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IMPACT OF OPERATIONAL EFFICIENCY ON CUSTOMER SATISFACTION IN THE INDIAN AUTOMOBILE INDUSTRY

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Abstract
The paper shall explore relationship between the operational efficiency as well as customer satisfaction within Indian automobile sector with particular emphasis on the showroom level operation. The aim was to get insights into the effect of different operational determinants on overall customer happiness and long-term customer loyalty in a competitive and dynamic automotive market. An organized customer satisfaction questionnaire consisting of 25 statements was made as per the insights gained through the literature review. The tool was given to 75 participants who recently dealt with the employees in the showroom, which gave the opportunity to record the real-time impressions about the operational performance and the quality of services. These were investigated on the dependence between independent variables of operations and the satisfaction of customers using the descriptive statistics and regression analysis. The results showed that framework of proposed explanations (0.4429 percent) elucidated the variation in customer satisfaction, and the determinants (the selection) possess moderate explanatory strength. The operational aspects that were studied involved production lead time, quality of service after sales, efficiency of supply chain, inventory, reliability of the vehicle, its sustainability and green operations, and automation of technology and processes. Among these variables, production lead time has been found out to be the most significant factor in customer satisfaction. Although even post sales quality of service altered the customer loyalty and satisfaction only slightly and its contribution was insignificant as a statistical element, it is also a significant factor of customer loyalty and satisfaction. The results underline the significance of properly conveying the strengths of the operations to the customers. Better knowledge about efficiency-related programs will allow firms to achieve higher customer experience, enhance their competitive advantage, and develop a culture of operational excellence and long-term customer relationships in the automobile industry.

Key Words: *Customer satisfaction, Operational efficiency, Competitive advantage, Automobile industry, Indian market*

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1.Introduction

Automobile market forms an important part of the world economy and contributes to the economy development directly. One of the most essential sources of industrial developments is also the automotive industry in India because it is rather important to the growth and production of the country. The industry generates mass employment, elevates the subsidiary industries, and stimulates the manufacturing, logistical and service infrastructure innovation. India being one of the fastest emerging automotive markets in the world still remains a favored place of investment, either domestic or international, which makes it a strategic economic hub. To maintain this growth, there is a need of automobile firms to ensure that they establish parts of operation, which are responsive to changing customer needs and expectations, thus enhancing quality in the services and customer satisfaction.

The capacity of any automobile organization to supply quality products and services in a sufficient time and an efficient manner is of paramount importance in the increasingly competitive markets in which customers are offered a wide range of options (Sharif et al., 2025; Zygiaris et al., 2022). Customers have become more digital, informed and quality conscious than ever before. They do not just consider the technical aspects of the cars, but the entire purchasing and service experience. Service quality has been positively associated with the customer behavioral results like customer satisfaction, and customer loyalty. Customers feel confidence, promptness and professionalism in service delivery, hence when they feel this, they tend to build trust and relationship towards the brand in the long run.

In the automotive industry, the drive in operations required is efficiency in enhancing customer satisfaction, as well as minimizing customer costs. Simplification procedures like manufacturing efficiency and supply chain coordination helps companies to streamline the production lines and logistics of these companies to deliver vehicles in time and build reliability, customer trust and loyalty. Effective integration among manufacturers, suppliers, distributors and showrooms minimizes the number of bottlenecks and eliminates unnecessary wastages. Just-In-time and synchronized supply systems can decrease the inventory costs and enhance the availability of products, thus, enhancing the overall service performance. These types of operational strategies enable the firms to have competitive prices and also provide high level service performances.

Employee training is also essential in enhancing operational effectiveness. Employee competence, responsiveness, and quality of service delivery are also developed with the help of training, which subsequently has a positive impact on organizational performance and customer perceptions (Esteban-Lloret et al., 2018). Customers in the car industry are usually keen to know about the specifications of the vehicle, financing, warranty and services in terms of servicing. The sales and service members are the main face of the organization and the customer. Educated and sensitive workers will make a difference in enhanced consumer experience and satisfaction. The continuous training programs also enable the employees to effectively handle customer complaints, resolve and offer personalized solutions to the customer complaints and this increases the perceived service value.

The other important determinant of satisfaction is timely and efficient after sales service. The studies on the automotive after-sale setting prove the fact that the customer satisfaction and long-term loyalty directly depend on the dimensions of the service quality (Balinando et al., 2021). The customer experience can be enhanced by the quality of managing the systems of appointments, the supply of spare parts, and warranty services that can strengthen the maintenance of relationships. The nature of the after sales communication would have a more significant effect on the brand perceptions in the long term than the initial purchase experience. The more favorably the customers consider the service quality to be high, the more their behavioral intention will be, which will consist of a repeat purchase and a positive word of mouth communication. This supports the need to combine operational efficiency and customer-focused service approaches.

The automobile industry is such that customer satisfaction is determined by a mix of operation efficiency, service quality, adoption of technology and employee empowerment. Due to the changing nature of the market, companies need to constantly match their operations with the expectations of their customers in order to be competitive. Automobile companies can be able to increase customer loyalty, develop competitive advantage, and attain long-term performance by ensuring that operational processes are aligned with their expectations in dynamic markets. In this case, the proposed study is intended to determine the most significant operational independent variables that influence customer satisfaction in the Indian automobile sector, and, therefore, assist the manufacturers concentrate on efficiency variables that can guarantee customer satisfaction and long term strategic success.

Objectives of the Study are:

- To research the degree of consumer satisfaction in the automotive sector.
- To study the different factors affecting customer satisfaction.

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- To study, how the optimized supply chain management can lead better product availability, timely deliveries, and, consequently, higher customer satisfaction.
- To assess the customer's expectation from the company's authorized service centers.

Study how improving employee skills and engagement through training programs positively impacts operational efficiency, leading to better customer service and satisfaction.

Literature Review Production lead Time

Customer satisfaction has also been observed to be a highly significant element that defines the success of the organization in the automobile industry.It is concluded that customer satisfaction is closely connected to the level of relation both between automobile companies and their clients and that good relational relationships can attract more financial benefits (Fakiruddin et al., 2010). This has also focused on comprehending customer intentions, finding the points of differentiation, customer retention and linking organizational strategies to customer expectations (Anil and Bhupender et al., 2016).

Services are quite different as compared to tangible products since they should be measured mainly on the perspective of the customer. Increasing customer satisfaction then involves the simulation of order-processing services, including the design customization, to study customer behavior besides assessing the product lead time (Hara and Arai et al., 2011). Operationally, total lead time is the time of order processing time, procuring and manufacturing time as well as the time of transporting the product among various supply chain operations. The reduction of lead times may frequently occur when a shipment of goods is made at the moment of production or delivery to the supplier. Organizations are becoming more concerned with quality and delivery time to achieve competitive advantage, profitability, cost reduction and service performance (Blackburn et al., 1992).

Customer satisfaction has been described as the attitude or the disappointment of a person caused by the comparison of the perceived service performance with the expectations (Oliver, 1980). The time spent by a manufacturer between an order and its arrival in an inventory is known as lead time, and it is quite influential in the quality of customer care and inventory costs.

It has been suggested that a holistic approach should be used when evaluating performance in the supply chain and not just on cost metrics only but also operational metrics (Beamon et al., 1999). The overall performance of the supply chain requires integrated approaches that would enhance the performance of the supply chain (((Kim & Narasimhan, 2002). Proper supply chain activities are directly linked to the increased profitability and better positioning (Christopher et al., 2016).

Data Envelopment Analysis (DEA) is widely applicable in the process of measuring the efficiency of the supply chain because it allows the assessment and comparison of different decision making units in an industry (Charnes et al., 1978). It also enhances the supply chain visibility greatly, allowing the stakeholders to check the product authenticity and real-time locations (Kshetri et al., 2018). Moreover, the blockchain technology is less prone to fraud and human error in transactions, which leads to cost savings and better inventory management (Saberi et al., 2019).

Service Quality After Scale

It is determined that after sales service influences much on the overall customer satisfaction and the least on the level of satisfaction is the cost of service. The paper is valuable to the body of literature as it helps to better understand how automobile organizations can enhance the satisfaction of after-sales service (Poudel, 2019).

Responsiveness, reliability and competence of service providers in the automobile service industry directly impacts on customer satisfaction, and therefore, service performance dimensions are critical in determining the way customers perceive the service. Customers who have become loyal tend to be more lenient to occasional service failures and they are more prone to express repeat patronage and positive word-of-mouth expression, both of which are useful results to service providers (Oliver et al., 1999).

The SERVQUAL framework has had a strong impact on service quality assessment.The model determines five dimensions, which are tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman et al., 1988). It has however been argued that the interpersonal interactions and perceived value may serve as more influential factors in influencing customer satisfaction compared to just individual service quality dimension.

Inventory Management

Inventory management is a vital aspect of the successful operation of companies, especially those that operate in the sphere of supplying cars, as the appropriate level of stocks directly impacts profitability and satisfaction of the customers (Barcelo et al., 2025). It involves tracking, ordering, storing and selling of stock as a means of facilitating the smooth operation flow and efficiency in service delivery.

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The performance metrics related to logistics also share a strong connection with inventory management, such as on-time in-full delivery, vehicle capacity utilization (Nallusamy et al., 2021). It is however difficult to keep up with proper inventory levels in cases where the client schedules are dynamic and changing every other minute. This demand variability usually leads to stock-outs and poor on-time/in-full performance and hence the negative impact on the efficiency of the operations.

Vehicle Reliability

The SERVQUAL scale is considered in the non-Western context of service to better see the dimensions structure and its impact on customer outcomes situations (Izogo et al., 2015). Results show that aspect of service quality holds strong effects on customer satisfaction and customer loyalty, explaining the applicability of SERVQUAL in the non-West.

Pricing has also been associated with quality judgment in the automotive industry. The quality index obtained can be used with price factor in different stages of automobile production (Amineh et al., 2016). Price quality ratio integration enhances the making of informed decisions whenever evaluating the purchase of the car.

The automobile industry has also experienced customer satisfaction formulated at the level of individual vehicle (customer) and then at collectively at the level of a vehicle model to establish overall contentment with a particular vehicle model. Such a multi-level measurement can allow manufacturers to evaluate the experience of individual customers, as well as the model-wide level of performance results (Chougule et al., 2013).

Sustainability and Green Operations

Green initiatives have been identified as a key strategic practice, which firms have to adopt to improve their organizational performance and sustainable development (Kushwaha et al., 2016). A strategy has been devised to enable the adoption of the green initiative at the firm level, and at the same time to create a correlation between the firm performance and the outcome of sustainability.

Additional studies investigated how the market demand affects the performance of firms with major mediating factors being green innovation and environmental performance (Lin et al., 2014). This indicates that with efficient environmental policies, business models need to be incorporated into the model to realize better performance results.

Also noted to be critical towards enhancement of performance in the automobile industry are strategic alliances (Abbas et al., 2023). Different forces that enable successful strategic alliances should be identified and managed strategically by automobile companies in order to enhance their competitive status and performance.

Technology and Process Automation

This has been investigated in the recent past by the way Industry 4.0 is now taking place in manufacturing companies, especially by determining the degree to which Industry 4.0 technologies are adopted in comparison to the degree of business process management (BPM) maturity within the companies that have been chosen (Gažova et al., 2022). Moreover, the strong implementation of process automation has been considered with the help of models combining planning, control, and assurance concepts, as well as such methods as veto-right decision structures in customer claim handling and the creation of mature audit tools to enhance process governance (Venkatasudhahar et al., 2023).

Research on digital transformation has also highlighted that after identification of opportunities, the managers should seize them by turning knowledge into innovation, better processes and strategy. Digital transformation also helps companies to know the true customer requirements, enhance customer interactions, address issues better, and predict needs by producing superior products and services (Miguel et al., 2022). Similarly, supply chain-oriented studies within the emerging technologies have underscored the development of the electric vehicle (EV) supply chains, where gaps and opportunities exist in the ecosystem and provided implications to managers to address better the challenges linked with this disruptive shift (Rehman et al., 2025).

Despite the presence of quite a few studies in the world, the research findings in India are limited and should be checked on a regular basis since the market of automobiles is dynamic and is constantly changing.. As observed in the literature review, an analytical framework would be proposed in order to steer the study, and this is exhibited in Figure 1.

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Figure 1: Conceptual Framework

Methodology

Research Design and Study Area

The current research article was based on a quantitative research design, which presupposes that the studies are about the impact of the characteristics of operational efficiency on customer satisfaction in the automobile industry. The researchers developed the research in the Kondapur district of Hyderabad in India in the area in which Toyota automobile display outlets and the customers are situated. The research was founded on quantifying the effects of the various variables of operational efficiency on customer satisfaction, after customer interaction with the showroom employees.

Sample and Data Collection

The primary data was collected among customers who had attended the Toyota showroom and had communication with the sales or service representatives. Customers were asked to complete a systematic customer satisfaction survey after having interacted with showroom employees. The respondents were free to participate and the post-service interaction was done right after attending the showroom to get the right perceptions. The analysis only included the completed questionnaires to provide consistency and reliability of the data.

Instrument Design and Measurement of Variables

The research tool was a questionnaire, which was structured to provide an assessment of feedback on different aspects of quality of operations and services. These statements quantified items of operational effectiveness, such as production lead time, supply chain effectiveness, post-sale services, inventory control, vehicle dependability, sustainability and green operations, and technology and process automation, among total customer satisfaction.

The measurement of all 25 statements was made using a 5-point Likert scale where 1 meant strongly disagree and 5 strongly agree.

Table 1: Operationalization of Variables and Corresponding Questionnaire Items

Variable	Production Lead Time	Supply Chain Efficiency	Service Quality After-Sales	Inventory Management	Vehicle Reliability	Sustainability green operations	Technology process Automation	Customer Satisfaction
Q. No	6,7,8	9,10	11,13	14,15,16	17,18,19	20	21,22	12,23,24,25

This variable is the Customer satisfaction of the group with regard to the person in charge. Table 1 of analysis showed conversion of the same into an aggregate variable of the question break-up.

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Data Analysis Procedures

The interpretation of data was performed through the application of statistical tools (Microsoft Excel). The analysis began by describing the variables to investigate the distribution and the central tendency of the variables using descriptive statistical methods. Mean and dispersion were among the measures that were employed to summarise customer perceptions. Internal consistency test was done to identify the consistency of the scale items.

They were then subjected to correlation analysis to establish whether there were any correlations of the variables of operational efficiency and their direction. The multiple regression analysis was then performed to test hypothesized research model, as well as determining effect of the operational efficiency determinants on customer satisfaction. The statistical tests were conducted on the hypothesis using regression with each of the independent variables tested to conceptualize the value of the independent variable in the variation of customer satisfaction.

Analysis and Findings

This research are the elements of Operational Efficiency that comprise the foundation of the independent variable of a person that involves the consumer satisfaction with production lead time, supply chain efficiency, after sales service quality, inventory management, vehicle reliability, sustainability and green operation, and technology and process automation that operate on the information to the contentedness of the consumers.

Calculation of Cronbach alpha was used to carry out the internal consistency test. Table 2 reveals the values of alpha of Cronbach as of the whole questionnaire, which included the independent variables.

Table 2: Internal consistency of all variables

Serial No	Sample Details	Cronbach alpha
1	Customer's feedback ---scale components.	0.82

According to the reference provided above, reliability is measured when the corrected item-total correlation is above 0.3, Cronbach alpha is above 0.6 and the acceptable range is between 0.6 to 0.8. Having a Cronbach of 0.82, this means that the questionnaire is reliable and consistent and therefore, the subsequent set of analyses must be carried out in MS tools

(20) . Descriptive statistical analysis has also been used to present the sample size features as shown in Table 3 below which is a frequency table.

Table 3: Descriptive Statistics

Parameter	SCE	SQAS	IVM	VRL	SAGO	TPA	PLT	CS
Mean	3.4	3.13	3.12	3.71	3.65	3.23	3.55	3.52
SE	0.1	0.10	0.07	0.12	0.13	0.11	0.15	0.10
Median	3.5	3.50	3.00	3.67	4.00	3.50	4.00	3.50
Mode	4.5	3.50	3.00	5.00	4.00	2.50	5.00	4.50
SD	1.1	0.85	0.64	1.03	1.14	0.96	1.31	0.84
SV	1.2	0.72	0.40	1.07	1.31	0.91	1.71	0.71
Kurtosis	-1.0	-0.21	0.41	-0.68	-0.84	-0.73	-0.83	-0.39
Skewness	-0.4	-0.58	-0.17	-0.51	-0.44	-0.36	-0.55	-0.68

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Figure 2 depicts the customers' gender-wise breakup with respect to their participation, indicating 49% male and 51% female customers in the study sample.

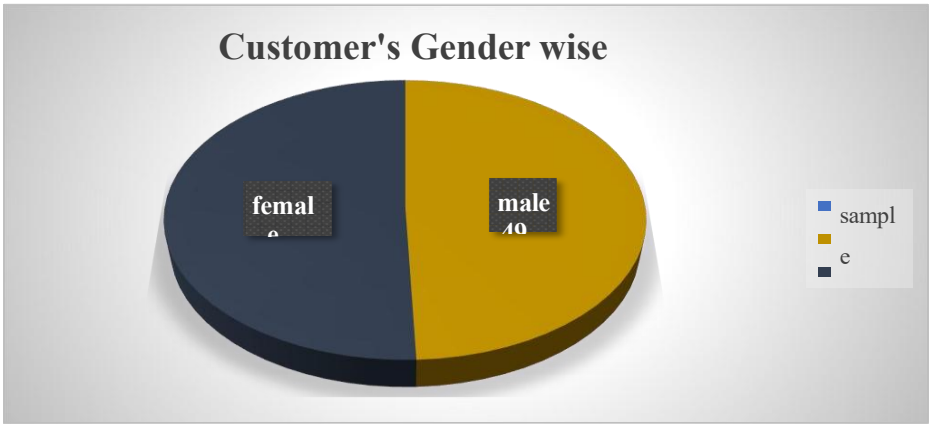

Figure 2: Customer's gender wise break-up

Figure 3 below was the analysis of customers by age which showed that 54% of them form the 18-24 age group,23% of them form the 25- 30 age group,11% of them form the 31-40 age group,9% of them form the 41-50 age group,3% of them are the 50 years above age group, which were represented in the study sample.

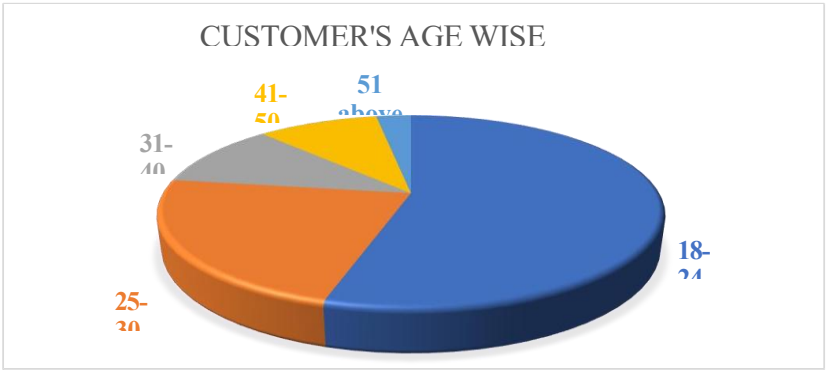

Figure 3: Customer Age Profile Breakup

The analysis of the customers Income levels analysis as shown in figure 4 below, shows the varying income levels of the individuals, with the respect of participation showing that 20% of their income level is 1 -4 lakhs, 23% of their income level is 5-8 lakhs, 19% of their income level is 9 -10 lakhs, 38% of their income level is 10 lakhs above was represented by the study sample.

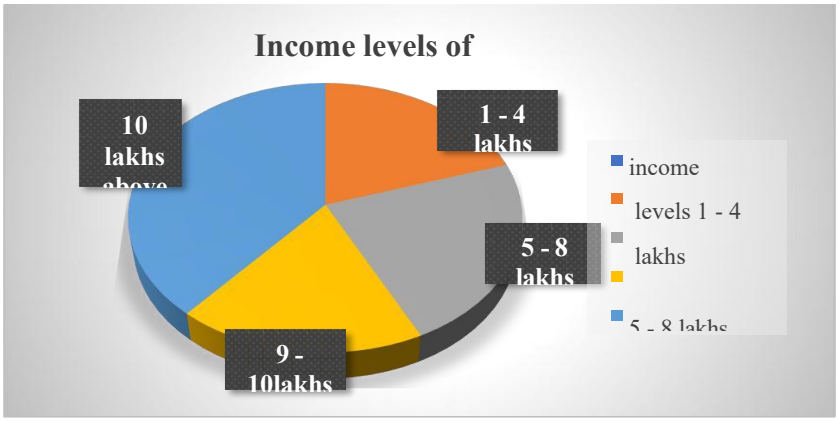

Figure 4: Customers Income levels break-up

Figure 5 illustrates the preferred car model analysis of the customers and different car models preferred by the individuals as far as participation is concerned, which means that 9 percent of the ev cars, 16 percent of the luxury cars, 32 percent of the sedan cars and 43 percent of the suv cars were reflected in the study sample.

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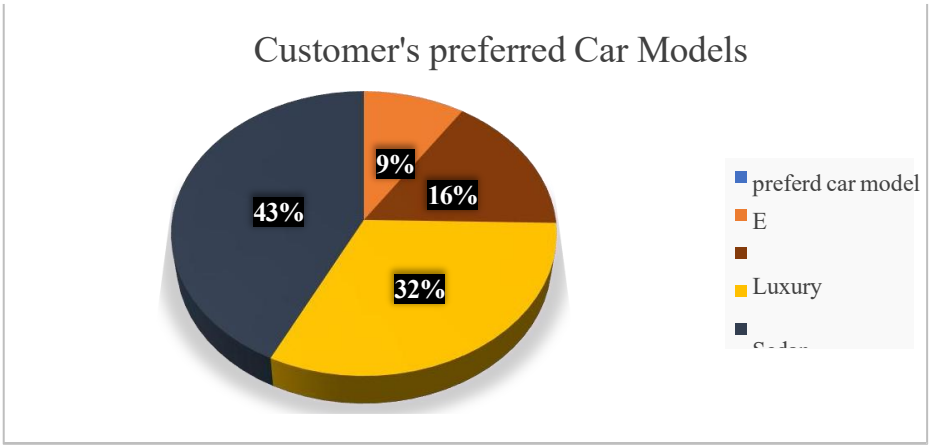

Figure 5: Customer preferred care model

As shown in table 4, correlation analysis was performed, demonstrating a positive correlation between all variables.

Table 4: Correlation Analysis

Supply chain efficiency	Service quality after sales	Inventory Management	Vehicle Reliability	Sustainability & Green Operations	Technology & Process Automation	Production Lead Time
1						
0.319745	1					
0.21086	0.414835	1				
0.562926	0.385217	0.252968	1			
0.597586	0.464165	0.342561	0.578915	1		
0.404968	0.398085	0.414029	0.48284	0.714742	1	
0.293801	0.278316	0.25045	0.406663	0.426103	0.49933	1

Regression Analysis

Regression analysis is an inferential statistical method of coming up with the percentage of the independent variable that can either be used to explain the dependent variable or the independent variable and other dependent variables. The analysis of correlation and establishing the most significant factors leading to consumer satisfaction within the automotive industry was done through linear regression analysis since it was necessary to test the correlation between the independent and dependent variable.

Here, it is possible to report the determinants of Coefficients of R, R 2 and R 2- Adj that are shown in Table 5. Then, the correspondence between the independent and dependent variable was stated using R which was 0.70 when all the independent variables were incorporated into the model. The value of the R-value was 0.4956. This refers to the fact that the dependent variables that have been specified by the independent variables have changed by 49.56 percent.

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Table 5: Regression statistics (Model fit summary)

Regression Statistics	
Multiple R	0.704019
R Square	0.495643
Adjusted R Square	0.442949
Standard Error	0.630278
Observations	75

Table 6 illustrates the AVOVA test results for the independent variables that have a significant correlation with customer satisfaction. As it can be observed, with P-value = 0.00. It can be concluded that F was significant at 0.05. This indicates that at least one of the factors representing customer satisfaction influences the operational efficiency.

Table 6: Anova Test for testing the model significance

ANOVA	df	SS	MS	F	Significance F
Regression	7	26.15591	3.736559	9.406061	0.00
Residual	67	26.61576	0.39725		
Total	74	52.77167			

Hypothesis Testing

Hypothesis Testing was carried out to assess impact of the independent variables on the dependent variable, which is consumer satisfaction in the Automobile Industry, using a T-test.

Testing Hypothesis:

Supply Chain Efficiency

1)Null Hypothesis (H_0): Supply Chain Efficiency is not having impact on Customer Satisfaction

1a) Alternative Hypothesis (H_1): Supply Chain Efficiency is having impact on Customer Satisfaction Information pertaining to the expected values from the sample is derived, as shown in Table 7.

Table 7: Testing the Hypothesis of SCE Vs customer satisfaction

ANOVA	df	SS	MS	F	Significance F
Regression	7	26.15591	3.736559	9.406061	0.00
Residual	67	26.61576	0.39725		
Total	74	52.77167			

P=0.76 that was not significant and was higher than 0.05. Therefore, the null hypothesis was accepted by rejecting the alternative hypothesis which showed that SCE does not affect customer satisfaction in the automobile industry.

Service Quality after Sales

2)Null Hypothesis(H_0): Service quality after sales does not impact on customer satisfaction.

2a) Alternative Hypothesis (H_1): Service quality after sales has an impact on customer satisfaction. Information pertaining to the expected values from the sample is derived, as shown in Table 8.

Table 8: Testing the Hypothesis of Service Quality after sales Vs customer satisfaction.

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
SQAS	0.195692	0.103878	1.883867	0.06	-0.011649	0.403032

Although P was moving towards significance, P=0.06, which was not significant and was more than 0.05. Hence, the null hypothesis was accepted to reject the alternative hypothesis. This finding indicates service quality after sales does not impact on customer satisfaction in the automobile industry.

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Inventory Management

3)Null Hypothesis(H_0): Inventory Management will not affect customer satisfaction. 3a) Alternative Hypothesis (H_1): Inventory Management affects customer satisfaction.

As shown in the below Table 9, information pertaining to the expected values from the sample was derived.

Table 9: Testing the Hypothesis of inventory management Vs customer satisfaction

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
IVM	0.022044	0.132736	0.166074	0.87	-0.2428986	0.286987

P=0.87, which was not significant, and > 0.05. Therefore, the alternative hypothesis is rejected and the null hypothesis is accepted, demonstrating no impact of inventory management on customer satisfaction in the automobile industry.

Vehicle Reliability

4)Null Hypothesis(H_0): Vehicle Reliability is not having impact on Customer satisfaction

4a) Alternative Hypothesis (H_1): Vehicle Reliability is having impact on Customer satisfaction Information pertaining to the expected values from the sample was derived, as shown in Table-10.

Table 10: Testing the Hypothesis of vehicle reliability Vs customer satisfaction.

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
VRL	-0.0676	0.09536	-0.70885	0.48	-0.257935	0.122744

P=0.48, which was not significant, and > 0.05. As a result, the alternative hypothesis is disproved, demonstrating that there is no connection between customer satisfaction and vehicle dependability in the automobile industry.

Sustainability and Green Operations

5) Null Hypothesis (H_0): Sustainability & Green Operations do not affect customer satisfaction. 5a) Alternative Hypothesis (H_1): Sustainability & Green Operations affect customer satisfaction. Information on the expected values from the sample is derived, as shown in Table 11.

Table 11: Testing the Hypothesis of Sustainability and Green operations Vs customer satisfaction

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
SAGO	0.099251	0.108743	0.912711	0.36	-0.117801	0.316363

P=0.36, which was not significant and was > 0.05. Therefore, the alternative hypothesis is rejected, proving that sustainability and green operations have no effect on customer happiness in the automotive sector, and the null hypothesis is accepted.

Technology and Process Automation

6)Null Hypothesis (H_0): Technology & Process Automation is not having impact on Customer satisfaction

6a) Alternative Hypothesis (H_1): Technology & Process Automation is having impact on Customer satisfaction. Information on the expected values from the sample is derived, as shown in Table 12.

Table 12: Testing the Hypothesis of Technology and Process automation Vs customer satisfaction

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
TAPO	0.054926	0.118956	0.46173	0.65	-0.182511	0.292363

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P=0.65, which was not significant, and > 0.05. By rejecting the alternative hypothesis, the null hypothesis is accepted, proving that technology and process automation have no effect on consumer satisfaction in the automotive sector.

Production Lead Time

7)Null Hypothesis (H_0): Customer satisfaction is not influenced by production lead time. 7a) Alternative Hypothesis (H_1): Customer satisfaction is impacted by production lag time.
Information pertaining to the expected values from the sample is derived, as shown in Table 13.

Table 13: Testing the Hypothesis of production lead Time Vs customer satisfaction

	Coefficients	SE	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.274118	0.423112	3.011302	0.00	0.429583	2.118654
PLT	0.335239	0.066385	5.049897	0.00	0.202733	0.467745

P=0.00, which was statistically significant, and less than 0.05. Therefore, in order to accept the alternative hypothesis and show that production has an influence, the null hypothesis is rejected.
As shown in the below Table 14, complies with the results of our study of customer satisfaction in the Automobile Industry.

Table 14: Summary of factors influencing the customer satisfaction

Determinants operational efficiency	**Supply Chain Efficiency**	**Sales Quality After sales**	**Inventory Management**	**Vehicle Reliability**	**Sustainability & Green operations**	**Technology & Process Automation**	**Production Lead Time**
Our study results	No	No	No	No	No	No	Yes

Discussion

The automobile industry has been really impacted on customer satisfaction with service experiences and operational experiences that customers directly experience in the course of purchasing their vehicles. The results have shown that operational efficiency has some significance in customer satisfaction but all the components of operations do not have the same degree of impact. Production lead time is the most significant factor that is considered among the ones that forecasted customer satisfaction among the analyzed determinants. This implies that the issue of on time delivery of vehicles and keeping to the promised schedules is a conclusive factor that dictates the customer perception in showroom environments. The literature on service quality notes that the perceptions of customers are conditioned by the responsiveness and reliability that have a direct impact on the behavioral consequences (Sharif et al., 2021). Here, production lead time is responsive and commitment fulfilment, hence it is an essential factor of satisfaction
After sales service quality though not statistically significant at the traditional level showed an insignificant effect. This result indicates a practical significance even without the vehement statistical validation. These dimensions dictate how the customers view the pre purchase and post purchase experiences.. Maintenance, warranty, and resolving of problems are the scenarios where after sales service comes in especially. The customers are mainly focused on delivery schedules at the point of purchase but the after sales interactions add to the longer term ratings of the brand.
The research on customer loyalty also shows that satisfied customers have high chances of having repeat patronage and positive word-of-mouth (Oliver, 1999). Although the after-sales service may not directly affect customer satisfaction at the showroom level, it is important in establishing customer relationships with the sales team over a longer period. Good after sale is one that builds trust and loyalty in the long run.
The lack of statistically significant impacts of supply chain efficiency, inventory management, vehicle reliability, sustainability and green operations, and technology and process automation are indicative of the possibility of these factors to act indirectly, but not directly, in store customer satisfaction in the short run. Instead of focusing on the operating mechanisms of the business, customers tend to judge the service experiences based on the people they interact with and their value perceptions (Tsoukatos and Rand, 2007). A

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lot of operations take place in the back-end and they are not necessarily observable by the customers unless something goes wrong. Consequently, their input into satisfaction can be conditional on the productive communication and exposure.

Service experiences may also be interpreted by the cultural and contextual aspects of customers. Studies have shown that interpersonal relationship and perceived value might supersede technical service dimensions in determining satisfaction.

The results thus point to the significance of ensuring the alignment of operational excellence with customer-facing communication strategies. Even though, organizational performance requires internal efficiency, customer satisfaction is largely impacted by factors which are experienced and perceived directly. The most observable operational deliverable would be timely delivery and therefore production lead time is a major differentiator in competitive markets.

In general, the discussion reveals that the operational efficiency has a role in customer satisfaction, but only when it is converted into the real and measurable service outcomes. The most prominent factor is the one of production lead time, but the dimensions of service quality are also required to develop long-term loyalty. There is a way to increase the level of integration between operational processes and customer engagement practices, which would help to increase satisfaction and ensure long-term competitive advantage in the automobile industry.

Conclusion

The level of dissatisfaction by the customer with production lead time can greatly affect the level of satisfaction in the automobile industry. Delays in the process of booking and receiving a vehicle can cause frustration and the lack of met expectations, which can erode the brand reputation and raise the rate of losing a customer. Delays may thus eclipse other good things of the service experience. Shoring of lead times on the other hand, leads to better perceptions regarding operational effectiveness and builds customer confidence. In the event that the promises made to the customers are met, they might feel that the organization is reliable hence developing loyalty and commitment in the long run. Successful communication and quality management are critical towards finding a balance between speed and customer expectations. Open communications on the state of production and delivery schedule that is realistic and correct can help to decrease uncertainty and minimize dissatisfaction even in case of minor delays. There is a clear lack of a connection between operational efficiency within and customer awareness. Although companies can streamline production and supply chain processes, customers might fail to appreciate them unless they take the initiative of communication. The improvement of awareness in the showroom setting can assist in making the customer more aware of the value generated by the efficient operations.The correlation between both lead time and satisfaction implies that a shorter and known delivery time would have a positive impact on the customer. Delay can be substantially minimized by streamlining the production planning, enhancing supply chain coordination and optimization of the operational workflows.

Scope, Limitations, and Future Research Directions

We carried out our research in a popular Toyota dealer in Kondapur of Hyderabad an urban district. Although our study is a solid framework, it does not lack limitations. These limitations will remove the opportunities that may improve our knowledge of the dynamics of customer satisfaction regarding automobile purchases in the dynamic and very competitive automotive industry. Some limitations that warrant further investigation include the following:

a)Investigating several showrooms in a city; furthering the research to cover showrooms in a city, urban, semi-urban, and rural setting, either at the metropolitan or state level, to better understand the variables that contribute to customer satisfaction when buying automobiles.

b)Further segmentation of the study by the customer segment type including the hard and tough automobile segment, the prestige segment, and the luxury segment might have given a more detailed explanation of the interaction of factors contributing to customer satisfaction.

c)Lastly, we would suggest a national research study to understand more on the issue of customer satisfaction in the purchase of automobiles in a very competitive and dynamic market.

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