

SYNOPSIS OF THE THESIS

**CRITICAL FACTORS AFFECTING SATISFACTION
OF CUSTOMERS FOR INDUSTRIAL CHEMICAL
PRODUCTS**

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BY

KINSUK MUKHERJEE
(UID No: 15JU11400005)

Under the guidance of

Research Supervisor

Dr. Hari Haran
Former Adjunct Professor
ICFAI University Jharkhand,
Ranchi, India



ICFAI University, Jharkhand
Ranchi
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CONTENTS

Page No.

1.	Introduction	1
2.	Relevance of the study	3
3.	Research Scope	5
4.	Review of Literature	5
5.	Research Gap	16
6.	Objectives of the Study	17
7.	Research Hypotheses	17
8.	Research Methodology	20
9.	Data Analysis	24
10.	Findings and Conclusions	28
11.	Limitations of the research	34
12.	Recommendation for future research	35
13.	Bibliography	37

1. Introduction

To develop a sustainable business, it is imperative to ensure customer satisfaction which results from the degree to which the customer's expectation of the product or service is met or exceeded. In this competitive business world, the need for customer-centeredness has accrued from the critical role that satisfaction plays in enhancing company image and customer loyalty. Loyalty is demonstrated by their repeated purchases despite the efforts of competitors to lure them away. This in turn increases customer lifetime values and decreases customer acquisition costs. These customers are more likely to resolve issues with the supplier directly instead of complaining publicly about any issue related to the product or service. Loyal customers give their valuable feedback, if any, for improving the quality of products or services and are more likely to spread the message about their good experience. They can even engage themselves collaboratively in search of innovative solutions, new product launches and cost reduction. According to Rust et al. (1999), it is more expensive to win new customers than to retain current customers and longer-term customers are likely to purchase more. Customer satisfaction enables companies to stretch beyond retaining the existing customer bases and attract new customer groups from marketplaces or niches that might not have been exploited before.

Given the importance of customer satisfaction for a firm's long-term business survival and growth, monitoring customer satisfaction and diagnosing what factors drive customer satisfaction should be an essential activity of every firm (Chakraborty et al., 2007). Also, the imperativeness of focusing on the needs and preferences of customers has arisen from the need for competitive advantage, a trend coming in the wake of stiffening competition among product and service providers. Companies need to work meticulously and persistently with

existing and potential customers to understand their needs and preferences as customer segments, market necessities and expectations change dynamically.

The central purpose of the current study is to identify the factors which can influence the satisfaction of customers in a business-to-business context, particularly the satisfaction of carbon black customers in two major industries i.e. Tyre manufacturing and Automotive Rubber Component (Non-Tyre) manufacturing industries and to evaluate the relative importance of identified dimensions of customer satisfaction on overall satisfaction. This is also to study the applicability of these factors to influence the satisfaction of customers for other industrial chemical products viz. Sulphuric Acid, Potassium Carbonate, Potassium Nitrate, Hydrochloric Acid, Sodium Hydroxide, Rubber Process Oil (RPO), Zinc Oxide, Sulfur, Stearic Acid, and Sodium Silicate which are used in Lead–Acid Battery manufacturing company, Precipitated Silica manufacturing company, Steam power plants (CPP), Carbon Black manufacturing company.

As reported by the All India Association of Industries, Indian chemicals industry with more than 80,000 commercial products, stood at US\$ 178 billion in 2019 and is expected to reach US\$ 304 billion by 2025 registering a CAGR of 9.3% (<https://aiaindia.com/chemicals/#:~:text=The%20Indian%20chemicals%20industry%20stood,to%20India's%20GDP%20by%202025>). The demand for chemicals is expected to increase by 9% per annum by 2025. The chemical industry in India is expected to contribute US\$ 300 billion to its GDP by 2025. The production of key chemicals in October 2020 was 880,569 MT and the production of petrochemicals was 1,808,997 MT.

By understanding the relative importance of different factors in influencing the customers' satisfaction and the preference for procurement of industrial chemical products, the supplier can frame their strategy to develop and implement a standardized customer satisfaction

process across their class of markets and geography (countries) and thereby can achieve the status of 'preferred supplier'.

2 Relevance of the Study

With the increase in competition in market competition, customer satisfaction plays a vital role in achieving the status of preferred supplier and thereby to increase the market share and profitability. Thus, it is important to identify the factors which can satisfy the customers of industrial chemical products and to understand the relative importance of these factors in improving customer satisfaction. Most of the industrial chemical products are generic in nature and produced by various manufacturers. Price alone cannot decide the business as it can be easily imitated. There are other important factors which can act as a key differentiator. Several studies have identified multiple parameters which influence customer satisfaction in a business-to-business context. However, there is hardly any detailed study done on critical customer satisfaction factors which are specific to carbon black and other industrial chemical product manufacturing industries. A few dimensions such as Product stewardship of the supplier, Quality Management System (QMS) ensuring Quality of the product, Incentives offered to customers, Suppliers' Sustainability Performance etc. which apparently play a vital role, have not been under the purview of any existing literature studied. It is also necessary to explore other factors, if any, which influence the satisfaction of customers of industrial chemical products. The significance of these factors in customer satisfaction may vary from one industry to another industry which is not found to be addressed for industries like Tyre manufacturing, Automotive Rubber Components manufacturing, Carbon Black manufacturing etc. Thus, it is felt necessary to sensitize the suppliers of industrial chemical products regarding the major variables that ought to be considered while seeking to improve

customer satisfaction and thereby to increase the market share and profitability. By understanding the factors that influence a Customer's preference for buying from a manufacturer as far as Carbon black and other industrial chemical products are concerned, organizations can frame their strategy to improve Customer Service level and thereby can retain their existing Customers as well as gain more customers to increase their business volume.

As per the International Carbon Black Association (ICBA), Carbon Black is in the top fifty industrial chemicals manufactured worldwide, based on quantity. Because of its unique properties, Carbon black has a variety of applications starting from tyres, and industrial rubber products to plastics, coating, toner, printing inks etc. which are used in our daily lives. Similarly, other industrial chemical products viz. Sulphuric Acid, Hydrochloric Acid, Sodium Hydroxide, Sodium Silicate, Sulphur, Zinc Oxide, Stearic Acid, Rubber Process Oil, Potassium Carbonate, Potassium Nitrate, which have been considered under the scope of this study also play a vital role in the manufacturing process of various products which are essential in our daily life as described earlier in this chapter. The market size of all the selected industrial chemical products is very big and the findings of this study may be horizontally deployed to other industrial chemical products.

International Organization for Standardization (ISO9001:2015) has also included Customer Satisfaction as one of the clauses (Clause number 9.1.2) in which it is mentioned that the organization shall (mandatory requirement) monitor customer's perceptions of the degree to which their needs and expectations have been fulfilled.

3. Research Scope

The study has been carried out to identify the factors which can influence the satisfaction of Carbon Black customers in two major industries i.e. Tyre manufacturing industries and Automotive Rubber Component (ARC) manufacturing industries in India and evaluate the relative importance of these factors on overall satisfaction of customers. An effort has also been made to study the applicability of these factors in influencing the satisfaction of customers for other industrial chemical products. Various industrial chemical products which have been chosen under the scope of this study apart from Carbon Black are Sulphuric Acid, Hydrochloric Acid, Sodium Hydroxide, Sodium Silicate, Sulphur, Zinc Oxide, Stearic Acid, Rubber Process Oil, Potassium Carbonate, Potassium Nitrate. These chemical products play a vital role in the manufacturing of various products which are essential in our daily lives.

4. Review of Literature

Concept of Customer Satisfaction

Rahimić (2012) opined that customer satisfaction is a key factor in developing and sustaining competitive advantages. According to Ngo, V. M. (2015), customer satisfaction can play an important role in putting a higher barrier against switching to other competitors.

Naumann et al. (2009) mentioned two major benefits of customer satisfaction:

- 1) Satisfied customers are more likely to continue buying from the company over the longer term, and to increase their business volume
- 2) Satisfied customers are more likely to spread their positive experiences, which in turn will attract new customers for the company

Mittal et al. (2010) mentioned the benefits of customer satisfaction as follows; it increases the expected 'life' of current customers, reduces price elasticity (i.e. they are less likely to defect when competitors offer lower prices), insulates customers from the competition, lowers costs of future transactions, reduces operating costs, lowers costs of attracting new customers, builds trust and reputation, leading indicator of future economic returns.

Anderson et al. (2004) opined that ensuring customer satisfaction is a central strategic concern of any business. They also added if any business cannot satisfy customers as effectively and efficiently as their competitors, customers and investors will turn elsewhere. Customer satisfaction, according to the authors, is determined by quality as well as by market segmentation and customer selection executed through product and service offerings, pricing, distribution channels, and proper communications.

Rossomme, J. (2003) mentioned about four elements which influence customer satisfaction in the B2B context. These are a) Information satisfaction i.e. satisfaction with the information used to choose a product e.g. technical specifications, marketing literature, pricing and payment schedules delivery schedules shipping information etc. b) Performance satisfaction i.e. satisfaction with the post-purchase overall performance of the supplier in delivering and supporting the transaction e.g. smooth transactional processes, ROI etc. c) Attribute satisfaction i.e. satisfaction from the performance of a product or service feature or dimension e.g. product reliability, technical support, training, post-sales service d) Personal satisfaction i.e. satisfaction resulting from the relationship with the supplier e.g. perceived personal risk, supplier reputation, past experience with supplier, past experience with similar products/services, personal relationship with supplier contact

According to Mill (2002), there is no universally accepted definition of customer satisfaction. He referred to a number of definitions of customer satisfaction given by different authors as follows:

- Customer satisfaction, is defined as the buyer's cognitive state of being adequately or inadequately rewarded for the sacrifice he has undergone (Howard and Sheth,1969)
- It can be seen as an evaluation (cognitive) that the chosen alternative is consistent with prior beliefs with respect to that alternative (Engel and Blackwood, 1982)
- It can also be seen as a complex human process involving extensive cognitive, affective and other undiscovered psychological and physiological dynamics (Oh and Parks, 1997)

Mill mentioned two widely accepted theories that best describe customer satisfaction viz. disconfirmation paradigm and expectancy-value concept. Both these theories, however, do not address the relationship between customer satisfaction and actual purchase behaviour. According to the Disconfirmation theory, customers make purchases based on their expectations, attitudes, and intentions (Oliver 1980). Then a perception of performance occurs as customers evaluate the experience during or after consumption and compare this actual service performance with their pre-experience standard or pre-consumption expectation. This results in confirmation, satisfaction, or dissatisfaction of customers. Disconfirmation or dissatisfaction results if there is a deviation of actual performance from the expectations. Expectations are evolved from 1. Equitable performance which is based on the individual's investment and anticipated rewards 2. Performance of ideal product or service 3. The desired performance based on comparison with competitors 4. Quality of relationship of the customer with the salesperson. The author referred to Oliver (1980) who

mentioned the following operational assumptions as part of the theory:

- a) When the expectation is high and performance is low, moderately low disconfirmation will result as the expectations are not met. On the other hand, high performance against high expectations will result in a moderately high level of expectations being met (EM) due to confirmation.
- b) When the expectation is low and performance is also low, it will result in very low EM ratings, while high performance against low expectation will result in very high EM ratings due to a surprise effect.
- c) When expectations match performance at any level, it will result in conformance and EM will represent the value of the expectations/ performance level.

As per the expectancy-value theory, customers often make some judgments about a product, its benefits, and the probable outcomes of using the product. The overall attitude of customers is a function of beliefs about the attributes of an object and the strength of these beliefs. The following relationship was presented by Carmel (1990): $Q = \sum I_i (P_i - E_i)$, where Q is the overall quality; I is the importance of service attribute i; the sum is over the number of service attributes; P is the perception; E is expectation. Some models indicate a link of satisfaction to repeat purchase intention but not yet to actual purchase.

Yüksel et al. (2008) reviewed various consumer satisfaction theories viz. Dissonance Theory, the Contrast Theory, the Expectancy-Disconfirmation Theory, the Comparison Level Theory, the Value-Percept Theory, the Attribution Theory, The Equity Theory, the Person-Situation Fit concept, and the Importance-Performance model. The deviation of the actual outcome from the expected one constitutes the basis of most of the satisfaction theories. According to the majority of these theories when product performance exceeds prior expectations or some form of standards, it signifies satisfaction. When product

performance falls short of the standard or expectation, it results in dissatisfaction.

Thus, customer satisfaction is generally based on meeting the expectations of customers.

However, when customers receive a positive surprise that is beyond their expectations, it results in customer delight (Berman, 2005). Studies suggest that customer loyalty increases significantly as a result of delight.

As per Lingqvist et al. (2015), companies with a handful of big customers, need to meet them to analyze how they really make purchase decisions whereas large companies with a huge number of customers need data-driven market research to gain deeper insights into how different variables such as price, delivery times, or product features affect purchase decisions of customers.

The findings of the study conducted by Russo, I. et al. (2017) showed that customer satisfaction moderates the relationship between the re-purchase intent of the customers and the switching costs.

Exit barriers imposed by the higher switching costs may force customers to stay loyal. The findings of their study also indicate that even when switching costs are low, the purchase intent of customers can be increased by improving the level of customer satisfaction.

Day (1994) mentioned that for several years managers have been exhorting to stay close to the customers and to define the purpose of a business as the creation and retention of satisfied customers. To enjoy a long-term competitive advantage and superior profitability, companies need to be better equipped in responding to market requirements and in anticipating changing conditions. Market sensing and customer linking capabilities are recognized as the two distinctive features of market-driven organizations and these distinctive capabilities are difficult for the competitors to understand and imitate.

Factors which can Influence Customer Satisfaction

From the existing literature, it is found that there are multiple parameters, which can influence the satisfaction of industrial customers as described in the following table.

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
1	Improving business-to-business customer satisfaction programs: Assessment of asymmetry, heterogeneity, and financial impact.	<i>Journal of Marketing Research,</i>	Research Paper	Vikas Mittal, Kyuhong Han, Ju-Yeon Lee & Srihari Sridhar	2021	<ul style="list-style-type: none"> • Eight key strategic attributes driving B2B customer satisfaction are as follows: Quality of Product / Service, Pricing, Safety, Sales Process, Project Management, Corporate Social Responsibility, Communication, and Ongoing Service and Support.
2	Assessing the effects of perceived quality and perceived value on customer satisfaction	Management Science Letters	Research Paper	Andreas Samudro, Ujang Sumarwan, Megawati Simanjuntak, Eva Z Yusuf	2020	<ul style="list-style-type: none"> • Product quality in the chemical market is considered in terms of performance consistency, emissions and toxicity level, reject level, lifetime, and durability • Reliability, assurance, empathy and responsiveness are the four constructs of service dimensions • Perceived value is the customer's benefit (core solution and other additional services) towards sacrifices (price and relationship cost) • Chemical market tends to put perceived value as a priority as long as product quality meets the standard parameter

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
3	The effects of product quality on customer satisfaction and loyalty: Evidence from Malaysian engineering industry,	International Journal of Industrial Marketing	Research Paper	Ling Chen Hoe & Shaheen Mansori	2018	<ul style="list-style-type: none"> • The dimensions of product quality that affect customer satisfaction are 1) Performance which refers to a product's primary operating characteristics 2) Features which are additional characteristics that enhance the appeal of the product to the customer; these are the secondary aspects of performance 2) Reliability which is the likelihood that a product will not fail within a specific time period when put into use 4) Conformance which is the precision with which the product or service meets the specified standards 5) Durability which measures the length of a product's operating life 6) Serviceability which is the speed, ease and costs with which the product can be put back into service when it breaks down 7) Aesthetics which refers to how the product looks, feels, sounds etc.; it is a matter of personal judgement and a reflection of individual preference 8) Perceived quality is the quality attributed by the customer, noting that perception is not always reality.

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
4	Predictors of customer loyalty in business-to-business trading.	Journal of Applied Environmental and Biological Sciences,	Research paper	Zainuddin Zakaria, Zuraini Jusoh, Mohd Hafizuddin Mohd Ghazali, & Norchahaya Johar	2016	<ul style="list-style-type: none"> • Companies should focus on the factors like service quality, affordable price, minimizing mistakes, ease of communication and high responsiveness to ensure customer satisfaction.
5	Relationship Bonding Strategies and Customer Retention: A Study in Business-to-Business Context	IOSR Journal of Business and Management (IOSR-JBM)	Research paper	Prof. Milna Susan Joseph, Ms. Anusree Unnikrishnan	2016	<ul style="list-style-type: none"> • Financial bonds should not be treated as the only mechanism for customer retention because it can be easily imitated • The use of social bonds and structural bonds are found to be more effective in achieving customer retention in a B2B context
6	Optimizing profitability through customer satisfaction of the customers of textile machinery industry-a study	AMU Library	Research paper (PhD Thesis)	Narasimhan, P L	2015	<ul style="list-style-type: none"> • Customers in Industrial markets are professionally trained and technically qualified • Purchasing decisions are made based on compliance with specifications, cost-effectiveness and dependability of the supply • Functional benefits involving product design characteristics, aspects are attractive to technical personnel • Operational benefits related to product attributes such as reliability and consistency are important to manufacturing and quality control people • Financial benefits i.e., favorable credit terms and cost-saving opportunities are important to purchasing managers

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
7	Customer Satisfaction in a High-Technology Business-to-Business Context	Reposentralen. Universiteteti Oslo	Research paper	Einar W. Aaby Hirsch	2011	<ul style="list-style-type: none"> • Industrial customers are different from consumers in the decision-making process which involves several people, and this issue is often resolved by focusing the customer satisfaction study on the key decision-maker • The different roles in the customer organization influence overall customer satisfaction; purchasing people would likely to give more importance to the commercial aspects than product-related information, while the engineers give more importance to product-related information over the commercial issues • Customer organizations may have very different structures. In one organization the main purchase manager decides which product to purchase, while in another organization this decision can be made by a group, often referred to as decision making units or buying centers • Loyal customers are related to profitability. More specifically the cost of customer retention is lower than the cost of acquiring new customers. It is also considered an important source of competitive advantage

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
8	A study on different factors influencing customer satisfaction on industrial market.	<i>Management Science Letters</i>	Research paper	Shirani, A., Danaei, H., & Shirvani, A.	2014	<ul style="list-style-type: none"> ● The factors considered for the satisfaction of customers in the model were the Price of the product, Quality of the products, Distribution of the product i.e., on time and appropriate delivery, Suppliers' appropriate communication, Trust, Improvement and being responsive, Meeting customers' expectations and Existence of conflict. The effects of the first five variables were positive and conflict had a negative impact on customer satisfaction
9	Are drivers of customer satisfaction different for buyers/users from different functional areas?	Journal of Business & Industrial Marketing	Research paper	Gautam Chakraborty, Prashant Srivastava & Fred Marshall.	2007	<ul style="list-style-type: none"> ● Three major factors affecting customer satisfaction in B2B contexts viz. reliability, product-related information, and commercial aspects ● The dimension 'Reliability' indicates Reliability of the supplier and adherence to delivery schedule ● Technical specifications for products and breadth of product line are considered under the dimension 'Product-related information' ● Competitive prices, credit policy, return policy, and warranty coverage are considered under the dimension 'Commercial aspects'

Sl. No.	Literature Reviewed					Gist of points gained
	Title of paper/ Article	Source: Name of journal/ Magazine /Book, Chapter etc.	Literature Type: Research paper/ Review Paper	Author	Publishing Year	
10	Critical success factors for supplier selection: An Update	Journal of Applied Business Research	Review Paper	S. Hussein Cheraghi, Mohammad Dadashzadeh & Muthu Subramanian	2011	<ul style="list-style-type: none"> • Supplier selection criteria will continue to change with the expansion of excellence • Traditional aspects of performance are Quality, delivery, price, service, whereas non-traditional, evolving ones are just-in-time, communication, process improvement, supply chain management • Flexibility, Consistency, Reliability and Long-Term Relationship are four significant new entrants into the list of critical success factors for supplier selection
11	Customer satisfaction in industrial markets: dimensional and multiple role issues	Journal of Business Research	Research paper	Christian Homburg and Bettina Rudolph	2001	<ul style="list-style-type: none"> • Satisfaction of industrial customers is measured by seven different dimensions such as satisfaction with product, salespeople, product-related information, order handling, technical services, internal personnel and complaint handling
12	Relationship Marketing of Services— Growing Interest, Emerging Perspectives	<i>Journal of the Academy of Marketing Science</i>	Review-paper	Leonard L. Berry	1995	<ul style="list-style-type: none"> • There are three levels of relationship bonding with customers • Financial bond comes first and they include pricing incentives such as discounts during purchases, rewards for repeated purchases etc. • Social bonds come next which involves personalization and customization of the relationship • Structural bonds, which are usually technology-based and the solution to customer's problem designed into the service-delivery system, come in level three

5. Research Gap

It is observed from the review of existing literature that multiple parameters have been identified that influence customer satisfaction. The theoretical framework of the contribution of several factors to customer satisfaction has been established through several studies as indicated in the literature review. However, gaps have been identified in the following areas which necessitate further research:

- a) There is hardly any detailed study done on critical customer satisfaction factors which are specific to carbon black and other industrial chemical products
- b) In most of the literature, few common customer satisfaction factors like price, quality of product and services, distribution of product, complaint handling, technical services, relationship with the customer, brand image etc. have been addressed; but other dimensions, which apparently play a vital role to influence satisfaction of customers of the industrial chemical products, have not been under the purview of these literatures.
- c) Relative importance of the factors in customer satisfaction may vary from one function to another function at the customer end, which is not found to be addressed for industrial chemical products
- d) The significance of these factors in customer satisfaction may vary from one industry to another industry which is not found to be addressed for industrial chemical products

6. Objectives of the Study

From the review of existing literature available on the subject and from the identified research gaps following research objectives have evolved:

1. To identify the factors influencing the satisfaction of carbon black customers in Tyre manufacturing companies and Automotive Rubber Component (ARC) manufacturing companies in India
2. To evaluate the relative importance of factors influencing satisfaction of carbon black customers in Tyre manufacturing companies and ARC manufacturing companies in India
3. To do a comparative analysis of the factors influencing the satisfaction of customers in various functional departments of Tyre manufacturing companies and ARC manufacturing companies
4. To study the applicability of the above factors to influence the satisfaction of customers for other industrial chemical products

7. Research Hypotheses

To achieve the objectives as mentioned in section 6, a set of 21 (twenty-one) hypotheses were formulated based on the nine factors identified in section 2.4 and the applicability of these factors in Tyre manufacturing companies, Automotive Rubber Component (ARC) manufacturing companies and the companies using few other industrial chemical products. Customer satisfaction has been identified as the dependent variable. These non-directional null hypotheses were tested statistically and a conclusion was drawn from the test results.

The hypotheses formulated for this research work are:

- H01: QMS Ensuring Quality of the Product (Carbon Black) does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H02: Packaging of the Product (Carbon Black) does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H03: Price of the Product (Carbon Black) does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H04: Incentives Offered to Customers do not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H05: Order Execution and Delivery of the Product (Carbon Black) do not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H06: Customer Service of the Supplier does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H07: Suppliers' Sustainability Performance does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H08: Company Image of the Supplier does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H09: Product Stewardship of the Supplier does not have a significant role in satisfaction of customers in Tyre manufacturing companies
- H010: QMS Ensuring Quality of the Product (Carbon Black) does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H011: Packaging of the Product (Carbon Black) does not have a significant role in satisfaction of customers in ARC manufacturing companies

- H012: Price of the Product (Carbon Black) does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H013: Incentives Offered to Customers do not have a significant role in satisfaction of customers in ARC manufacturing companies
- H014: Order Execution and Delivery of the Product (Carbon Black) do not have a significant role in satisfaction of customers in ARC manufacturing companies
- H015: Customer Service of the Supplier does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H016: Suppliers' Sustainability Performance does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H017: Company Image of the supplier does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H018: Product Stewardship of the Supplier does not have a significant role in satisfaction of customers in ARC manufacturing companies
- H019: There is no significant positive association between the rankings of factors influencing the satisfaction of customers in Tyre manufacturing companies and ARC manufacturing companies
- H020: There is no significant positive association between the rankings of factors influencing the satisfaction of customers in different functions of Tyre manufacturing companies and ARC manufacturing companies
- H021: There is no significant positive association between the rankings of factors influencing the satisfaction of customers of different industrial chemical products

8. Research Methodology

The research methodology i.e., the research design, the sources of data, the sampling design applied for this research, research instruments opted for data collection are described in the following sub-sections. Various analytical tools which are used for the analysis of the collected data to arrive at the conclusions are also explained.

Statement of the Problem

The present study aims to give insight to the manufacturers of industrial chemical products to serve their customers in a better way. While identifying different factors to influence the satisfaction of industrial customers of various chemical products, the availability of literature is not as adequate as with consumers. Whatever studies are available, appear to be sketchy and do not adequately address the industrial chemicals products.

It is not clear whether the customer satisfaction factors identified in the literature survey are all applicable to industrial chemical products or whether there can be some other factors that are typical of industrial chemical products.

It is also not clear from the existing literature, whether there is a resemblance or difference in the relative importance of each of the customer satisfaction factors among different functions like R&D, QA, Production, Purchase, and Technical functions of customers' organizations using industrial chemical products, because different roles in the customer organization may influence overall customer satisfaction as mentioned by Einar et al. (2011).

The significance of these factors in customer satisfaction may vary from one industry to another industry which is not found to be addressed for industries like Tyre manufacturing, Automotive Rubber Components manufacturing, Carbon Black manufacturing etc.

It is also not clear whether other dimensions which apparently play a vital role, are applicable to carbon black and other industrial chemical products.

Under the above circumstances, this study will be concentrating on and around different factors which influence the satisfaction of customers of carbon black and other industrial chemical products with their suppliers specifically in the Indian context. Prioritization of these factors to help the companies in making a proper strategy for improving Customer satisfaction level which in turn will influence the buying behaviour of these Customers for raw materials like carbon black and other industrial chemical products viz. Sulphuric acid, Hydrochloric acid, Sodium Hydroxide, Sodium Silicate, Rubber Process Oil (RPO), Zinc Oxide, Sulfur, Stearic Acid, Potassium Nitrate and Potassium Carbonate.

Research Design

Overall research design decision consists of a) The sampling design i.e. the procedure to be adopted in selecting the items and the number of items to be included in the sample b) The observational design i.e. the conditions under which the observations are to be made c) The statistical design i.e. the number of items to be observed and the procedure of analyzing the information and data collected d) The operational design which is related to the techniques of implementation of the procedures specified in the sampling, statistical and observational designs.

Kothari et al. (2014) opined that most of the social research comes under descriptive research studies. Descriptive research is concerned with finding out who, what, where, when, or how much (Cooper et al., 2012). According to Sekaran et al. (2016), descriptive study is involved in the collection of data that describes the topic of interest. It may be either quantitative in

nature involving the collection of quantitative data such as satisfaction ratings, demographic data etc., or it may be qualitative in nature entailing the collection of qualitative information such as data to describe how consumers go through a decision. It may also include correlational studies to describe relationships between variables. It helps researchers to think systematically about the aspects of a given situation like the factors related to job satisfaction. Since the purpose of the current study is to identify the factors which can influence the satisfaction of customers for industrial chemical products, a descriptive research design has been adopted as it is deemed to be the most appropriate.

Research Sampling and Data Collection

The target population (sources of data) for the current study are the industrial customers chosen from the following manufacturing companies in India

- Major Tyre manufacturing companies across India
- Major Automotive Rubber Component (ARC) manufacturing companies across India
- Lead–Acid Battery manufacturing company in India
- Precipitated Silica manufacturing company in India
- Steam power plants (CPP) in India
- Carbon Black manufacturing company in India

The manufacturing companies mentioned above are not confined to a particular region in India, rather these are spread across India. The chemical products procured by these companies, which were considered for the present study are as follows:

Carbon Black, Hydrochloric Acid, Sulphuric Acid, Sodium Hydroxide, Zinc Oxide, Stearic Acid, Sulphur, Rubber Process Oil (RPO), Potassium Carbonate, Potassium Nitrate, Sodium Silicate

Target respondents were chosen by using a non-probability purposive sampling method in which samples are chosen arbitrarily by the researcher based on the qualification and experience of the respondents on working with industrial chemical product manufacturing companies. These respondents are conveniently located and reached for the survey. The inclusion criterion for the participants was the minimum qualification of graduation and industrial working experience of at least two years so that they are better placed to identify business factors that might have boosted their satisfaction levels and shaped their buying behaviour. There was no restriction on the rank or designation of the respondents.

To carry out the study for ascertaining the relationships of customer satisfaction with the variables identified in the conceptual framework, quantitative and qualitative primary data collection is proposed to be done using survey questionnaires. The questionnaire was used because it is economical, structured and appropriate to capture primary data to test the hypotheses formed and to answer the research questions. The instruments of data collection involved administering pre-tested structured questionnaires and conducting face-to-face or telephonic interviews, as deemed convenient, with the respondents to clarify the questions and capture additional insights. Given the resource constraint and time limitation on the part of the researcher, a questionnaire was also sent via email to the customers of the different business segments of the industry.

Secondary data were collected as per requirement from annual reports of the company, trade journals, business magazines and other publications, wherever possible.

A pilot survey was conducted to simulate on a small scale of the main survey which indicates the opportunity for improvements, if any, in the questionnaires and also in the survey techniques. Responses were collected from around 10% of the samples considered for the final survey. Based on the experience gained in the pilot survey, feedback from the customers, analysis of data collected during the pilot study and the discussion with the professionals of these industries, the questionnaire was improved for the collection of data in the final survey with maximum factual accuracy.

The customer satisfaction factors identified for the final survey are the Price of the Product, Incentives offered to customers, QMS ensuring Quality of the Product, Packaging of the Product, Order execution and delivery of the product, Customer service of the supplier, Company image of the supplier, Suppliers' Sustainability Performance, Product stewardship of the supplier. The respondents were also asked to indicate any other factor which, as per their opinion, can influence the satisfaction of customers of industrial chemical products.

9. Data Analysis

The factors that emerged in the questionnaire for collection of responses were tested for inter-item correlation within each of the factors using Cronbach's alpha. Since all these factors resulted in a Cronbach's alpha of 0.7 or more, these factors and their constructs can be considered as reliable and therefore useful for further analysis as part of a specific variable.

Harman's single-factor (one-factor) test, the most common statistical approach to test for Common Method Bias (CMB), was then used to check the existence of Common Method

Bias which may threaten the validity of the conclusions about the relationships between measures. Since the total variance extracted by a single factor was found less than the recommended threshold of 50%, we can say there is no problem of common method bias in the data set collected from the respondents of Tyre manufacturing companies and ARC manufacturing companies.

The data was first presented in tabular form representing the different responses' given by the respondents. The feedback received was analyzed by using statistical techniques with the help of software package like SPSS (Version 23), Excel etc.

The number of independent variables in the regression model was assessed by estimating Adjusted R- Square Value for Tyre manufacturing companies and ARC manufacturing companies.

The values of VIF (Variance Inflation Factor) were determined for all the identified factors in both the cases of Tyre manufacturing companies and ARC manufacturing companies to determine whether there is co-linearity between the predictor variables. It is known that the co-linearity between the predictor variables is not a matter of concern if the VIF values are lower than 10.0, which means these factors influence customer satisfaction independent of each other.

Hypotheses on the significance of each of the nine different factors were then tested by regression analysis and finding the value of 'p' in each case for Tyre manufacturing companies and ARC manufacturing companies.

The hypothesis on the ranking of the factors was then tested by estimating the value of the Standardized Regression Coefficient (Beta). It is known that the degree of the impact of the predictor variable on the dependent variable increases with the increase in the value of Beta.

Spearman correlation coefficients were then measured on the ranking of customer satisfaction factors in both the sectors i.e., Tyre manufacturing companies and ARC manufacturing companies to test the hypothesis on significance of the difference in prioritization of factors influencing satisfaction of customers in these two sectors. Critical value for Spearman's Rank Correlation Coefficient (r_s) for 9 pairs of data ($n=9$) at 0.05 level of significance was determined using the standard formula. The Spearman correlation coefficients, if found less than the critical value at 0.05 level of significance, indicate there is no significant positive association between the rankings of customer satisfaction factors as per the opinion of respondents from Tyre manufacturing companies and ARC manufacturing companies and reverse will be the case if Spearman correlation coefficients are found higher than the critical value.

Correlation of the rankings of the identified factors as derived from the weightages given by the respondents from different functions of Tyre manufacturing companies and ARC manufacturing companies was estimated to test the hypothesis on the significance of the difference in prioritization of the factors influencing satisfaction of customers of different functions in these two sectors. In case the number of responses from the two functions viz. Production and R&D are less as compared to the numbers of respondents from other functions, respondents of similar functions based on their nature of job were clubbed together e.g., respondents of Technical and Production functions were clubbed together, respondents of Quality Assurance and R&D functions were clubbed together while Purchase function is kept alone. Spearman correlation coefficients were then measured on the ranking of factors influencing the satisfaction of customers of different functions in tyre manufacturing companies and ARC manufacturing companies. The Spearman correlation coefficients, if found less than the critical value at 0.05 level of significance, indicate there

is no significant positive association between the rankings of customer satisfaction factors as per the opinion of respondents from different functions of Tyre manufacturing companies and ARC manufacturing companies and reverse will be the case if Spearman correlation coefficients are found higher than the critical value.

Correlation of rankings of the identified factors as derived from the weightages given by the industrial customers of various chemical products viz. Carbon Black, Zinc Oxide, Stearic Acid, Sulfur, Sulphuric Acid, Sodium Silicate, Hydrochloric Acid, Sodium Hydroxide, Potassium Carbonate, and Potassium Nitrate were estimated to test the hypothesis on the significance of the difference in prioritization of factors influencing satisfaction of customers of different industrial chemical products. Spearman correlation coefficients were then measured on the ranking of factors influencing the satisfaction of customers of industrial chemical products. The Spearman correlation coefficients, if found less than the critical value at 0.05 level of significance, indicate there is no significant positive association between the rankings of customer satisfaction factors as per the opinion of different industrial chemical products and the reverse will be the case if Spearman correlation coefficients are found higher than the critical value at 0.05 level of significance.

On analyzing the data, hypotheses formulated earlier were tested through various statistical tools as explained.

Credibility of Research Findings

In the current study, data collection and analysis followed the methods applied in similar types of research using similar types of information and measurement scales. The reliability of data was ensured by subjecting the data to a reliability test in the statistical software package. The name of the respondent was kept optional in the questionnaire and the

respondents were given adequate time to respond to the questionnaire to eliminate the possibility of errors or biases related to the respondent.

The findings of the main survey have been placed before a group of industrial experts to validate these findings. This ensured that identified customer satisfaction factors for industrial chemical products and the relationships between the rankings of factors were endorsed.

10. Findings and Conclusions:

Customer centricity is the key to success for any business organization, and improving the satisfaction of customers is an important goal of business practices today. With this background, the findings of this research work provide several key insights for company managers. Specifically,

- a) The factors which were found to have a positive impact on the Overall Satisfaction of customers in Tyre manufacturing companies are QMS ensuring Quality of the Product, Order Execution and Delivery of the Product, Product Stewardship of the Supplier, Packaging of the Product, Customer Service of the Supplier, Suppliers' Sustainability Performance and Price of the Product. Whereas the factors which were found with no positive impact on the Overall Satisfaction of customers in Tyre manufacturing companies are Incentives Offered to Customers and, Company Image of the Supplier
- b) The factors which were found to have a positive impact on the Overall Satisfaction of customers in ARC Manufacturing companies are QMS ensuring Quality of the Product, Price of the Product, Incentives Offered to Customers, Customer Service of the Supplier,

Order Execution and Delivery of the Product, Product Stewardship of the Supplier. Whereas the factors which were found with no positive impact on the Overall Satisfaction of customers in ARC Manufacturing companies are Suppliers' Sustainability Performance, Packaging of the Product, and Company Image of the Supplier.

- c) Prioritization of the factors shows that QMS ensuring the Quality of the Product comes at the top in influencing the satisfaction of customers for both Tyre manufacturing companies and ARC manufacturing companies. However, it is quite evident that the degree of significance of the rest of the factors investigated was found to vary from one group of customers (Tyre) to another group of customers (ARC). There is a significant difference in the prioritization of factors influencing satisfaction of customers in Tyre manufacturing companies and ARC manufacturing companies as evidenced from the Spearman correlation coefficients
- d) No other critical factor, apart from the aforesaid ones, which can influence their satisfaction, was suggested by the respondents. It indicates all the respondents agree that these factors, as described above, can ensure their satisfaction with the supplier.
- e) Responses were collected from the different functions viz. Purchase, Technical, Production, Quality Assurance, and R&D of both Tyre manufacturing and ARC manufacturing companies. It was observed that the number of responses from the Production, R&D, Technical and Quality Assurance functions is less as compared to the number of responses from the purchase function. Respondents from similar functions based on their nature of jobs are clubbed together. Thus, respondents from the Technical and Production functions are clubbed together, respondents from the Quality Assurance and R&D functions are clubbed together while respondents from the Purchase function

are kept alone.

- f) The difference in prioritization of customer satisfaction factors, whatever is small observed among respondents of different functions of tyre manufacturing companies, can be explained according to Sheth (1973, p. 52) who mentioned that each function has unique interests and orientations and therefore, each of them may consider different criteria in judging a supplier. According to Einar et al. (2011), the different roles in the customer organization influence overall customer satisfaction; purchasing people are likely to give more importance to commercial aspects than product-related information, while engineers give more importance to product-related information over commercial issues.
- g) It is also observed from Spearman's Ranking Correlation Coefficients, that there is a significant positive association among the ranking of customer satisfaction factors as per opinion of respondents from Purchase function, Technical and Production Functions, R&D and QA function of Tyre manufacturing companies.
- h) We cannot find any difference in the prioritization of customer satisfaction factors as per the opinion of respondents of different functions of ARC manufacturing companies. However, the weightage given to different factors by these respondents varies to some extent.
- i) Thus, it is evident there is no significant difference in prioritization of satisfaction factors among the customers in different functions of Tyre manufacturing companies and ARC manufacturing companies.
- j) Factors which can influence the satisfaction of customers of industrial chemical products are the same for all the chemical products, only the degree of significance of these factors is found to vary from one customer to another customer to some extent

- k) Among the nine factors under investigation, ‘QMS ensuring Quality of the Product’ is recognized as the most significant factor in influencing satisfaction of customers of all the industrial chemical products under study. It indicates that customers are also of the opinion that Quality cannot be compromised for any other factor and consistent quality can be ensured through the development of the system. Quality requirements for a chemical product may vary from one customer to another customer depending on the application. So, companies need to work meticulously to develop and implement QMS in fulfilling the specific requirement of their customers on the quality of product consistently
- l) ‘Order Execution and Delivery of the Product’ is considered as the second or third priority for the customers as any deviation from the agreed delivery schedule (quantity and time) may impact production at customer end which may result in failure in delivery schedule for their customers; thus, suppliers need to ensure On Time In Full (OTIF) quantity of delivery
- m) ‘Customer Service of the Supplier’ which includes resolution of complaints, response time, technical support in improvement of product performance at customer end etc. is also considered with the higher ranking (3rd or 4th) as usual to shape customer satisfaction; so, the suppliers should ensure salespeople are knowledgeable enough to capture the specific requirements by interacting with the customers and respond on time and they should be backed by knowledgeable technical people to provide technical support as per requirement of customers
- n) Higher ranking (5th rank) of ‘Product Stewardship of the Supplier of the Chemical Product’ as per opinion of most of the customers reflects rising concern about the safety aspects and environmental impact of the product; Substances of Very High

Concern(SVHC), PAH etc. in the industrial chemical product is a matter of global concern from Environment (one of the pillar of ESG) point of view and so, the restriction of these hazardous substances in the chemical product by working on the use of environment friendly raw material and improvement in manufacturing technology must be in the priority list of suppliers

- o) 'Packaging of the Product' is also considered in the list of important factors (6th for carbon black and 4th for other chemicals) influencing satisfaction of customers which necessitates suppliers to ensure the basic requirements of cleanliness and zero leakage at the time of receipt of product at customer end, weight of each bag within the acceptable limit and identification visibility.
- p) 'Price of the Product' occupies comparatively lower ranks than 'QMS Ensuring Quality of the Product' as per opinion of most of the customers indicating that customers are not interested in compromising Quality for Price; however, there are some customers who opined for higher ranking (2nd for carbon black and 6th for other chemicals) of 'Price of the Product' as they look for lower price of raw material to reduce the cost of production which ultimately impact the bottom line of their business
- q) 'Suppliers' Sustainability Performance' which fulfils the criteria of 'Sustainable Procurement' for the customers, occupies 7th rank as per opinion of most of the customers. Sustainability performance is gaining momentum with the disruption in the usual balance of nature and the worsening effect of our activities on climate change. All the manufacturing industries are being encouraged to adopt the practice of reducing, reusing and recycling non-biodegradable materials and natural resources, implement Water, Energy, Solid Waste and Green House Gas management systems and publish sustainability reports (e.g. GRI based reporting), implement Environment Management

Systems and Occupational Health and Safety Management Systems, and to take actions to mitigate Environmental, Social and Governance (ESG) related risks. Customers have started pushing their suppliers to improve their ESG performance

- r) Company Image of the Supplier' which describes the industry leadership of the supplier, competency in meeting specific requirements of customers consistently, having a loyal customer base, having speed and agility in responding to market needs etc. occupy comparatively lower rank as per opinion of most of the customers indicating that these parameters may be attractive for the new customers, but the existing customers are more interested in fulfilling the requirements as described above
- s) Most of the customers are least interested in favorable credit terms, discounts, rewards etc. which is reflected by the lowest ranking of Incentives Offered to Customers as per the opinion of most of the customers

Experts endorsed that the identified factors which can influence the satisfaction of customers of industrial chemical products are adequate. On the other hand, the findings on the difference in ranking of the customer satisfaction factors among Tyre manufacturing companies and ARC manufacturing companies were explained and established by the experts. The finding on the positive correlation of the rankings of satisfaction factors among the customers of different functions of Tyre manufacturing companies and ARC manufacturing companies was also endorsed by the experts. Finally, the positive correlation of the ranking of satisfaction factors among most of the customers for different industrial chemical products was also established by the experts.

The prioritization of the identified factors will help the suppliers in making a proper strategy to fulfil the requirements or expectations of their customers and thereby improve the satisfaction level of these customers, which in turn will influence their loyalty and buying behaviour for raw materials like carbon black and other industrial chemical products.

Moreover, though the influence of the sustainability factor is found to be less on overall customer satisfaction in this particular study, it is now getting global attention. It may be mentioned that it is a new dimension added in this research work and it may be an important consideration in subsequent research as it gains more importance and is understood from a proper perspective, especially for the chemical industry.

11.Limitations of the Research

Despite the utmost care taken in every stage of current research, there are some scopes of improvements, which are also potentially fruitful areas for further research.

- It is very difficult to establish a fundamental relationship between variables from the current study as it is of cross-sectional type involving the collection of data at a specific point of time (as mentioned in Chapter 5, data were collected during the period from 2019 to 2021) and thus presents a static view of the relationship
- Another potential limitation of the current study is that the sample was drawn from a single country (i.e. India), which introduces a risk of generalization.
- The current study dealt with only one side of the supplier-customer relationships i.e. respondents were selected from the customer end only and it could have been collected from the supplier end also (dyadic perspective)

- In the current study, different factors influencing the satisfaction of customers were considered holistically and in doing so, some of the major aspects of each of these factors might have been missed

12.Recommendation for Future Research

The quest for knowledge, solutions to problems and research questions leading to continual improvement in the quality of research results in the progress of human civilization. Whereas the limitations of current research are highlighted in the previous section, an outline for future research to pursue, in the domain of customer satisfaction for industrial chemical products, is given below.

- To establish the fundamental relationship between variables as speculated in the present cross-sectional study and to increase confidence in the nature and power of theory, the research can be replicated over several periods in terms of a longitudinal study by assessing how the relative importance of the satisfaction factors changes over time; for example, several targets were announced in COP 26 at Glasgow summit in November,2021 to mitigate climate change and thereafter awareness on sustainability is increasing day by day which may impact the ranking of satisfaction factor on sustainability
- Future research could benefit from verifying the generalization of our findings in more diverse settings i.e., in other countries as the awareness about sustainability may be more in developed countries which may impact the ranking of the factors influencing satisfaction of the customers

- The current study focuses only on the customer; future studies may be done from a dyadic perspective by incorporating data collected from the respondents of both suppliers' organization and customers' organization
- In the future, there is a scope to conduct a study by capturing the opinion of customers of a single industrial product on the different aspects of one particular factor e.g. different parameters of quality of that particular product to influence customer satisfaction or different parameters of ESG to influence customer satisfaction and so on
- Future research could also focus on samples consisting of 'real' loyal customers and estimate the effect of customer satisfaction on increase in the market share in the domain of loyal customers and on the retention of customers
- The study could be replicated in different industries, other than those already studied in this research, to complement this study
- Future study could be conducted to examine how pull factors affect customer satisfaction
- Future research could also focus on some of the challenges faced by the marketing teams of these industrial chemical products in their quest to ensure that their organizations attract and retain customers.

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