS 20 to assess the reliability, as presented in Table 2. The resulting Cronbach Alpha value of 0.875, based on 25 data points, signifies a high level of reliability, surpassing the threshold of >0.60. Consequently, the validation indicator test encompasses 25 statement items covering various domains, including information sharing, information technology, information quality, supply chain management, productivity, and customer satisfaction, each comprising four statements, with an additional five statements dedicated to customer satisfaction. These items underwent rigorous reliability and validity assessments, meeting the necessary criteria for in-depth analysis. The Likert formula was employed to compute the response index, and the results are detailed in Table 3.

Table 3. Total Respondents Who Answered

Answer	**Code**	**Total Number of Respondents;**	**Code * Total number of Respondents**
Strongly disagree	1	45	45
Disagree	2	652	1304
Somewhat agree	3	2880	8640
Agree	4	3353	13412
Totally agree	5	1070	5350
Total Score		8000	28751

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Table 3 presents a comprehensive overview of respondents' answers, providing valuable insights into the study. To effectively interpret the data, it is imperative to ascertain each criterion's highest (X) and lowest (Y) scores. It is achieved by applying a specific formula: Y is determined by multiplying the highest Likert score by the number of respondents minus five. X is derived by multiplying the lowest Likert score by the number of respondents minus one, accounting for the weight value. For instance, the highest score within the "Strongly Agree" category can be computed as Y = 5 x 8000, resulting in 40000, while the lowest score for "Strongly Disagree" stands at X = 1 x 8000, totalling 8000. To elucidate the assessment for respondents demonstrating an Index Value % of 71.88%. It places the results squarely in the "Agree" category, signifying a commendable outcome. Further corroborating this, Table 4 corroborates the findings, showing a prevalence of values falling within the 61 – 80% range, thus affirming the "Agree (good)" assessment.

Table 4. Presentation Value

Answer	Information
1 – 20%	Strongly disagree (Poor)
21 – 40%	Disagree (bad)
41 – 60%	Simply (impartially)
61 – 80%	Agree (good)
81 – 100%	Totally agree (Very Good)

3.1. SEM-Amos Analysis Test

3.1.1 Information Sharing Constructs variables

The research employed the Variable Information Sharing (IS) model, assessed through Confirmatory Factor Analysis (CFA) as depicted in Fig. 2. The processing and goodness-of-fit evaluations revealed that the criteria for AGFI, RMSEA, and TLI levels needed to be met. It was primarily due to the RMSEA value surpassing the recommended range of 0.05 to 0.08. Furthermore, AGFI fell below the acceptable threshold at 0.625 (≤ 0.9), and TLI remained at 0.457, still under the desired 0.9 mark, while GFI excelled at 0.925 (> 0.90). As a result, the subsequent phase entailed meticulously examining the loading factors and estimating their values to assess the suitability of all indicators as assessment tools. The standard threshold for loading factors was set at > 0.50. The examination of the indicators yielded that variables IS4 and IS1 exhibited loading factor values of ≤ 0.50, leading to their exclusion from the research model.

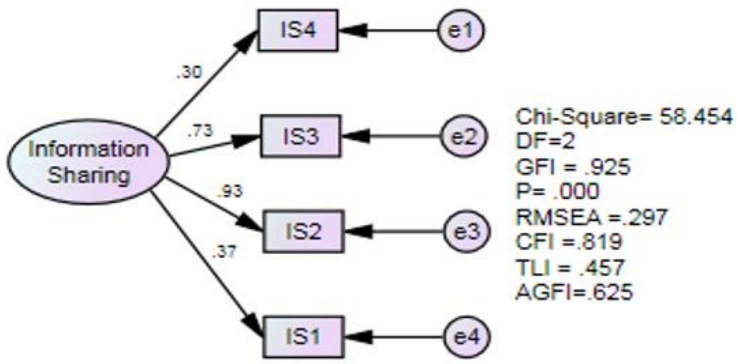

Fig. 2. Confirmatory Factor Analysis (CFA) builds Information Sharing model

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3.1.2. Quality of Information Construct variables

In our study, we conducted a variable information quality (IQ) model using CFA. The results is depicted in Fig. 3, evaluating the goodness of fit, reveal that the indicators for information quality variables have successfully met the prerequisites: GFI at 0.989 (greater than or equal to 0.9), AGFI at 0.943 (greater than or equal to 0.9), and TLI at 0.923 (greater than or equal to 0.9). However, the Chi-Square (7.708 with 2 degrees of freedom) and RMSEA (0.095) did not meet the criteria, as the RMSEA value exceeded the recommended range of 0.05 to 0.08. Our subsequent step involved assessing the loading factor values to determine if all indicators could be retained as test indicators. The standard threshold for loading factors is greater than 0.50. It was found that IQ1 exhibited a loading factor value of ≤ 0.50, leading to its exclusion from the subsequent stages of our research model.

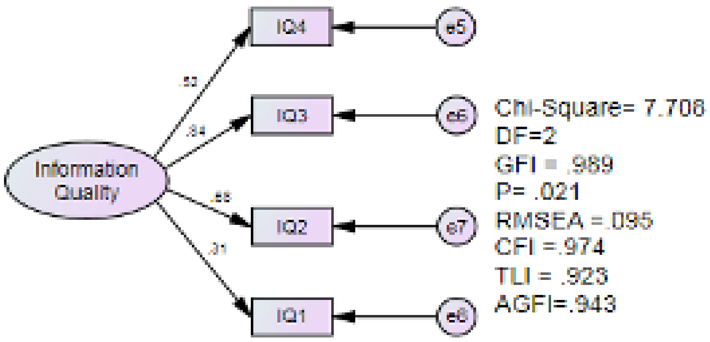

Fig. 3. Confirmatory Factor Analysis Builds Information Quality

3.1.3. Information Technology Construct Variables

The confirmatory factor analysis (CFA) results for the information technology (IT) model, as depicted in Fig. 4, indicate promising outcomes. The model successfully meets the essential GFI criterion, with a value of 0.955, surpassing the required threshold of 0.9. However, it falls short in terms of AGFI, registering at 0.773, below the recommended 0.9 benchmark. Additionally, TLI stands at 0.274, less than the preferred 0.9 threshold, and RMSEA is at 0.225, surpassing the upper limit of 0.08 but still within an acceptable range of 0.05 to 0.08. Further scrutiny of the loading factor values for all variables is imperative. Notably, all indicators meet the stipulated criterion of ≥ 0.50, except for IT2 and IT1, which fall below the 0.50 threshold. Consequently, excluding these data points from subsequent research models is imperative.

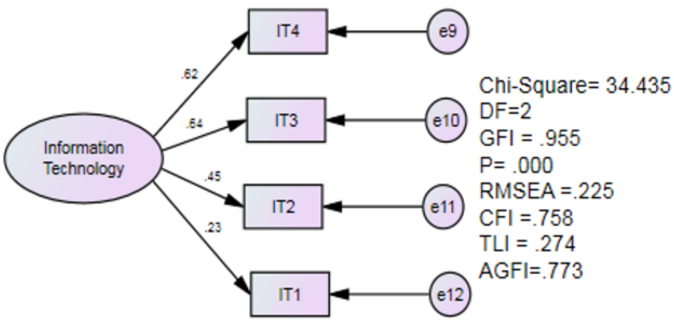

Fig. 4. Confirmatory Factor Analysis Building Information Technology

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3.1.4. Supply Chain Management (SCM) Implementation Construct Variables

The findings derived from the CFA processing of the Fig. 5 model indicate that the model is not suitable due to certain key indicators. Specifically, the Goodness-of-Fit Index (GFI) yielded a value of 0.895, which falls slightly below the acceptable threshold of 0.9. The Root Mean Square Error of Approximation (RMSEA) was also calculated at 0.341, within the range of 0.005 to 0.008. Moreover, the Adjusted Goodness-of-Fit Index (AGFI) resulted in a value of 0.474, below the desired threshold of 0.9. Finally, the Tucker-Lewis Index (TLI) scored 0.185, falling short of the recommended 0.90 cut-off value. Further examination of the loading factor values for each indicator within the model revealed that two exhibited values above 0.50, namely SCM1 (0.397) and SCM2 (0.480), while the remaining two fell below 0.50. Consequently, the data associated with SCM1 and SCM2 will be omitted from subsequent research models to ensure the validity and reliability of the analysis.

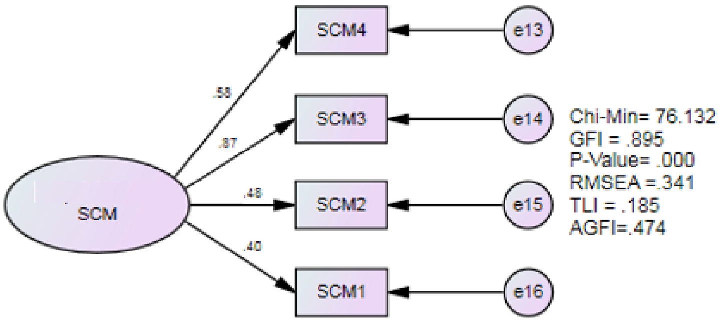

Fig. 5. Construct Confirmatory Factor Analysis SCM Implementation

3.1.5. Productivity Construct Variables

The results from Fig. 6 reveal a well-fitting model, indicated by the high GFI value of 0.997 (≥ 0.9), AGFI of 0.987 (≥ 0.90), and TLI of 1.003 (≥ 0.90). Additionally, the RMSEA value 0.000 (< 0.05 – 0.08) falls within the acceptable range, confirming the model's adequacy. To refine our understanding, we scrutinized the loading factor values of each indicator in the model. Four indicators were considered, with three exhibiting values ≥ 0.50, signifying solid correlations. The exception, PR4, demonstrated a lower loading factor value of 0.328, falling below the desired threshold. Consequently, this data was retained for subsequent research models, ensuring a comprehensive analysis.

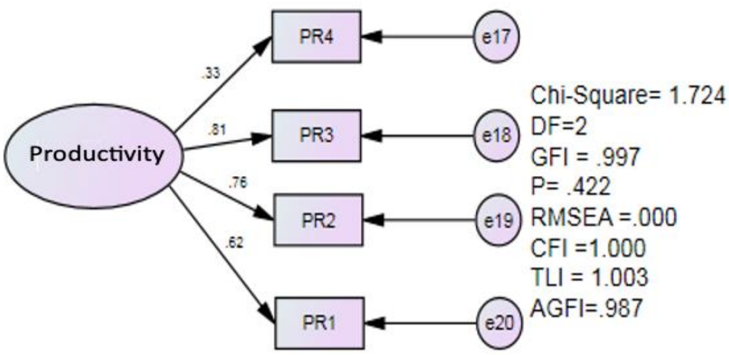

Fig. 6. Confirmatory Factor Analysis Builds Productivity

3.1.6. Customer Satisfaction Construct Variables

The Customer Satisfaction (KP) construct variable model underwent Confirmatory Factor Analysis (CFA), as depicted in Fig. 7. The results of this CFA, shown in Figure 7, revealed that the model failed to meet the specified cut-off criteria for several key parameters. Specifically, the GFI (Goodness of Fit Index) fell short of the acceptable threshold at 0.868 (≤ 0.9), while the RMSEA registered at 0.260 (outside the recommended range of 0.05 – 0.08). Furthermore, the AGFI (Adjusted Goodness of Fit Index) scored 0.603, which is below the desirable threshold of <0.9, and the TLI (Tucker-Lewis Index) recorded a value of 0.677, also falling short of the required <0.90 threshold. Consequently, it becomes imperative to scrutinize each loading factor value for the model's indicators, as highlighted in the table. Among the five indicators, four demonstrated loading factors ≥ 0.50, except KP2, which yielded a loading factor value below the critical threshold of 0.50. As a result, it is necessary to exclude the data associated with KP2 from the research dataset in the subsequent model refinement process.

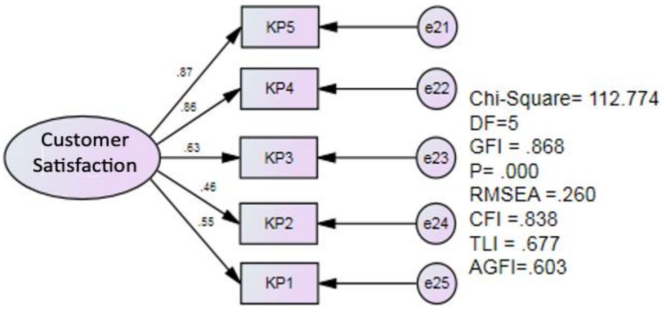

Fig. 7. Confirmatory Factor Analysis Builds Customer Satisfaction

3.1.7. Confirmation Factor Analysis Test for complete structural model

After conducting a Confirmatory Factor Analysis (CFA) for each construct and assessing the obtained Goodness of Fit results, the subsequent crucial step involved performing a Confirmatory Factor Analysis test for the comprehensive model [24, 25]. This step aimed to elucidate the intricate interrelationships among the IS, IQ, IT, SCM, PR, and KP variables as depicted in Fig. 8. However, a notable revelation emerged upon scrutinizing the data processing outcomes in Fig. 8. The model exhibited inadequacy, as evidenced by the GFI value of 0.844, falling short of the recommended threshold of 0.90, and the Chi-Square value of 457.396. This discrepancy signals the need for further refinement and fine-tuning in order to achieve a more accurate representation of the underlying constructs.

3.2. Loading Factor (λ)

The lambda value (λ) is a crucial metric for evaluating the coherence and unidimensionality of the constituent indicators within a factor. A lambda value (λ) or loading factor of ≥ 0.50 is deemed requisite; any lower value suggests that the respective indicator or manifest does not share the same dimensional characteristics as its counterparts. A meticulous examination of Figure 9 reveals that each indicator boasts a loading factor value exceeding or equal to 0.50 in the standard estimation column. Notably, exceptions arise in the cases of information sharing, Information Technology, Information Quality, and SCM implementation, where the loading factor falls below 0.50,

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according to Table 5. Consequently, it is discernible that these specific indicators collectively establish the unidimensional nature of each latency variable.

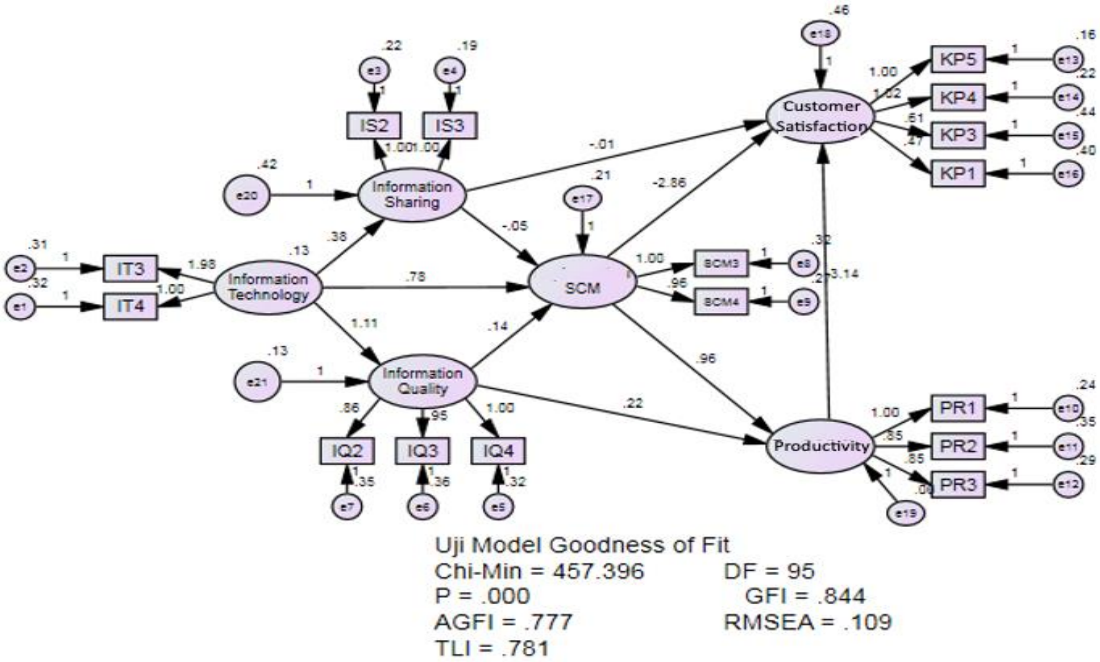

Fig. 8. Initial Complete Model Confirmatory Factor Analysis

Table 5. Lambda value ≤ 0.50

			Guess
Information Sharing	<---	Information Technology	.207
Implementation_SCM	<---	Information Sharing	-.059
Implementation_SCM	<---	Information Quality	.136
Implementation_SCM	<---	Information Technology	.497
Productivity	<---	Information Quality	.193
Customer Satisfaction	<---	Information Sharing	-008
Customer Satisfaction	<---	Implementation_SCM	-2.000

3.3. Weighted Factor (Regression Weight)

The study employed a t-test for regression weights to assess the dimensional strength associated with the latent variable. The results, presented in Table 6 under the Critical Ratio (CR) column, indicate that all indicators exhibit values exceeding 2.277 (t-table df 95, t=0.025), with the exception of indicators related to information sharing, information quality, information technology, productivity, and SCM implementation. This suggests that indicators with a CR value significantly surpassing 1.982 contribute to the formation of the latent variable dimension. In essence, these findings underscore the pivotal role of specific indicators in shaping the latent variable.

Table 6. Value Critical Ratio (CR) ≤ 2.277

			Guess	ONE	CR	P
Implementation_SCM	<---	Information Sharing	-.051	.056	-.910	.363
Implementation_SCM	<---	Information Quality	.142	.159	.893	.372
Customer Satisfaction	<---	Information Sharing	-.010	.075	-.131	.896
Customer Satisfaction	<---	Implementation SCM	-2.862	1.373	-2.085	.037

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3.4. Weight Regression Analysis on Goodness of Fit Criteria

The Regression Weight Analysis conducted in the SEM model aimed to assess the extent of influence exerted by the variables under scrutiny. The results of this analysis are graphically depicted in Fig. 9. However, an examination of Table 7 reveals that the model testing process may not have been executed appropriately. This is evident as the Chi-Square value, standing at 457.396, surpasses the designated cut-off value of 119. Ideally, the Chi-Square value should be lower than the specified cut-off value.

Furthermore, the Adjusted Goodness-of-Fit Index (AGFI) registers at .777, and the Goodness-of-Fit Index (GFI) is at 0.844, falling short of the recommended criterion of ≥ 0.90 for both AGFI and GFI. Additionally, the Root Mean Square Error of Approximation (RMSEA) reports a value of 0.109, a range higher than the preferred interval of 0.05 to 0.08. Therefore, modifying the model to ascertain the most fitting and accurate representation is imperative.

Table 7. The Goodness of Fit Criteria

The goodness of fit criteria	Value Deductions	Result	Information
Chi Square (df = 95)	11 9	457	Unacceptable
cmin /df	≤ 2.00	4.81	Unacceptable
Probability	≥ 0.05	.000	Unacceptable
GFI	≥ 0.90	.844	Unacceptable
AGFI	≥ 0.90	.777	Unacceptable
RMSEA	≤ 0.08	.109	Unacceptable
TLI	≥ 0.90	.781	Unacceptable

3.5. SEM Assumption Testing

3.5.1. Assumption of data normality

The assessment of normality in both univariate and multivariate data hinges on the scrutiny of critical values obtained through a normality test executed with the AMOS program. Data falling beyond -2.58 ≤ SR ≤ 2.58 at a significance level 0.01 are classified as exhibiting an abnormal distribution. Consequently, instances failing to meet these criteria are excluded from subsequent analyses. For these cases, univariate outcomes are derived from variables demonstrating normality.

Based on the findings presented in Table 8, it is evident that some variables exhibit a Critical Ratio (CR) skewness that falls outside the acceptable range of ±. Specifically, variables KP4, PR2, IQ4, and IT4 display abnormal univariate distribution with skewed ratios. Achieving a dataset with a normal distribution necessitates a rigorous assessment of outliers—identifying data points that significantly deviate from the rest of the dataset. It is anticipated that employing advanced AI algorithms can effectively identify and remove these extreme data points, ultimately rectifying abnormal data distributions.

3.5.2. Outlier Evaluation

The term "outliers" refers to observations exhibiting distinct characteristics that significantly deviate from the rest of the dataset in terms of univariate or multivariate attributes. The Mahalanobis Distance Test serves as a crucial tool in identifying multivariate outliers. Within the AMOS program's output, one can find Mahalanobis distance metrics, integral components of the structural outputs in the Mahalanobis subcategory. This distance metric quantifies the spatial gap between each observation and the mean of all variables in a multidimensional context, thus aiding in outlier detection [26]. The Chi-Square value is employed to compute the Mahalanobis Distance, with degrees of freedom equating to the total variables and a significance level set at $p < 0.001$. In the presence of multivariate outliers, they are recognized and incorporated into subsequent analyses unless a specific rationale exists for their exclusion. For instance, X2 (0.001; 95) = 119 was calculated using Excel's "chi-inv" function. Data processing results demonstrate the furthest Mahalanobis distance (d-Square) at 61.653 and the closest at 18.971 (see Table 9). Small p-values, at or below 0, indicate data points with outlier values. In this study, outliers were identified among respondents numbered 85, 167, 97, and so forth, all the way down to 129 and 248, totalling 72 outliers. The subsequent step involves their systematic exclusion while preserving the rest of the data for a comprehensive model assessment.

Table 8. Inclination and Kurtosis Criteria in Normality Assessment (Group number 1)

Variable	Min	Max	Leaning	Cr	Kurtosis	Cr
KP1	2,000	5,000	-271	-1,979	-.599	-2,186
KP3	1,000	5,000	-233	-1,699	-380	-1,386
KP4	1,000	5,000	-,402	-2,934	-271	-,990
KP5	1,000	5,000	-297	-2,172	-120	-440
PR3	1,000	5,000	,298	2,180	.028	,103
PR2	1,000	5,000	,421	3,076	.075	,275
PR1	2,000	5,000	-,023	-,165	-.489	-1,785
SCM4	2,000	5,000	,026	,187	-427	-1,558
SCM3	1,000	5,000	,252	1,837	-167	-,609
IQ2	2,000	5,000	-320	-2,334	-207	-756
IQ3	1,000	5,000	-111	-807	-287	-1,048
IQ4	2,000	5,000	-379	-2,766	-275	-1,005
IS3	1,000	5,000	-136	-,990	-.085	-309
IS2	1,000	5,000	-,044	-322	,104	,379
IT3	1,000	5,000	-183	-1,339	-.537	-1,960
IT4	2,000	5,000	-706	-5,152	1,296	4,731
Multivariate					68,485	25,523

Table 9. Multivariate Outlier Measurement with Mahalanobis Distance

No Respondents	Mahalanobis d-Squared
85	61.653 (Max)
128	18.971 (Min)

3.5.3. Estimation of Complete Model Parameter Values

The findings depicted in Fig. 9 reveal that the initial model did not meet the Chi-Square criteria, registering a high value of 45.396 with a p-value of 0. Consequently, a crucial step was taken to refine the model by replacing the original data with post-outlier-adjusted data, incorporating modification indices. This meticulous process culminated in the attainment of the final model also illustrated in Fig. 9. Notably, a significant improvement was observed as the Chi-Square value plummeted from 457.396 to 214.105, albeit with a persistent p-value of 0. While the Chi-Square metric may suggest inadequacy,

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alternative assessments, including GFI (0.919, surpassing the 0.90 threshold), RMSEA (0.080, within the acceptable range of 0.05 – 0.08), and TLI (0.918) affirm the model's suitability. The subsequent phase involves a comprehensive parameter estimation analysis, which is critical in determining the validation of the proposed hypotheses within this study. This assessment hinges on the outcomes of standard regression weight estimations.

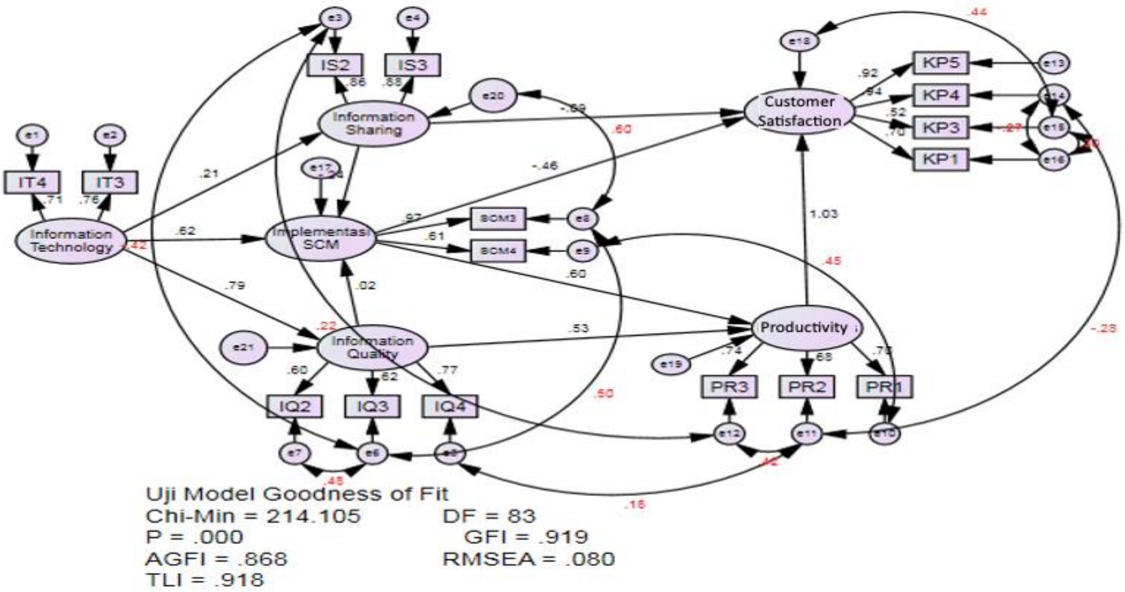

Fig. 9. Final Outlier Model Output

3.6. Analysis of the results of the information sharing hypothesis

The findings of the hypothesis indicate that sharing information does not exhibit a significant positive influence on the implementation of supply chain management. Nevertheless, it does yield a favourable impact on customer satisfaction. Therefore, it becomes imperative to pinpoint the key indicators that sway information sharing and its repercussions on the company. To this end, the company must establish a robust correlation between strategies employed for information dissemination and the seamless integration of the supply chain within its operations [2]. Including pivotal metrics such as agility, operational efficiency, and economic performance proves to be immensely advantageous in refining the execution of the supply chain [27]. Within the company's production line, three distinct challenges impede the supportive role of information sharing for the supply chain, primarily revolving around distribution-related data. Reliance on manual information dissemination by the planning department in assigning production tasks has led to a reliance on manual data among some workers rather than utilizing an integrated system. Secondly, instances arise where production information fails to be inputted into the system, resulting in delays and a lack of clarity regarding necessary processes. The information received could be more reliable for production managers to meet consumer needs or demands, owing to the constantly shifting and inaccurate data the planning department provides. If these issues persist and the effective implementation of information sharing within the company's supply chain remains unrealized, it could culminate in diminished productivity among operators on the production line, escalated operational costs due to enforced overtime necessitated by shortages in meeting consumer demands, and potential penalties from customers for

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delayed deliveries. Most critically, the company may erode customer trust in its overall performance.

In light of the information provided, the company must tackle the identified issues and ensure the seamless flow of information within the organization. This objective can be realized by implementing a series of strategic measures. Firstly, the company should actively seek employee input regarding information enhancement within the organization. Encouraging an open dialogue with staff members will foster a culture of transparency and bring valuable insights into the information-sharing processes. Secondly, the company must provide all production personnel with easy access to disseminated information through email or specialized company software. It ensures that critical data reaches the right individuals promptly.

Furthermore, recording all operational information through email or updating the company's system regularly is crucial for maintaining an up-to-date and accurate database. To facilitate this, the organization should invest in continuous training programs for employees and leaders involved in the company's information system. This training will equip them with the necessary skills to effectively adapt to evolving technological advancements and information-sharing practices. Lastly, conducting briefings or discussions during each shift exchange can serve as a valuable platform for addressing any unresolved issues promptly and collaboratively.

The company should also consider establishing Standard Operating Procedures (SOPs) that authorize members to access and make decisions on various tasks to streamline decision-making processes. By implementing these measures, the company can enhance its information-sharing practices, mitigate potential bottlenecks, and ensure that issues are resolved before the commencement of work. In doing so, the organization promote efficiency and bolster its overall productivity and competitiveness.

3.7 Implications Research

This study underscores the critical role of information sharing in enhancing business productivity and its indispensable significance in constructing robust supply chains. The study identifies interconnected factors, such as supply chain implementation, technological information, quality information, and customer satisfaction, all of which are pivotal in this process. According to the survey findings, company executives must prioritize the effective communication of pertinent information to boost productivity and enhance customer satisfaction. The success of supply chain implementation hinges on providing timely, accurate, transparent, and valuable information across the entire network. While information sharing is undeniably crucial for superior outcomes, it is equally vital to recognize the significance of supply chain visibility in sustaining and elevating corporate productivity. This study's outcomes unequivocally demonstrate that information sharing is a strategic advantage for businesses, government entities, and managers.

Future research endeavours should address certain limitations encountered in this study to broaden the knowledge base surrounding supply chains from a more comprehensive perspective. It is essential to acknowledge that the study primarily focused on manufacturing businesses, which limits the generalizability of its conclusions to other industries with distinct supply chain dynamics. Given that each company possesses a unique supply chain structure, future research should encompass various industries for a more comprehensive understanding. Secondly, the study employed composite variables, which may have hindered a nuanced comprehension of these concepts. Future research can thus dissect these variables into sub-components or dimensions to yield more profound insights. Furthermore, data collection over a specific duration could significantly enhance the precise assessment and comprehension of the long-term effects of information sharing on the supply chain, particularly in light of the ongoing evolution of information technology platforms. Recognizing and addressing these limitations will undoubtedly contribute to a more thorough comprehension of supply chain concepts for academic researchers and industry practitioners.

4. Conclusion

The findings of this research, employing the SEM method, reveal that information-sharing indicators do not exert a positive and significant impact on the implementation of supply chain management. Nevertheless, they do enhance supply chain management performance and contribute to an improved level of customer satisfaction. It is evident that the effective implementation of supply chain management positively and significantly influences productivity, indicating that a higher degree of implementation leads to increased productivity within the company. During a one-month production period, the company experienced a notable 10% boost in productivity, rising from 85% to 95%. However, it is essential to note that mishandling information-sharing can have adverse effects, such as decreased customer trust, heightened production costs, and customer penalties due to delivery delays and operational delays caused by material shortages in the production line.

Based on these findings, several recommendations can be made to ensure effective information sharing within the organization. The company should foster an open and responsive environment for employees to provide input on enhancing information sharing. In addition, all production personnel responsible for operations should have easy access to distributed information through email or company software. Thirdly, all operational data within the company must be meticulously recorded through email or updated in the company's system. Continuous training and skill improvement programs should be established for everyone involved in the company's operations. Additionally, brief meetings or discussions during each shift change can help promptly identify and address any unresolved issues before commencing work. Furthermore, establishing formal Standard Operating Procedures (SOPs) for task access and decision-making processes is highly recommended to ensure smoother operations and information sharing within the company.

In terms of future research, further investigations into the specific mechanisms of information-sharing and its impact on supply chain management could provide deeper insights. Exploring case studies of companies successfully implementing information-sharing strategies and their subsequent supply chain performance could offer valuable lessons for others. Additionally, a longitudinal study could assess the long-term effects of information-sharing on supply chain management and customer satisfaction, allowing for a more comprehensive understanding of this complex relationship.

Declarations

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