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Publication of Artha Beekshan, the quarterly referred journal of Bangiya Arthaniti Parishad, that is, the Bengal Economic Association, is one of the most important academic activities of the Association. The present volume, Volume 34, No. 3 & 4 of the Journal, contains the papers contributed by scholars. We are thankful to the authors and members who have helped in one way or other in the preparation of this volume.

I would like to extend my whole-hearted thanks to the Editorial team, the Publisher, and all who have helped in the publication process, and especially the office bearers of Bangiya Arthaniti Parishad for their kind endeavors to make this issue of Artha Beekshan viable and Kolkata Mudran for bringing out the present issue.

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Performance of Handloom Industry in India- an Overview

Soumy Mandal¹

Abstract

The Indian textile industry describes the rich and diversified culture heritage of the country. It provides livelihood and employment to millions of weavers, craftsmen, and allied workers of these neighboring countries. Through this research paper on handloom sector under the purview of textile industry in India, we intend to analyze the performance of handloom sector.. After evaluating the performance, we have identified some basic problems of handloom sector. Thereafter, we have suggested some measures to provide sustainable economic growth of this sector.

Keyword: Textile industry, Handloom Sector, Public Sector, Private sector, Performance ,analysis

Section I

INTRODUCTION:

History of handloom industry is as old as human civilization, and “The Indian handloom industry” is well known for its rich cultural heritage and unique craftsmanship. This legacy of Indian handloom industry is still continued through various GI tag products like- (Muga Tashar from Assam, Jamdani share from west Bengal) of different state. This years old household base industry is the second largest employment provider of India. As per 2019-‘20 handloom census report 35.22 lakh workers are engaged with this activity.

At present, textile Industry of India is categorised in the following ways:

1. NATURAL FIBERS/FEBRICS

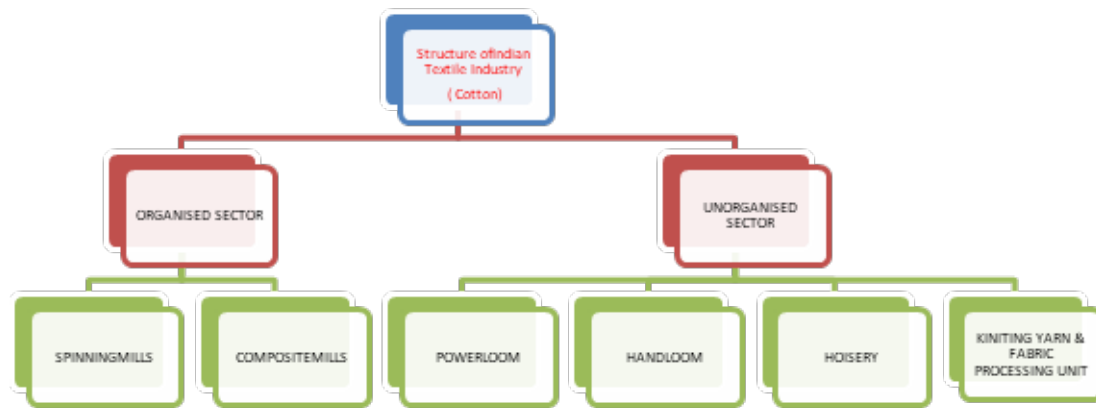
- **WOOL**
- **JUTE**
- **SILK**
- **COTTON***

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2. MAN-MADE FIBERS/FEBRICS

- **REYON (cellulose)**
- **BLENDED(synthetics+ Natural)**
- **SYNTHETICS (Nylon,PET,PAN)**

Now the cotton segment is again classified in two major part , one is organised sector that includes spinning mills and composit mills. On the other hand unorganised sector is composed with four majore segment- Powerloom, Handloom, Hoiseary and Kiniting yarn & fabric.



Source: Ministry of Textile, PIB, Economic survey

LITERATURE REVIEW

The survey of literature plays an important role in establishing the back-drop for any research work in social science. It is felt that the justification of the present study can be clarified by reviewing the following literature on the subject.

Dr. Nabanita Pal(2024) in her research paper “A Study on Contribution of Handloom and Cotton Industry in Indian Economy” discuss about the strategies of handloom sector to cope up with the worldwide changing competitive environment. The glorious past and tragic present of Bangladesh handloom industry haven discuss by *Jahan(2021)* sector-wise as well as product-wise. Similarly *Aggarwal et al, (2010)* analysed the elementary problems faced by customers, retailers and weavers of the handloom products in the state Assam, India. According to the study, the availability of products, improvement

in the quality and durability of colours and innovative design were a few of the challenges. From the organized sector of Indian handloom industry, it is clear that- over the decades, the experience of handloom co-operatives has been a mixed one, the arbitrary mergers, excessive control by master weavers and local power groups, politicization and bureaucratization and mismanagement of funds, were some factors that obstructed the efficient functioning of co-operatives(*Dharma raju ;2006*). Again *Patil (2005)* served handloom industry, and dealt with state wise weavers under different categories, focusing on technological problems. The glorious past of handloom industry as well as the different problems of handloom industry in West Bengal, India are discussed as a whole by *das, (2001)*. He provided some suggestions regarding the problems. He also presented a picture of socio-economic condition of weavers in West Bengal and compared them with other states of India.

From the above literature review it has been found that a few studies have been made on the problems of textile industries in different parts of India but no study has been found to be made on identifying the performance of public sector firm and private sector firm in textile industry region A The study seeks to analyse the performance of public sector firm and private sector firm in Indian context, with the help of different annual report, census report etc.

OBJECTIVES OF THE STUDY

The preliminary objectives of the study is to analysis the performance of handloom sector under textile industry as a whole. To fulfil the above objectives the study is intend to evaluate the Performance of handloom sector in India.

RESEARCH METHODOLOGY

This paper is based on secondary data. The required data & information has been collected from different website Government of India web side, academic research papers, journals and books. The data is arranged, categorised, tabulated and analysed by representing various table, chart and diagram.

The following data have been collected from national and international journals, websites, ministry of commerce & industry, National Textile Corporation LTD. (NTCL), National Handloom Development Corporation (NHDC) Handloom Export Promotion Councils (HEPC), and different reputed books.

In this paper I would like to analysed the contribution of handloom sector in Indian Economy during the last five years from 2017-18 to 2021-22. Sales turnover, Profit Before Tax (PBT) and export share of handloom sector in overall Textile Industry.

SECTION: II

Economic Condition of Handloom Sector in India:

Handloom sector is one of the major players of overall Indian textile industry. The sector has its significant contribution in textile industry as well as in Indian economy. one of the important features of handloom sector is its- dualistic structure which include organised sector (i.e co-operative units) and decentralised small –scale segment (i.e weavers mahajon, individual weavers). As per 4th handloom census following is the table of employment status wise weavers classification.

Table 1: NO. OF HANDLOOM WORKERS BY EMPLOYMENT STATUS

STATE	INDEPENDENT WEAVERS	UNDER MUSTER WEAVERS	UNDER KHADI& VILLAGE INDUSTRIES COMMISSION/BOARD	UNDER STATE HANDLOOM DEVELOPMENT CORPORATION	UNDER CO-OPERATIVE SOCIETY	TOTAL
ASSAM	12,67,047	12,348	1,304	2,097	1085	12,83,881
WEST BENGAL	2,65,082	3,35,116	3,894	9,406	17,949	6,31,447
MANIPUR	2,16,859	6,991	101	230	503	2,24,684
TRIPURA	1,31,754	3,589	430	1,088	778	1,90,957
AP	74,737	85,528	462	1,719	15,001	1,77,447
UP	99,997	79,540	271	347	10,802	1,37,639
ODISHA	81,629	24,119	51	320	11717	1,17,836
OTHERS	4,39,939	1,36,829	8,631	7,643	1,65,579	7,58,621
ALL INDIA	25,77,044	6,84,060	15,144	22,850	2,23,414	35,22,512

Source: 4th census report

The Indian handloom sector is one of the major component in Indian textile industry. The sector has its significant contribution in textile industry as well as in Indian economy. The handloom sector is the 2nd largest domestic (household base) employment generating sector, as per 4th census report most of the Hindu religious back ward community peoples engaged in this sector (Table:2).

Table :2 Number of handloom worker households by social group

Sl no.	Social group	Total (in lakhs)	Percentage (%)
1	Scheduled castes (SCs)	4, 48,737	14.3%
2	Scheduled tribes (STs)	6,01,661	19.1%
3	Other backward class (OBCs)	10,55,882	33.6%
4	Others	10,38,559	33.0%
	Total	31,44,839	100%

Source: 4th census report

One of the important characteristic of handloom sector in its – dualistic structure which include organised sector (i.e Co-operative units) and decentralised small-scale segment (i.e individual and muster weavers) in weaving, knitting and apparel/garment –marketing along with multiple stage controlling(vertically integrated) large-scale composite mill segment (spinning and weaving)(table1). Handloom sector is mainly domestic oriented sector with cotton and silk as their primary raw material.

The textile industry has been very crucial for India's economic growth. Since India trade all over the world of clothing and textiles. The GDP (gross domestic product) of India affected by the contribution of textile industry. It is the second largest exporter of textiles and clothing, and in the fiscal year 2022, the exports stood at US\$ 44.4 billion. India is the world's largest producer of cotton. In the year October 2021-September 2022, the production stood at 360.13 lakh bales for the crop. At present textile industry (including Handloom sector) contributes 2.3% to Indian GDP.#

In the year 2020-21, 1.13 million tonnes of cotton yarn were exported from India. The textile industry in India has also witnessed a spurt of investment not just from our own country but also from several foreign countries and companies. From April 2000-December 2021, the industry (including dyed and printed) attracted Foreign Direct Investment (FDI) worth US\$ 3.93 billion.

The export earnings of handloom sectors is 1178.39 crore in the financial year 2024-25 as per handloom export promotion council.(table: 3)

From the table:3 it is clear that the organization is recovering its earnings than last two years 23-24 and 22-23. In the year 21-22 the growth rate of handloom products are in negative side, although the sales turnover is increased by Rs.226.52 cr. than previous year.

Table:3 Exports Earnings of Handloom Products Durig Fy: 2012-'13 To 2024-'25

YEAR	AMOUNT (INCR.)	Growth Rate(%)
2012-13	2811.97	0
13-14	2233.11	-21%
14-15	2246.48	1%
15-16	2353.33	5%
16-17	2392.21	2%
17-18	2280.15	-5%
18-19	2392.39	5%
19-20	2248.33	-6%
20-21	1644.78	-27%
21-22	1987.63	21%
22-23	1445.53	-27%
23-24	1146.33	-21%
24-25	1178.39	3%

Source: national handloom Development Corporation, ministry of commerce & industry.

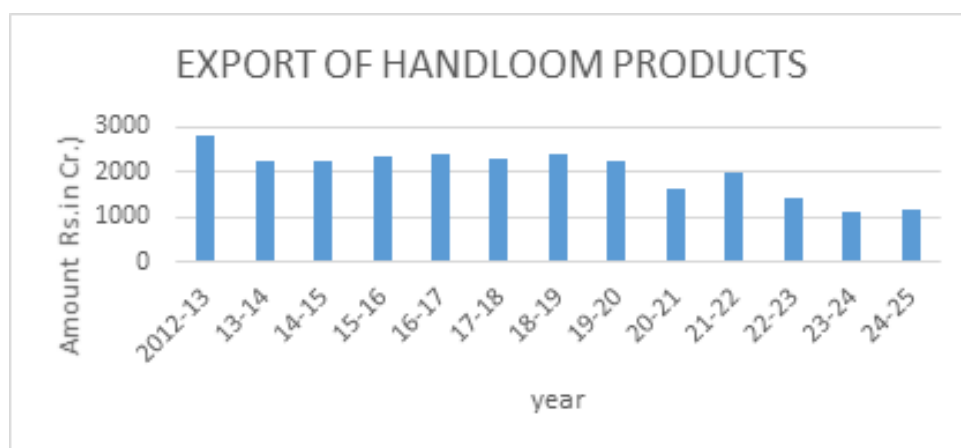
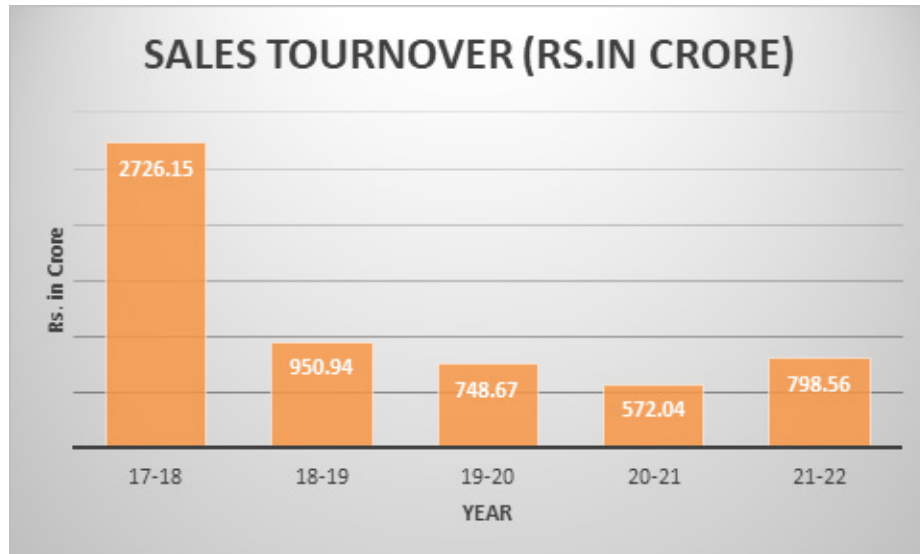
Fig:1

Fig: 2 Sales turnover of handloom sector

Source: handloom export promotion council

Performance of handloom– An empirical study.

In our study we have selected National Textile Corporation Ltd.(NTC) and National Handloom Development Corporation (NHDC) the reputed public sector organization under Ministry of Textile, Government of India.

Table4: Year wise sales turnover and profit before tax of NHDC.

(amount in Lakh)		
YEAR	TURNOVER	PBT
2016-17	299351.79	4654.1
17-18	272614.73	3538.22
18-19	95093.59	-1586.77
19-20	74866.74	-1113.18
20-21	57203.63	-981.28
21-22	79856.28	-263.62
22-23	116948.44	650.6
23-24	122676.69	552.67
24-25	121296.66	-475.86

Source: annual report of NHDC

From the above table it is clear that – the organization is suffering for loss in the year 2024-25, but from the year 20-21 and 21-22 it reduce its amount of loss. In 22-23 it incurred profit of Rs.650.6 cr but again in 23-24 it reduced to 552.67 cr.

Table:5 Year wise sales turnover and profit before tax of NTCL

YEAR	(amount in Lakh)	
	TURNOVER	PBT
2016-17	116849.57	97,315.63
17-18	1,06,626.74	-30,693.52
18-19	1,08,184.72	-31,464.64
19-20	85,041.62	-34,655.47
20-21	85,041.62	-34,077.75
21-22	14,814.65	-34,180.74

Source: annual report of NTC

From table 5 we can say that – this organization also incurring loss from the year 2017-18 to 2021-22, although the loss amount does not show any huge fluctuation during these years.

NTC has 23 mills with obsolete technology and has remained non -operational. Notably it has 7,825 employees working /on the rolls at its mills.

Inter-ministerial consultation are under way on the likely closure of the ailing NTC. As per media report, NTC’S land may be monetised.

Unavailability of working capital and other financial constrains are the main reasons causing the operations in all NTC mill units to remain under suspension now.

Though NTC made profits due to monetisation of of land in FY’17 it has been incurring operational losses since FY’17.Rs. 1,646 crore has been spend on the modernisation of its mills under the revival scheme. However, despite such an infusion of funds the corporation has not been operationally profitable, partly due to rise in raw material costs.

Employees are being paid wages and statutory dues as per mutual agreement between the management and representing workers of the mill.

Arvind Limited

Arvind Limited (formerly Arvind Mills) is a textile manufacturer and the reputed company of the Lalbhai Group. Its head office are situated in Naroda, Ahmedabad, Gujarat, India. The company starts its business in the year1897.The company manufactures cotton shirting, denim, knits and bottom weight (khaki) fabrics. It has also recently

ventured into technical textiles when it started Advanced Materials Division in २०११. It is India's largest denim manufacturer.

Sanjaybhai Lalbhai is the current Chairman and managing director of Arvind and Lalbhai Group. In the early 1980s, he led the 'Reno-vision' whereby the company brought denim into the domestic market, thus starting the jeans revolution in India.

At present the have various retail own brands like Flying Machine, Newport and Excalibur and licensed international brands like Arrow, Tommy Hilfiger, and Calvin Klein through its nationwide retail network. Arvind also runs three clothing and accessories retail chains, the Arvind Store, Unlimited and Megamart, which stocks company brands. . As per BSE Sensex report- this is the top selling textile company in 2019-'20, with revenue Rs. 7,229 Cr.

Table: 2.2 Year-wise Profit Before Tax (PBT) :

ARVIND LTD.	
YEAR	PBT(Rs.in cr)
23-24	404.05
22-23	414.18
21-22	111.94
20-21	56.04
19-20	250.11
18-19	243
17-18	291.61
16-17	382.64

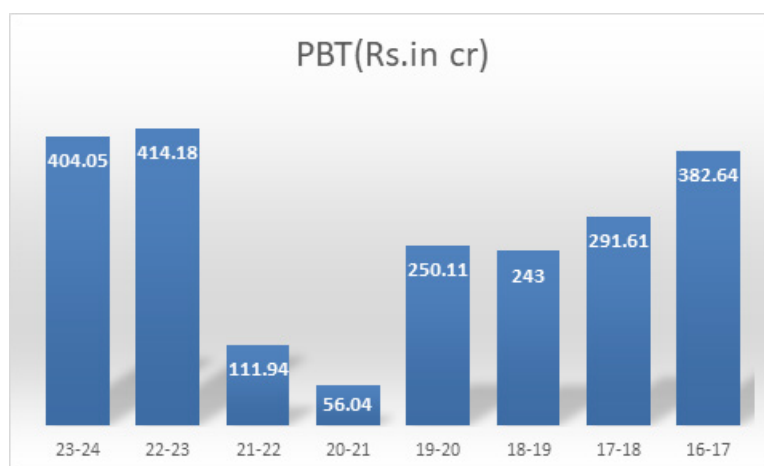


Fig: 3

From the above table it is clear that in the FY '17-18 Arvind ltd also facing some negative fluctuation of profit due to demonetization. Again in FY 20-21 the share of profit remarkably decrease due to pandemic situation. After that in the year 21-22, 22-23 and 23-24 the firm is making its usual percentage of profit. Otherwise this private sector firm is making profit consistently but the rate of profit is fluctuating.

Findings

After previous analysis we can say that –handloom sector enterprises are not doing well due to the following reasons-use of obsolete technology, which is making constraints in product diversification of the organization. Not only that lack of market research, poor customer relationship, improper or ineffective way of using govt. scheme making the public sector enterprises a loss making mechanism.

On the other side private sector organizations are making profit constantly with their modern technology, efficient management personnel, expert marketing task force, variety of product range. The study can provide valuable insights into problem-solving and may be able to contribute with effective policy formulation. It can also be used to leverage efficiencies, expand management understanding of matters and support with decision-making.

Conclusion & Recommendation

Indian handloom sector now a day going through different changes. Central and different state government are taking different initiatives to revive these years old weaving heritage. National Handloom Development Programme (NHDP), Handloom Weavers' Comprehensive Welfare Scheme (HWCWS), Comprehensive Handloom Cluster Development Scheme (CHCDS), Yarn Supply Scheme (YSS), Marketing Incentive Component, Weavers Mudra Scheme there are some govt. scheme to improve the performance of this sector.

But the major problem of this sector is lack of awareness, majority of the weavers are not aware regarding these schemes.

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Sustainability and Profit: Evaluating the Connection Between ESG and Financial Performance

Srijita Mandal¹

Abstract

Environmental, social, and governance (ESG) practices and their effects on corporate financial performance (CFP) have received more attention because to the increased focus on sustainable development. In order to evaluate the directional and economic impact of ESG on financial outcomes and identify important mechanisms—such as green innovation, stakeholder capital, and governance quality—through which ESG creates value, this study investigates the relationship between ESG practices and CFP. The study synthesizes information from a variety of empirical studies, including meta-analyses, recent systematic reviews, and panel data research across established and emerging economies, using a systematic literature review approach.

The results show that, while the degree varies depending on the situation, ESG performance is generally linked to non-negative and frequently positive financial consequences. While environmental programs provide long-term benefits despite short-term expenses, social and governance elements show more constant positive outcomes. The study also emphasizes how innovation, stakeholder engagement, and governance effectiveness mediate ESG impacts, while financial leverage, the state of the economy, and innovation capacity moderate them. Overall, the study comes to the conclusion that, in an increasingly complicated global business environment, ESG is a strategic driver of long-term profitability, resilience, and sustainable value creation rather than just a compliance necessity.

Keywords: ESG, Corporate Financial Performance, Sustainability, Green Innovation, Stakeholder Theory, Governance, Systematic Review.

1. Introduction

Sustainability is becoming an essential part of business strategy in the modern global economy. The growing understanding that long-term company success depends not just on financial performance but also on environmental stewardship, social responsibility,

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and effective governance is reflected in the growing integration of ESG practices. As a result, scholars, practitioners, and policymakers have paid close attention to the connection between ESG and CFP.

ESG adoption may increase business value, lower risk exposure, and boost operational effectiveness, according to recent empirical research (Friede et al., 2015; Li & Pang, 2024; Zhang, 2025). ESG practices also boost investor confidence and financial resilience, according to data from rising economies like India (Kumar & Firoz, 2022; Ghosh & Saima, 2023). However, there are still disagreements over the extent and methods of this relationship's transmission despite rising agreement.

In light of this, the current work attempts to methodically examine the relationship between ESG and CFP. The study has two different goals, first, to make clear how ESG affects financial performance both directionally and economically, and another one is to pinpoint the mechanisms—such as green innovation, stakeholder management, and governance quality—that transform sustainability initiatives into capabilities that drive value. This paper adds to the current scholarly and policy conversation on sustainable finance by summarizing recent research.

2. Theoretical Framework

A multifaceted theoretical framework is necessary to comprehend the connection between CFP and ESG activities. A variety of viewpoints offer a more thorough understanding of how sustainability measures convert into financial value than any one idea alone. Stakeholder involvement, resource optimization, effective governance, and institutional alignment can all be used to interpret the ESG–CFP relationship. As a result, theories that describe how ESG practices generate long-term value include Stakeholder Theory, Resource-Based View (RBV), Legitimacy Theory, Agency Theory, Institutional Theory, and Shared Value Theory. These frameworks demonstrate that sustainability is a strategic tool that affects company performance, risk management, and competitive advantage in addition to being a compliance obligation.

A. Stakeholders Theory

According to R. Edward Freeman's Stakeholder Theory, businesses create value by attending to the interests of many stakeholders. ESG practices improve trust and long-term profitability by fortifying ties with workers, clients, and investors (Freeman, 1984; Gillan et al., 2021; Ghosh & Saima, 2023).

B. Resource-Based View

According to Jay Barney's Resource-Based View, ESG-related skills like innovation and governance function as strategic resources that produce long-term competitive ad-

vantage. Businesses that invest in ESG-driven innovation see increased productivity and profits (Barney, 1991; Flammer, 2015; Li & Pang, 2024).

C. Legitimacy Theory

According to legitimacy theory, businesses should implement ESG practices in order to conform to social norms and expectations. By doing this, they improve their financial performance by securing resources, lowering regulatory risks, and enhancing their reputation (Suchman, 1995; Broadstock et al., 2021; Zhang, 2025).

D. Agency Theory

Agency Theory, which was created by Michael C. Jensen and William H. Meckling, emphasizes how governance can reduce disputes between management and shareholders. Good governance practices increase corporate value by lowering information asymmetry and increasing transparency (Jensen & Meckling, 1976; Fatemi et al., 2018; Khan et al., 2016).

E. Institutions Theory

Paul DiMaggio and Walter W. Powell's Institutional Theory describe ESG adoption as a reaction to global standards and regulatory pressures. In order to remain legitimate and competitive, especially in globalized markets, businesses adhere to ESG criteria (DiMaggio & Powell, 1983; Eccles et al., 2014; Kumar & Firoz, 2022).

F. Sustainability Theory and Shared Value

According to Michael E. Porter and Mark R. Kramer's Shared Value notion, businesses can create social and economic value at the same time. ESG activities improve long-term profitability and competitive advantage, especially in environmental innovation and social responsibility (Porter & Kramer, 2011; Friede et al., 2015; Bolton & Kacperczyk, 2021).

When taken as a whole, these ideas show how stakeholder connections, innovation capabilities, governance structures, and institutional compliance are all interconnected routes via which ESG practices impact business financial performance. The connection between sustainability and financial performance is reinforced by this integrated perspective, which highlights the strategic necessity of ESG adoption for long-term value development.

3. Research Methodology

3.1 Search and Selection of Literature

In order to guarantee methodological rigor, replicability, and thorough identification of pertinent studies on the ESG–CFP nexus, this study uses a methodical and transparent

literature review strategy based on the PRISMA 2020 framework (Page et al., 2021). By facilitating an organized process for study identification, screening, eligibility evaluation, and final inclusion, the PRISMA technique reduces selection bias and improves the dependability of results.

In order to represent the multifaceted nature of the relationship between ESG and corporate financial performance, the literature search incorporates several lines of empirical data. First, there is widespread agreement on the beneficial relationship between ESG and financial performance thanks to meta-analytical research, especially those by Friede et al. (2015), which offer pooled evidence from over 2,000 empirical articles. Second, current insights into new trends, methodological developments, and sectoral differences in ESG research are provided by recent systematic reviews, such as those published by Taylor & Francis (2025). Third, to capture dynamic and time-varying interactions between companies and markets, panel data studies like MDPI (2026b), which are based on firm-level observations, are included.

The review gives priority to peer-reviewed journal articles published in influential academic publications in order to guarantee quality and relevance. To improve generalizability, studies that span several geographic contexts—including developed and emerging markets—are taken into consideration. In order to reflect changing ESG frameworks, regulatory developments, and market conditions, attention is also placed on contemporary research, mostly published after 2015. The final selection of studies is based on their empirical rigor, methodological robustness, and direct relevance to the study's goals of identifying value-creation mechanisms like green innovation, stakeholder management, and governance quality, as well as examining the directional impact of ESG on financial performance (Gillan et al., 2021; Li & Pang, 2024; Zhang, 2025).

3.2 Sources of Data and Screening

To guarantee thorough coverage of excellent research in finance and sustainability, a literature search was carried out across top academic databases, such as Web of Science, Scopus, ScienceDirect, and SSRN. To find pertinent research, a combination of keywords including "ESG," "corporate sustainability," "environmental social governance," "ROA," "ROE," and "stock returns" was employed. To narrow down search results, boolean operators and filters (such as publication year, subject area, and document type) were used. To ensure uniformity and impartiality, the screening procedure adhered to predetermined inclusion and exclusion criteria. Studies that (a) used an empirical study approach, (b) included quantifiable ESG or corporate sustainability indicators, and (c) provided quantitative financial performance metrics, such as market-based or accounting-based indicators, were included. On the other hand, case studies without statistical analysis, merely descriptive research, conceptual papers without empirical validation, and non-

peer-reviewed working papers without later publication were not included. Abstracts and complete texts were thoroughly examined to make sure they aligned with the study's goals, and duplicate records were eliminated. By ensuring that only excellent and pertinent research are included in the analysis, this stringent screening procedure improves the validity and reliability of the synthesized data.

3.3 Analysis and Synthesis

The study uses quantitative insights to support qualitative synthesis. Finding recurring patterns, effect directions, and moderating factors affecting the link between ESG and CFP is emphasized.

4. Results and Findings

4.1 Direction and Strength of the ESG-CFP Relationship

According to the review, around 90% of research shows that there is a positive correlation between ESG and financial performance (Friede et al., 2015; Zhang, 2025). Positive results are more likely to occur in regulated industries and large corporations (Li & Pang, 2024).

Table 1: ESG and Financial Performance

ESG Pillar	Financial Metrics	Direction of Effect	Remarks
Environmental	ROA, ROE	Positive (long-term)	Initial cost burden
Social	ROA, ROE, Tobin's Q	Strongly positive	Most consistent
Governance	ROA, volatility	Positive	Improves transparency
Aggregate ESG	ROA, stock returns	Positive/Neutral	Context-dependent

Source: Author's own creation

4.2 Mechanisms of Mediation

The conversion of sustainability activities into economic value is explained by mediating processes in the link between ESG and business financial performance. By enabling businesses to implement resource-efficient technologies and create sustainable goods, green innovation acts as a major channel, increasing operational effectiveness and profitability. According to empirical data, green innovation reinforces long-term value creation by substantially mediating the ESG–performance relationship (Liu et al., 2025).

By encouraging trust-based relationships with staff, clients, and investors, stakeholder capital enhances this relationship even further. Stable financial performance is supported

by strong stakeholder engagement, which also improves access to financial resources, boosts resilience in times of crisis, and improves business reputation (Cunha et al., 2025; Jin, 2025). Additionally, by enhancing accountability, transparency, and monitoring systems, governance quality plays a critical role. Good governance lowers the cost of capital and improves firm valuation by reducing agency conflicts and information asymmetry (Cek & Kalmaz, 2025; Zhang et al., 2025).

All things considered, these mediating mechanisms demonstrate how ESG indirectly improves financial performance through boosting innovation capacity, fortifying stakeholder ties, and boosting governance effectiveness.

4.3 Moderating Elements

A number of moderating factors have a substantial impact on the strength of the association between ESG and corporate financial success. Because companies with high debt levels frequently experience financial challenges that limit their ability to invest in sustainability activities, financial leverage might limit investment in sustainability initiatives, hence reducing the positive effects of ESG (Ammar et al., 2024). Companies with less leverage, on the other hand, are better able to devote resources to long-term value development and ESG-driven innovation.

The relationship between ESG and performance is also shaped by the economic environment. Research indicates that ESG benefits may be smaller or delayed in emerging countries, but they are stronger in mature economies because of established regulatory frameworks, increased investor awareness, and better institutional quality (Tobar, 2025).

Last but not least, innovation capacity is a critical moderator: businesses that invest more in research and development (R&D) are better able to convert ESG initiatives into profits and competitive advantages (Widyantoro et al., 2025).

All things considered, these moderating factors show that the success of ESG practices varies depending on the institutional environment, financial structure, and firm-specific skills.

5. Discussion

By demonstrating that ESG positively affects financial performance while functioning through crucial mechanisms including innovation and stakeholder involvement, the results support the goals of the study (Friede et al., 2015; Kumar & Firoz, 2022). ESG is becoming more widely seen as a strategic advantage rather than a necessity for compliance.

From a management standpoint, companies should give top priority to integrating ESG into their core objectives, with a special emphasis on social activities and green innovation. In order to lower short-term expenses and promote long-term sustainability

investments, policymakers should create supportive frameworks. In general, ESG improves resilience and profitability, allowing businesses to manage global risks and economic uncertainty.

6. Conclusion

This paper highlights the increasing strategic significance of sustainability in contemporary business by offering a thorough synthesis of the relationship between Environmental, Social, and Governance (ESG) policies and corporate financial performance (CFP). The results show that ESG adoption is often linked to a non-negative, and frequently positive, influence on financial performance, while the amount differs between enterprises, sectors, and institutional settings, which is consistent with the study's primary objective (Li & Pang, 2024; Zhang, 2025). According to the second goal, the analysis pinpoints important mediating mechanisms—green innovation, stakeholder capital, and governance quality—through which ESG initiatives are converted into outcomes that add value and strengthen long-term business performance (Cunha et al., 2025; Liu et al., 2025).

The study also shows that the relationship between ESG and CFP is not consistent and is heavily impacted by moderating factors such as financial leverage, economic context, and innovation potential. These results highlight the fact that, although ESG can serve as an accelerator for resilience and long-term profitability, its efficacy is dependent on firm-specific traits and larger institutional settings (Widyantoro et al., 2025). Theoretically, combining several frameworks—such as resource-based, institutional, and stakeholder theories—confirms that ESG functions through interrelated pathways of value creation. In practical terms, the findings indicate that managers should include ESG into fundamental business strategy, governments should bolster institutional and regulatory support, and investors should take ESG more seriously as a crucial factor in determining long-term performance (Gillan et al., 2021).

Overall, the study confirms that sustainability is now essential to business success rather than merely incidental, acting as a major force behind long-term value creation, competitive advantage, and financial stability in a world economy that is becoming more complicated and dynamic.

7. Limitations of the Study

The methodology and scope allow for the identification of the following limitations:

- a) The study's original empirical contribution is limited because it solely draws from previously published empirical investigations.
- b) Despite being systematic, the study mostly uses qualitative synthesis as opposed to statistical aggregate and the publication bias in favour of positive results only.

c) An excessive dependence on accounting measurements (ROA/ROE) may distort long-term interpretations by ignoring market-based subtleties like enterprise value or total shareholder return.

8. Future Prospects of the Study

a) To better prove causation in the relationship between ESG and financial performance, future research can concentrate on empirical investigations at the firm level using primary data and sophisticated statistical techniques.

b) Deeper contextual insights could be obtained through sector-specific research as well as comparative studies between developed and emerging economies.

c) Future studies can also look at how regulatory and policy frameworks influence the adoption of ESG practices and their financial results.

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Pre-pandemic Scenario of Unemployment in India: An Analytical Study

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&

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Abstract:

Unemployment has remained one of India's most persistent socio-economic challenges. The sharp increase in unemployment reflected in the PLFS 2017–18 data has generated considerable debate among scholars, raising questions about the dynamics of the labour market during this period. This study seeks to capture a clear picture of the pre-pandemic employment situation by comparing three key datasets: EUS 2011–12, PLFS 2017–18, and PLFS 2019–20.

Across the three survey rounds, regression results show that unemployment rates reveal a pronounced upward trajectory, with the sharpest incidence among households reliant on regular wages. This underscores the growing scarcity of secure employment and the heightened vulnerability of existing jobs. Yet certain broad patterns remain consistent. Unemployment is persistently elevated in the north-eastern states and, more recently, in the BIMARU regions. It is disproportionately high among women, as well as among Christian and Muslim populations. A further paradox emerges: the greater the level of educational attainment, the lower the likelihood of securing employment.

Overall, India's employment–unemployment landscape is markedly imbalanced and structurally skewed. At the heart of this asymmetry lies a fundamental mismatch between the demand for and supply of labour. Confronting this challenge requires urgent policy attention, particularly through the promotion of skill development initiatives. Such measures are essential to curbing the persistently high levels of unemployment and to creating more favourable labour market conditions for the country's youth.

Keywords: Unemployment rate, NSSO, labour force, Pre-pandemic period.

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Pre-pandemic Scenario of Unemployment in India: An Analytical Study

1. Introduction:

Unemployment is one of the pressing problems of modern India. There exists a structural type of unemployment in our country (M. L. Dantwala, 1978). In fact, the issue has plagued our planners ever since the second five-year plan. Different policies have been implemented by the Indian Government to cope with this problem (Krishnan, 1992). It became increasingly clear to the planners that it is not possible for the economy to absorb all its available labour force. Even the flagship programmes of the government, like MGNREGA or EGS, generate only casual employment and hence cannot solve the problem in the long run (Patnaik, 2008). There has been observed huge structural and socio-economic asymmetry in the distribution of employment (Roy, 2008).

According to Shutt (2010) there is a digital revolution in world economy since 1970s and it reduces the demand for manpower needed to produce per unit of output and hence creates a lot of unemployment. The scenario is not different for India at all. After liberalisation, the concept of jobless growth became very pervasive in society (Mukherjee, 2013). In fact, the measurement of labour elasticity of output showed a decline in this period.

Singh (2018) points out that there is a huge increase in population pressure, lack of skills and knowledge, and illiteracy are the main reasons for a huge increase in unemployment rates in the country.

Thus, unemployment should be viewed not only as a macroeconomic indicator but also as a socio-economic phenomenon, since its patterns vary across countries, regions, communities, and households. In India, it manifests differently across gender and along caste and class lines.

We know that unemployment varies in different time points both on the aggregate level and on the basis of several covariates, such as region-wise, household's main occupation type-wise, **social and religious group-wise, age & sex group-wise, and education level-wise** (Sengupta and Mukherjee, 2024). Statistical analyses defined that unemployment in India has displayed sharp regional and social disparities, with record highs in the north-east and notable increases in the east and south during 2017–18 and 2019–20, affecting both casual and salaried households. Vulnerabilities are particularly pronounced among Scheduled Castes, Scheduled Tribes, Muslims, and Christians, with Muslims concentrated in low-skilled work and Christians—despite high education and the highest MPCE—often postponing employment in pursuit of white-collar opportunities. Female unemployment peaked in 2011–12 and 2017–18 but declined in 2019–20, while joblessness among the educated has persisted and intensified, underscoring a mismatch between skill acquisition and market demand. These patterns highlight the urgent need

to align skills with economic relevance to safeguard social welfare and prevent widening inequalities, forming the critical backdrop for this study (Mukherjee, 2022).

Thus, the present study builds upon these descriptive analyses, which documented sharp regional and social disparities in unemployment across India. In this study, we will analyse the economic significance of different socio-economic factors on the unemployment rates of India in a pre-pandemic situation. This is because in the post-COVID situation, the data bears a definitional change (Thakur and Choudhury, 2025). Unfortunately, this data is of a new age and a new variety. In the new definitions, the definition of domestic duties has been changed as it is included under self-employment. The pandemic has reshaped the socio-economic landscape of India. Many people who were previously out of the labour force have now considered self-employment (Thakur & Choudhury, 2025). The employment paradigm has been altered, making it difficult to compare with the pre-COVID situation (Thakur & Choudhury, 2025).

So, this study deals with the regression models that we have incorporated to analyse the significant effect of different socio-economic continuous and categorical variables on the unemployment rates (UR) of the country. Here, the measurement of labour statistics is done on the basis of usual status approach and a state-level analysis is attempted to compare the overall picture of unemployment condition of the country across different rounds, namely, EUS: 2011-12, PLFS: 2017-18, and PLFS: 2019-20.

Our study is divided mainly into six sections. Section 2 provides the context of the study. Section 3 gives us a literature review. Section 4 tells us about the data and methodology. Section 5 contains the analytical part, and finally, Section 6 is the part of the conclusion.

2. Context of the Study:

There is a lot of hue and cry with the publication of one of the recent NSSO data (PLFS 2017–18), which shows that rural male unemployment rose to 5.8% and rural female unemployment to 3.8%, while urban male unemployment reached 7.1% and urban female unemployment 10.8% under the Usual Status approach. These figures highlight a clear rise in unemployment across both sectors and genders. So, a preliminary data description is done to understand the severity and extent of the unemployment situation of the country, as already discussed above. So, this study is a modest attempt to understand the nature and pattern of some of these changes by using efficient econometric modelling, mostly across the socio-economic categories, such as education level, nature of unemployment, socially deprived categories, and so on.

Thus, the basic objectives of this paper are:

- To understand the pattern and nature of the chronic employment-unemployment situation of India.
- To find out the effect of different socio-economic variables on the present unemployment situation of the country.
- To understand the relative changes taking place across different rounds in the case of the pre-pandemic situation with the help of an analytical exercise.

3. Literature Review:

The problem of unemployment in India has been examined from multiple angles, with scholars highlighting structural, social, and policy-driven factors. Cannan (1930) noted that unemployment before World War II was largely due to industrial fluctuations, seasonal demand, and mismatches between labour supply and demand, while in the post-war years industries struggled to absorb surplus labour. Gulati (1976) emphasized the high proportion of women outside the labour force, pointing out that when women enter casual work it is often vital for family survival, making female unemployment a pressing concern. Minhas and Mazumdar (1987) further showed that the rise of casual labour and decline of regular salaried positions created widespread underemployment, a theme echoed later by Singh (1993), who argued that the New Economic Policy worsened job insecurity and unemployment.

Rural employment dynamics have also been central to the debate. Abraham (2009) highlighted distress-driven rural employment growth, while Ranjan (2009) found prosperity-induced shifts in western Uttar Pradesh but distress-induced ones elsewhere. Paul (1988) and Kurian (1990) documented rising rural unemployment and underemployment, especially among women and youth, and declining farm productivity alongside educational unemployment. Srivastav (2011) and Khan, Shamshad, and Hassan (2012) showed that unemployment and socio-economic deprivation were particularly severe in the north-east, especially among socially backward classes. Tripathi (2016) added that geographical constraints in the north-east hinder industrial development, worsening unemployment.

Education and skill mismatches emerge as another major factor. Agarwal (2006) pointed to systemic difficulties in higher education that aggravated employment problems, while Bairagya (2016) demonstrated that unemployment rates were higher among the highly educated, driven by socio-economic and regional factors. Sahin, Song, Topa, and Violante (2014) discussed mismatch unemployment, where skill gaps prevented job seekers from filling available vacancies. Singh (2018) added that population pressure, lack of skills, and youth unemployment were major drivers of India's high unemployment rate.

Social and gender dimensions are equally important. Srivastav and Srivastav (2010) noted that rural women, particularly married women, face discrimination and are pushed into low-paying jobs, reducing their participation in the labour force. Puhon (2016) highlighted persistent unemployment among socially backward classes despite government reservations, while Singh (2018) emphasized how illiteracy and lack of knowledge exacerbate youth unemployment. Ghose (1999) argued that while employment growth generally kept pace with labour force growth, poverty remained higher than unemployment due to low productivity jobs and child labour.

Taken together, these studies show that unemployment in India is not simply about joblessness but reflects deeper structural mismatches, rural distress, gender discrimination, and policy paradoxes. Underemployment, low productivity, and regional disparities remain defining features of the employment landscape, making the measurement and comparison of unemployment rates across time crucial for understanding how much of the labour supply is effectively utilized in the country's production process.

4. Data and Methodology:

The existing literature points out to the fact that the unemployment situation of the country differs across different regions, different socio-religious groups with different educational attainment and economic status. So, to study the present unemployment scenario of the country, we have to rely on some authentic secondary data sources.

From the early period of five year planning the urgency of collection of data on employment for the whole country on a regular basis was felt and thus the National Sample Survey (NSS) was set up in 1950 as a part of Indian Statistical Institute for the collection of various kinds of socio economic data for the country as a whole through field surveys for national accounting planning and other purposes, later it is named as National Sample Survey Organization(NSSO). Since the early 1970s, the NSSO has begun to measure unemployment according to three alternative definitions and concepts. Each of these definitions serves its own specific purpose. These are the-

- i) Usual status employment
- ii) Weekly status employment
- iii) Daily status employment.

The usual status method looks at the activity a person spent most of the past year doing, classifying them as principal or subsidiary workers. The weekly status method counts anyone who worked at least one hour in the reference week as employed, and those available but not working as unemployed, with "working" given priority in classification. The current daily status method is the most detailed, breaking each day into half-day units: four or more hours of work counts as a full day employed, one to four hours as half-day

employed and half-day unemployed, while those available but not working for at least four hours are considered unemployed. In short, the usual status captures long-term activity, the weekly status reflects short-term availability, and the daily status provides the most precise measure of employment and unemployment.

Hence, in this study, we have considered the EUS: 2011-12, PLFS: 2017-18, and PLFS: 2019-20 datasets for making a comparative analysis of the unemployment situation of the country.

Since we deal with cross-sectional data for different time points, we have done multiple regression analysis. It is a state-level study, where firstly, we have used the OLS methodology (as MODEL-1), then the WLS methodology (as MODEL-2), Tobit methodology (as MODEL-3) and lastly, Truncated model (as MODEL-4).

Let us start our discussion by considering the Ordinary Least Square (OLS). The analytics of the relationship starts with the simple ordinary linear least squares regression. These regressions are basically built on the assumption that there is a set of independent variables that are related to one dependent variable. Once these variables are identified, the next recourse is to find out the functional relationship between them. Following the well-known theorem of calculus, where a well-behaved function can be approximated by a polynomial of suitable degree, we take this functional form in that form only. In a linear specification, it is assumed that the relationship between the dependent and independent variables is linear.

However, it is easily seen that the variations in the so-called dependent variables cannot be explained fully by the variations in all the so-called independent variables. This distance between them is regarded as the statistical error term. In reality, however, we get data only on the samples and not on the population value. Consequently, in the state of the statistical error we get the estimated error. The error is selected in a way to minimize the sample distance between the values of the dependent and the independent variables. There are various ways in which this distance may be minimised. The most popular is, however, to take the sum of the squares of the estimated errors. The estimated values of the coefficients can mainly be statistically tested.

OLS is a very popular method and is always the first good approximation to any analysis. However, OLS suffers from various deficiencies. The theoretical error may not satisfy all the properties it is assumed to. One of them may be the assumption of constant variance of the theoretical error term. This is called the assumption of homoscedasticity. In reality, the variances of the theoretical error may not be constant. This is the problem of heteroscedasticity. If the errors are heteroskedastic, the OLS estimates lose some of their desirable properties. The technique of Weighted Least Squares (WLS) is then used in such a situation. WLS estimates are more robust than the OLS estimates under

heteroscedasticity. Therefore, these estimates are may be used when there is any sign of failing homoscedasticity.

Here, the dependent variables is the unemployment rate. For some smaller states and UTs, it becomes less than zero, and thus it creates an error in measurement. These should belong in the range of zero to one, and hence we have used the censored regression model, which is the Tobit model. Here the model becomes,

$$Y_i^* = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + u_i$$

Such that, $Y_i = 0$, if $Y_i^* \leq 0$, $Y_i^* \geq 1$,

$$Y_i = Y_i^*, \text{ if } Y_i^* \geq 0.$$

Here, the Y_i^* is the latent variable. We do not consider this variable for all the observations, but consider it only for the range of 0 to 1 because of censoring.

A unit change in the independent variable of the Tobit model actually has two effects: i) the effect on the mean value of the observed dependent variable, ii) the effect on the probability that the Y_i^* is actually observed.

Again, there are some observations for which information for the dependent variable, as well as the independent variable, in a specified range of values is not available, and hence it creates some error in measurement. Therefore, in that case, we use the Truncated regression model. Like the Tobit model, the truncated model can also be left censored, right censored, or both right and left censored. Thus, here also we use a limit to estimate the dependent variable. Where Y_i is the dependent variable & X_i are the independent variables.

Tab.1 Selected set of explanatory variables and their definitions:

Explanatory Variables	Explanatory Variables	Definitions	Justification of the Variables Chosen
Geographical Factor	NED	Dummy variable (1 for the states, Arunachal Pradesh, Meghalaya, Nagaland, Mizoram, Manipur, Sikkim, & Tripura, & 0 for others).	UR is quite higher in the north east parts of India and also, they are comparatively small states with little interstate variations.
Household Type	REGULAR HH	No. of HHs among total HHs whose major source of income comes from its members engaged in other's enterprises and received salary or wages on a regular basis.	These households enjoy job security and other advantages of a more formalized labour market. Hence it may be assumed that the members of such households have higher reservation wage as compared to others.
	NONAGCASUAL HH	No. of HHs among total HHs whose major source of income comes from its members engaged in other's non-farm enterprises & in return receives wages according to the terms of the daily or periodic contract without any job security, forms the proportion of non-agricultural labourers.	These households are not able to enjoy any type of job security. They face income risk and fluctuations. Hence, they should have a lower reservation wage than others. Members of such families are ready to enter the labour market at not so favourable conditions.
Social & Religious Factors	ST	Persons of population belongs to Schedule Caste category forms the proportion of ST.	Among the socially deprived classes we have considered the ST groups because they have markedly lower level of employment status than others in most of the cases.
	ISLAM	Persons of population belongs to Islamic category forms the proportion of Islam.	Similar conditions forced us to select the Islam and the Christian communities among our variables.
	CHRISTAIN	Persons of population belongs to Christian category forms the proportion of Christian.	
Education Related Human Capital Factors	NOT LITERATE	Persons of population who cannot either read or write or both, forms the proportion of not literate.	In any labour market analysis human capital factors are important. The most deprived among them is the non-literate who has no human accumulation. However, just being literate does not guarantee an endowment of human capital in any meaningful way. We have just considered as diploma and graduates as the most relevant categories.
	DIPLOMA	Number of populations having diploma degrees or completed certificate course forms the proportion of Diploma.	
	GRADUATE	Number of persons in population having graduate degrees forms proportion of graduates.	
Demographic Factors	ADULTFEMALE	Number of females belonging from the age group of 15 to < 60 years old forms the proportion of females.	Due to the strong social taboo in many families the adult females are not allowed to participate in the labour market. Yet under many circumstances they are forced to come out of their homes for job. Still here they are not deemed suitable for all types of jobs, mostly that required very high physical labour and working during night or odd times.
Economic Factors	AVGMPCE	Share of average monthly per capita expenditure among states	Two economic factors are considered average MPCE and land possessed. Both these are indicators of economic populace of the family. However, unfortunately the land data is not found in recent NSSO rounds (PLFS: 2017-18 and 2019-20).
	AVGLAND	Share of average land possessed among states.	

Table 2: Descriptive statistics of explanatory variables for EUS: 2011-12 & PLFS:

Explanatory variables	Explanatory Variables	EUS:2011-12		PLFS:2017-18		PLFS:2019-20	
		Mean	C.V	Mean	C.V	Mean	C.V
Geographical Factor	NED	0.2	201.4441	0.208333	196.3039	0.208333	196.3039
Household Type	REGULAR HH	0.1938353	80.7158	0.2514051	118.9445	0.209564	89.90032
	NONAGCAS UAL HH	0.0989233	53.97785	0.0947829	46.87671	0.0857214	42.67133
Social & Religious Factors	ST	0.0903221	58.54165	0.101477	64.16209	0.0875382	53.56477
	ISLAM	0.098743	77.85045	0.1105218	81.26037	0.0853976	67.11299
	CHRISTAIN	0.0465841	47.55775	0.0551995	54.36841	0.0452177	42.74295
Education Related Human Capital Factors	NOT LITERATE	0.1294865	86.5431	0.1290404	70.10185	0.1087498	64.00254
	DIPLOMA	0.0078072	5.4438	0.0053934	3.759121	0.0070639	5.231713
	GRADUATE	0.0440327	20.14005	0.0308126	13.96503	0.0520875	23.49682
Demographic Factors	ADULTFEMALE	0.2387541	104.7392	0.2461139	100.5374	0.227509	92.34721
Economic Factors	AVGMPCE	0.0285714	3.5204	0.2863731	47.86186	0.0138889	2.040528
	AVGLAND	0.0287691	17.46515	NA	NA	NA	NA

Author's own calculation

5. Empirical Results and Discussions:

Unemployment is one of the pressing problems of modern India. The issue has plagued our planners ever since the second five-year plan. It became increasingly clear to the planners that the economy cannot absorb all its available labour force. In fact, there was the famous choice of technique debate, where it was deliberated that the country should adopt a more capital-intensive growth strategy instead of a labour-intensive strategy. In this study, we have tried to find out the effects of different explanatory variables on the explained variable, i.e, Unemployment rate as shown by Tables (3), (4), and (5), and table A (1)³.

Firstly, the geographical factor shows us that the states in the north-east region increase the unemployment rates of the country significantly in 2011-12; however, PLFS: 2019-20 data tell us that the unemployment rates of these north-east states decrease significantly. As the north-east states are economically backward, the central as well as state Govt. has taken several plans to boost their economy. A significant change is noticed when the tertiary sector in this region leads ahead of the primary and secondary sectors (Singh, 2018).

Now, among the different kinds of households based on their major source of income here we can also notice that the proportion of non-agricultural casual labour-based households increases the unemployment rates of the country significantly across all the rounds. On one hand, there is a huge supply of labour in the market with low employment opportunities, and on the other hand, casualisation does not seek job security, so the member of these households increases the unemployment rates.

3. Table A (1) is given in the appendix, which shows the Conditional marginal effects of tobit & truncated regression models according to EUS: 2011-12, PLFS: 2017-18 & PLFS: 2019-20, which helps to compare the results with OLS estimates, and all these marginal effects are highly relatable with the discussed model in the main text.

Table 3: Regression results for PLFS: 2011-12 Dependent variable: Unemployment rate

2011-12					
		Model-1(OLS-Step)	Model-2(WLS-Step)	Model-3(Tobit-Step)	Model-4(Truncated)
<i>Geographical Factor</i>	NED	.0086169** (.0032)	-	.0091663*** (.0031)	.0122879** (.0060)
<i>Household Type</i>	REGULAR HH	-.0620434*** (.02187)	-.0452905** (.0198)	-.0613048*** (.0209)	-.059164** (.0295)
	NONAGCASUAL HH	.1195179*** (.0291)	.0924839*** (.0263)	.1206273*** (.0279)	.1545929*** (.0398)
<i>Social & Religious Factors</i>	ST	-	-	-	-.0216741 (.0299)
	ISLAM	.0291756*** (.0101)	.0373707*** (.0070)	.0290711*** (.0097)	.0353063*** (.0126)
	CHRISTAIN	-	.0422292** (.0182)	-	.0088473 (.0318)
<i>Education Related Human Capital Factors</i>	NOT LITERATE	-.1550995*** (.0273)	-.1137451*** (.0239)	-.1571535*** (.0262)	-.2088698*** (.0400)
	DIPLOMA	-.4038103*** (.2186)	-.3515491** (.1637)	-.4139821* (.2096)	-.7107101** (.3414)
	GRADUATE	.1852227** (.0806)	.179641*** (.0670)	.1848655** (.0773)	.1670517 (.1238)
<i>Demographic Factors</i>	ADULTFEMALE	.1070236*** (.0101)	.0813039*** (.0222)	.1097948*** (.0269)	.1506127*** (.0440)
<i>Economic Factors</i>	AVGMPCE	-	-	-	-.3617678 (.3617)
	AVGLAND	-	-	-	.0956364** (.0463)
CONSTANT		.0032939 (.0021)	.0018957** (.0007)	.0023524 (.0020)	.0014437 (.0114)
Sigma				.0091592 (.0007)	.0107035*** (.0013)
R-Square		0.6938	0.8441		
Adj. R-Square		0.6537	0.8236		
No. of observation		70	70	70	67
test statistic		F=17.28	F=41.27	L.R. CHI^2=82.39	wald chi^2=78.34
Prob.>F		0	0	0	0
Root MSE		0.00955	0.00441	Left censored obs= 3	No. of truncated obs= 3
				Uncensored obs= 67	
				Right censored obs= 0	

The Breacketed figures are estimated standard error, *** Significant at 1%, ** Significant at 5%, * Significant at 10% level.

Table 4: Regression results for PLFS: 2017-18 Dependent variable: Unemployment rate

2017-18					
		Model-1(OLS-Step)	Model-2(WLS-Step)	Model-3(Tobit-Step)	Model-4(Truncated)
<i>Geographical Factor</i>	NED	-	-	-	-.0037113 (.0058)
<i>Household Type</i>	REGULAR HH	.0217255** (.0090)	.0398116*** (.0062)	.0217255** (.0086)	.0278591** (.0112)
	NONAGCASUAL HH	.1116424*** (.0330)	.0964545*** (.0343)	.1116424*** (.0313)	.088533** (.0426)
<i>Social & Religious Factors</i>	ST	-	-	-	-.0048919 (.0250)
	ISLAM	-	-	-	.0101985 (.0129)
	CHRISTAIN	.0326196** (.0139)	.0447904*** (.0151)	.0326196** (.0132)	.0534826** (.0266)
<i>Education Related Human Capital Factors</i>	NOT LITERATE	-.0877566** (.0351)	-	-.0877566** (.0334)	-.0783978** (.0385)
	DIPLOMA	-	-	-	.1598476 (.3183)
	GRADUATE	.3089346*** (.1002)	.173316** (.0774)	.3089346*** (.0952)	.319587*** (.1126)
<i>Demographic Factors</i>	ADULTFEMALE	.1002449*** (.0314)	.0518219*** (.0153)	.1002449*** (.0298)	.0943535** (.0378)
<i>Economic Factors</i>	AVGMPCE	-	-	-	-.0232615 (.0267)
		.003257 (.0024)	.0038158** (.0014)	.0114322 (.0009)	.0067569*** (.0092)
Sigma					
R-Square		0.8874	0.9071		
Adj. R-Square		0.877	0.9		
No. of observation		72	72	72	72
test statistic		F=85.39	F=128.87	LR. CHI^2=157.25	wald chi^2=439.34
Prob.>F		0	0	0	0
Root MSE		0.01203	0.00781	Left censored obs= 0	No. of truncated obs= 0
				Uncensored obs= 72	
				Right censored obs= 0	

*The bracketed figures are estimated standard error, *** Significant at 1%, ** Significant at 5%, * Significant at 10% level.

Table 5: Regression results for PLFS: 2019-20 Dependent variable: Unemployment rate

		2019-20			
		Model-1(OLS-Step)	Model-2(WLS-Step)	Model-3(Tobit-Step)	Model-4(Truncated)
<i>Geographical Factor</i>	NED	-	-.0054509* (.0031)	-	.0019853 (.0066)
<i>Household Type</i>	REGULAR HH	-	.0751908*** (.0078)	-	.0086021 (.0350)
	NONAGCASUAL HH	.1080992*** (.0239)	.1723833*** (.0200)	.1080992*** (.0231)	.0899795 (.0606)
<i>Social & Religious Factors</i>	ST	-	-	-	.0076267 (.0338)
	ISLAM	.0313291** (.0135)	-	.0313291** (.0130)	.0323557** (.0168)
	CHRISTAIN	.0482363*** (.0170)	.0843006*** (.0275)	.0482363*** (.0164)	.0397841 (.0385)
<i>Education Related Human Capital Factors</i>	NOT LITERATE	-	-	-	-.0382416 (.0518)
	DIPLOMA	-	-.6386126*** (.1962)	-	.0907205 (.2972)
	GRADUATE	.191143*** (.0405)	-	.191143*** (.0391)	.1449552 (.1513)
<i>Demographic Factors</i>	ADULTFEMALE	-	-	-	.0428234 (.0558)
<i>Economic Factors</i>	AVGMPCE	-	-	-	-.4538569 (.5967)
CONSTANT		.007451** (.0024)	.0026829** (.0011)	.007451*** (.0010)	.0060083 (.0101)
Sigma				.0122218 (.0010)	.0134196*** (.0013)
R-Square		0.729	0.8676		
Adj. R-Square		0.7128	0.8575		
No. of observation		72	72	72	72
test statistic		F=45.05	F=86.48	LR. CHI^2=93.99	wald chi^2=139.39
Prob.>F		0	0	0	0
Root MSE		0.01267	0.00674	Left censored obs= 0	No. of truncated obs= 0
				Uncensored obs=72	
				Right censored obs= 0	

*The bracketed figures are estimated standard error

*** Significant at 1%, ** Significant at 5%, * Significant at 10% level.

However, the picture changes from 2011-12 to 2017-18 & 2019-20 in the case of regular wage-based households. Table (3) shows us that in 2011-12 the increase in the proportion of regular wage-based households actually decreases the unemployment rates significantly; however, they tend to increase the unemployment rates in 2017-18 & 2019-20 as seen in table (4) & (5) respectively. This strange result of increasing involuntary unemployment in present situation creates a serious question of occurrence of 'hidden in-formalisation' of formal sectors of the country.

Among the minorities and socially backward group of population (such as Islam, Christians & STs) we can notice that the unemployment rate becomes higher for the proportion of Islam and Christian populations, even if there are some types of reservation benefits for these groups. However, there is no significant relationship between the unemployment rate and the ST population.

Considering the case of human capital formation by determining the education levels of the population, it can be observed that the general result supports our tabular findings. In 2011-12, the higher the proportion of illiterate population, the lower the unemployment rates (URs). Again, the higher the proportion of graduates, the higher the unemployment rates (URs). For graduate people, the employment situation is similar across all the rounds. Thus, the presence of a high level of involuntary unemployment (URs) among graduates indicates that our education system does not match the demands of the labour market.

However, in the case of states with a proportion of people having a diploma education or having completed a certificate course, they had lower unemployment rates in 2011-12 & 2019-20. Therefore, semi-skill-based knowledge is more welcomed in the present labour market scenario.

Demographic factors like age and sex groups are very important to discuss the employment situation of a country. Tables 3 & 4 show us how the proportion of the adult female population increases the unemployment rates (URs) of the country in 2011-12 & 2017-18. This indicates the existence of sex bias, which hinders our country from enjoying the fruits of the demographic dividend to a great extent. However, the 2019-20 data do not provide us with any significant result of sex bias on unemployment (UR) of the country.

Lastly, considering some economic factors like AVGMPCE & AVGLAND, we can notice that the AVGMPCE has no relation with URs because these effects may be filtered out by other factors (such as education, household type, social deprivation, and others). In 2011-12, there is a positive relationship between AVGLAND and URs, as people wait to have a better job opportunity, as land acts for them as a major source of income. However, such information regarding land holding is not available in later PLFS rounds. That means people having land ownership can remain to be unemployed as they can depend on rental incomes.

6. Conclusion:

We find a wide difference among various types of social groups in terms of employment. Unemployment rates & proportions among the states having a higher proportion of women are significantly higher as per 2011-12 & 2017-18 data. Unemployment is more pronounced among the states having a higher proportion of the Islamic & Christian population of the country in more or less all time points. More alarming is the increase in the proportion of highly educated unemployed in the states. There has been a high growth of unemployment with higher levels of educational attainment (Bairagya, 2016; Sharma and Sharma, 2017). It was already high in 2011-12, but in 2017-18 & 2019-20 it became more pronounced. An additional feature of the PLFS: 2017-18 data is that there is a high proportion of unemployment among the states having a higher proportion of regular salaried-based households.

Thus, some very important things are, however, clear from this deliberation. In India, there is a clear mismatch between the type of skill formation and the type of skill that is demanded. In most cases, skills that are accrued have little or no market value. It thus becomes impossible to get jobs simply by accruing so-called “High Skills”. This mismatch is a serious concern for the Indian economy. The government must take appropriate measures to bridge the existing gaps; otherwise, it can create fissures in the social fabric that may deteriorate the general welfare.

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Table A (1): Conditional marginal effects of tobit & truncated regression models according to EUS: 2011-12 & PLFS: 2017-18 & PLFS: 2019-20

	2011-12		2017-18		2019-20	
	Marginal effects of Tobit model	Marginal effects of Truncated model	Marginal effects of Tobit model	Marginal effects of Truncated model	Marginal effects of Tobit model	Marginal effects of Truncated model
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
NED	.0089329*** (.0030)	.008793** (.0043)	-	-.0037005 (.0057)	-	.0018056 (.0060)
REGULAR HH	-.0597434*** (.0204)	-.0423368* (.0217)	.0217242** (.0086)	.0277779** (.0112)	-	.0078235 (.0318)
NONAGCASUAL HH	.1175552*** (.0272)	.1106241*** (.0290)	.1116357*** (.0313)	.0882747** (.0425)	.107565*** (.0230)	.0818352 (.0550)
ST	-	-.0155096 (.0214)	-	-.0048777 (.0250)	-	.0069364 (.0307)
ISLAM	.028331*** (.0094)	.0252646*** (.0090)	-	.0101688 (.0129)	.0311742** (.0130)	.0294271* (.0153)
CHRISTAIN	-	.006331 (.0227)	.0326176** (.0132)	.0533265** (.0265)	.0479979*** (.0163)	.0361831 (.0351)
NOT LITERATE	-.0153151*** (.0256)	-.1494637*** (.0305)	-.0877514* (.0334)	-.078169** (.0384)	-	-.0347802 (.0472)
DIPLOMA	-.0403439** (.2043)	-.5085722** (.2446)	-	.1593811 (.3174)	-	.082509 (.2703)
GRADUATE	.0180157** (.0753)	.1195393 (.0889)	.3089161*** (.0952)	.3186544*** (.1122)	.1901983*** (.0389)	.1318348 (.1376)
ADULTFEMALE	.0106999*** (.0262)	.1077759*** (.0325)	.1002389*** (.0298)	.0940782** (.0377)	-	.0389473 (.0508)
AVGMPCE	-	-.258875 (.2515)	-	-.0231937 (.0266)	-	-.4127767 (.5420)
AVGLAND	-	.0684358** (.0323)	-	-	-	-
No. of obs:	70	67	72	72	72	72
Model vce	OIM	OIM	OIM	OIM	OIM	OIM
At mean:						
NED	0.2	0.2089552		0.2083333		0.2083333
REGULAR HH	0.193835	0.2013602	0.2514051	0.2514051		0.209564
NONAGCASUAL HH	0.098923	0.1032204	0.0947829	0.0947829	0.085721	0.0857214
ST		0.0935753		0.101477		0.087538
ISLAM	0.098743	0.1031201		0.1105218	0.0853976	0.085398
CHRISTAIN		0.0486359	0.0551995	0.0551995	0.0452177	0.045218
NOT LITERATE	0.129487	0.134958	0.1290404	0.12904		0.10875
DIPLOMA	0.007807	0.008131		0.005393		0.007064
GRADUATE	0.044033	0.0458937	0.0308126	0.0308126	0.052088	0.0520875
ADULTFEMALE	0.238754	0.2488475	0.2461139	0.2461139		0.227509
AVGMPCE		0.02836		0.2863731		0.0138889
AVGLAND		0.0296064				

*The bracketed figures are estimated standard error, *** Significant at 1%, ** Significant at 5%, * Significant at 10% level.

Working Capital Management in Manufacturing vs. Service Firms: Evidences from India

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&

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Abstract

This research paper provides an in-depth comparative analysis of working capital management (WCM) strategies and their impact on firm performance in the manufacturing and service sectors in India. Working capital, the lifeblood of any business, presents unique management challenges influenced by industry specificities, operational models, and economic environments. Drawing on extant literature and employing a theoretical framework rooted in the trade-off theory and cash conversion cycle, this study investigates the distinct approaches adopted by Indian manufacturing and service firms. The paper highlights that manufacturing firms, characterized by substantial investments in inventory and extended production cycles, often prioritize efficient inventory management and supply chain finance. In contrast, service firms, with their minimal physical inventory and reliance on human capital, focus intensely on receivables management, unbilled revenue, and efficient cash flow acceleration. Through a rigorous methodological approach, potentially involving panel data analysis of publicly listed Indian companies and case studies, the research aims to uncover significant statistical differences in WCM components and their influence on profitability and liquidity across these sectors. The findings are to reveal that while effective WCM is crucial for both, the optimal strategies, metrics, and risk exposures vary considerably. Managerial implications are discussed, offering tailored recommendations for optimizing working capital in each sector within the dynamic Indian economic landscape. This study contributes to the WCM literature by providing specific, contextualized insights from one of the world's fastest-growing economies, bridging a critical gap in comparative, sector-specific WCM research.

Keywords: Working Capital Management, Manufacturing Firms, Service Firms, India, Cash Conversion Cycle, Inventory Management, Receivables Management, Payables Management, Firm Performance.

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1. Introduction

Working capital management (WCM) stands as a cornerstone of financial management, playing a pivotal role in determining a firm's liquidity, profitability, and long-term solvency. It encompasses the management of current assets (like inventory, accounts receivable, and cash) and current liabilities (such as accounts payable and short-term debt) to ensure the smooth operation of daily business activities. The efficiency with which a firm manages its working capital directly influences its operational fluidity, its ability to meet short-term obligations, and ultimately, its overall financial health and shareholder value creation (Smith, 1980; Gitman, 1997). An optimal WCM strategy aims to balance the trade-off between liquidity and profitability, avoiding both excessive investment in current assets which ties up capital and insufficient investment which can disrupt operations and lead to lost sales.

The global economic landscape of the 21st century, marked by rapid technological advancements, supply chain complexities, and intense competition, has further amplified the importance of prudent WCM. In emerging economies like India, where access to financing can be more challenging and economic cycles more volatile, the stakes of effective WCM are even higher. India's economy is characterized by a vibrant and rapidly growing manufacturing sector alongside an increasingly dominant and sophisticated service sector. These two sectors, while both critical pillars of the nation's economic growth, exhibit fundamentally different operational characteristics, asset structures, and revenue generation models. These differences inherently lead to distinct working capital requirements and management challenges.

Manufacturing firms, by their very nature, involve complex production processes, significant investment in raw materials, work-in-progress (WIP), and finished goods inventory. Their supply chains are often extensive, involving multiple stages from procurement to distribution, leading to longer operating cycles and higher capital tied up in inventory and receivables (Deloof, 2003). Managing these components efficiently becomes paramount for their survival and profitability. On the other hand, service firms predominantly rely on human capital, intellectual property, and efficient service delivery rather than physical goods. Their inventory levels are typically negligible or non-existent, and their primary working capital challenges revolve around managing accounts receivable (often referred to as 'unbilled revenue' or 'work-in-progress' in service contracts), efficient cash conversion from service delivery, and managing employee-related costs (Garcia-Teruel & Martinez-Solano, 2007).

The Indian context presents a unique opportunity to study these sectoral differences. The Indian manufacturing sector, encompassing diverse industries from automotive and pharmaceuticals to textiles and heavy machinery, faces challenges such as infrastructure

bottlenecks, regulatory complexities, and intense competition from domestic and international players. Simultaneously, the Indian service sector, particularly IT services, healthcare, and financial services, has witnessed exponential growth, contributing significantly to the country's GDP and export earnings. However, these firms grapple with issues like talent retention, project management in distributed teams, and managing client-specific payment cycles.

Despite the acknowledged importance of WCM and the evident structural differences between manufacturing and service sectors, most academic research often treats WCM with a generalized perspective or focuses on specific components rather than offering a holistic, comparative sectoral analysis, especially within the Indian context. While studies have explored WCM in India generally, comparative insights dissecting the nuances between manufacturing and service firms are still nascent. This research aims to fill this critical gap by providing a detailed comparative analysis, drawing on empirical evidence from leading Indian corporates.

1.1. Problem Statement

While the imperative of effective working capital management is universally acknowledged across industries, the specific components of working capital, their optimal levels, and the most effective management strategies differ significantly between manufacturing and service firms due to their fundamental operational and business model distinctions. Manufacturing firms typically have significant capital tied up in inventory (raw materials, work-in-progress, finished goods) and often extend credit for longer periods due to integrated supply chains. Service firms, conversely, have minimal physical inventory, but face unique challenges in managing unbilled revenue, accounts receivable stemming from project-based work or recurring service contracts, and often have shorter cash conversion cycles (albeit with different risk profiles).

In the Indian context, a dynamic and diverse economy with a rapidly growing manufacturing base and a globally competitive service sector, understanding these divergences is crucial for both academic theory and practical management. Existing literature often lacks a comprehensive, comparative empirical investigation into how these two distinct sectors manage their working capital, what specific strategies they employ, and how these strategies impact their financial performance. Without such a comparative analysis, generic WCM advice might prove suboptimal or even detrimental when applied across sectors. Therefore, the core problem is the insufficient understanding of the distinct WCM profiles, challenges, and success factors peculiar to Indian manufacturing versus service firms.

1.2. Research Questions

Building upon the problem statement, this study seeks to answer the following research questions:

- i. What are the fundamental differences in the composition and management of working capital components (e.g., inventory, receivables, payables, and cash) between manufacturing and service firms in India?
- ii. How do working capital management policies (e.g., aggressive vs. conservative) adopted by manufacturing firms in India compare to those adopted by service firms?
- iii. What is the impact of varying working capital management efficiency (e.g., measured by the Cash Conversion Cycle and its components) on the profitability and liquidity of manufacturing firms versus service firms in India?
- iv. What are the specific WCM challenges and best practices observed in Indian manufacturing companies through case studies?
- v. What are the specific WCM challenges and best practices observed in Indian service companies through case studies?
- vi. How do the insights from Indian corporate case studies reinforce or diverge from the broader empirical findings regarding WCM in manufacturing and service sectors?

1.3. Research Objectives

The primary objectives of this research are:

- i. To identify and quantitatively analyze the significant differences in working capital structure and policies between Indian manufacturing and service firms.
- ii. To empirically assess the relationship between working capital management efficiency and firm financial performance (profitability and liquidity) in both sectors in India.
- iii. To conduct in-depth case studies of selected leading Indian manufacturing and service companies to illustrate sector-specific working capital management strategies and their outcomes.
- iv. To compare and contrast the WCM practices and financial outcomes observed in the case studies with the broader empirical findings.

- v. To provide actionable managerial implications and recommendations for optimizing working capital management tailored to the unique characteristics of Indian manufacturing and service sectors.

This study focuses on publicly listed Indian corporates operating within the manufacturing and service sectors. The analysis will primarily utilize secondary financial data spanning a recent period (e.g., the last 5-10 years) to ensure contemporary relevance and sufficient data points for robust analysis. The scope includes key working capital components (inventory, accounts receivable, accounts payable, cash) and their impact on profitability measures (e.g., Return on Assets, Net Profit Margin) and liquidity measures (e.g., Current Ratio, Quick Ratio). The case studies will be, focusing on prominent companies to provide practical insights. However, it suffers from the following limitations.

- i. **Data Availability:** The reliance on secondary data may limit the depth of understanding of internal WCM policies that are not disclosed in financial reports. Proprietary information on highly granular WCM strategies is often not publicly available.
- ii. **Sector Heterogeneity:** Both manufacturing and service sectors are highly diverse. Grouping all manufacturing firms together or all service firms together might mask significant intra-sectoral variations. While efforts will be made to select a representative sample, complete homogeneity is unattainable.
- iii. **Causality vs. Correlation:** While statistical analysis can establish correlations, definitive causality between WCM policies and firm performance can be challenging to prove definitively due to numerous confounding variables (e.g., macroeconomic conditions, competitor actions).
- iv. **Influence of External Factors:** Economic downturns, policy changes, and global events can significantly impact WCM irrespective of firm strategies, and isolating their precise effects can be difficult.
- v. **Generalizability of Case Studies:** While, case studies provide in-depth insights into specific companies but may not be broadly generalizable to the entire sector. They serve as qualitative examples rather than universally applicable quantitative evidence.

1.5. Significance of the Study

This research holds significant theoretical and practical implications:

Theoretical Contributions:

- i. **Bridging Research Gaps:** It addresses a significant gap in the WCM literature by offering a comparative, sector-specific analysis within the context of an

emerging economy like India, a perspective often underrepresented in global studies.

- ii. **Contextualizing WCM Theory:** It contributes to a deeper understanding of how universal WCM theories (e.g., trade-off theory, cash conversion cycle model) manifest and require adaptation in diverse operational environments such as manufacturing versus service sectors.
- iii. **Empirical Evidence from India:** Provides robust empirical evidence from a high-growth economy, contributing to the growing body of literature on financial management in emerging markets.

Practical Contributions:

- i. **Informing Managerial Decisions:** Offers valuable insights and tailored recommendations for financial managers and executives in both manufacturing and service firms in India, enabling them to optimize their WCM strategies specific to their industry characteristics.
- ii. **Guiding Investors and Analysts:** Provides a clearer framework for investors and financial analysts to evaluate the financial health and operational efficiency of companies across different sectors by understanding sector-specific WCM benchmarks and risks.
- iii. **Policy Implications:** Could inform policymakers and regulatory bodies regarding sector-specific financial support mechanisms or regulatory frameworks that account for differing working capital needs.
- iv. **Enhancing Competitiveness:** By identifying best practices and common pitfalls, the study can help Indian firms enhance their operational efficiency, liquidity, and overall competitiveness in both domestic and international markets.

1.6. Structure of the Paper

The remainder of this paper is organized as follows: Section 2 presents a comprehensive review of the existing literature on working capital management, its theoretical underpinnings, and prior studies in both manufacturing and service sectors, including those focusing on India. Section 3 outlines the theoretical framework guiding the study and develops specific research hypotheses. Section 4 details the research methodology, including data sources, sample selection, variable definitions, and analytical techniques. Section 5 presents the data analysis and discussion of potential findings. Section 6 provides in-depth case studies of Indian manufacturing and service corporates. Section 7 discusses the managerial implications derived from the study. Finally, Section 8 concludes

the paper by summarizing key findings, highlighting limitations, and suggesting avenues for future research.

2. Literature Review

Working Capital Management (WCM) has been a subject of extensive academic inquiry due to its direct bearing on a firm's liquidity, profitability, and overall financial health. This section provides a comprehensive review of the relevant literature, tracing the theoretical foundations, examining empirical studies across various contexts, and specifically focusing on the distinctions between manufacturing and service firms, with an emphasis on the Indian scenario.

2.1. Theoretical Foundations of Working Capital Management

The theoretical underpinnings of WCM are primarily rooted in the trade-off between liquidity and profitability, and the concept of the operating cycle and cash conversion cycle.

2.1.1. Trade-off Theory of Working Capital:

A fundamental premise in WCM is the existence of a trade-off between maintaining high liquidity and achieving higher profitability (Myers, 1984). Holding a large inventory or significant cash balances enhances liquidity, reduces the risk of stock-outs or cash shortages, and allows firms to capitalize on un opportunities. However, it also incurs holding costs, ties up capital that could be used for more profitable long-term investments, and reduces returns. Conversely, aggressive WCM policies, such as minimizing inventory, extending payables, and aggressively collecting receivables, can boost profitability by reducing capital tied up and minimizing associated costs. Yet, such policies risk liquidity shortages, damage supplier relationships, or lose sales due to stock-outs (Shin & Soenen, 1998; Deloof, 2003). The objective of optimal WCM is to find the equilibrium point where liquidity and profitability are balanced to maximize shareholder wealth.

2.1.2. The Operating Cycle and Cash Conversion Cycle (CCC):

The operating cycle measures the time required for a company to convert raw materials into cash from sales. It encompasses the inventory conversion period (ICP) and the debtor conversion period (DCP). The cash conversion cycle (CCC), a refinement of the operating cycle, accounts for the credit period a firm obtains from its suppliers (creditor conversion period or CCP). It is calculated as: $CCC = ICP + DCP - CCP$. A shorter CCC implies that a firm converts its investments in inventory and receivables into cash more quickly, requiring less external financing for its operations and potentially leading to higher profitability (Gitman, 1997; Lazaridis & Tryfonidis, 2006). A longer CCC, conversely, indicates capital being tied up for extended periods, necessitating higher financing costs and potentially straining liquidity. Studies have consistently shown a negative

relationship between the length of the CCC and firm profitability, suggesting that efficient WCM, leading to a shorter CCC, enhances firm value (Shin & Soenen, 1998; Deloof, 2003; Garcia-Teruel & Martinez-Solano, 2007).

2.1.3. Other Relevant Theories:

While less central, theories like Agency Theory can also apply to WCM, particularly concerning potential conflicts between managers and shareholders regarding risk-taking and asset utilization. Managers might prefer higher liquidity (more conservative WCM) to reduce personal risk, even if it compromises shareholder returns, while shareholders might prefer more aggressive WCM for higher returns. Pecking Order Theory (Myers & Majluf, 1984) suggests firms prefer internal financing, then debt, and then equity. WCM indirectly relates as efficient management of current assets and liabilities can reduce the need for external financing, aligning with this preference.

2.2. General Studies on Working Capital Management and Firm Performance

A substantial body of empirical research has explored the relationship between WCM and firm performance. Deloof (2003), examining a sample of Belgian firms, found a significant negative relationship between gross operating income and the cash conversion cycle, accounts receivable, and inventory periods. This implied that reducing the cash conversion cycle by efficiently managing its components could increase profitability. Similarly, Lazaridis and Tryfonidis (2006) confirmed a negative relationship between the CCC and profitability for listed Greek firms. Padachi (2006) investigated small and medium-sized enterprises (SMEs) in Mauritius and concluded that effective WCM significantly impacts the profitability of firms. Raheman and Nasr (2007), studying Pakistani firms, also found a negative relationship between working capital components (inventory, receivables, payables) and firm profitability, suggesting that companies can create value by managing these components efficiently. These studies generally reinforce the idea that prudent WCM, characterized by shorter CCC, is beneficial for firm performance across various geographical contexts.

2.3. Working Capital Management in Manufacturing Firms

Manufacturing firms present distinct WCM challenges due to their operational model. Their production processes involve the conversion of raw materials into finished goods, leading to substantial investments in inventory at various stages (raw materials, work-in-progress, finished goods).

2.3.1. Inventory Management:

Inventory management is often the most complex and critical aspect of WCM for manufacturing firms. Balancing the costs of holding inventory (storage, obsolescence, damage, insurance) with the risks of stock-outs (lost sales, production stoppages, custom-

er dissatisfaction) is a perpetual challenge (Tersine, 1994). Strategies like Just-In-Time (JIT) inventory systems, Material Requirements Planning (MRP), Enterprise Resource Planning (ERP) systems, and supply chain management techniques are widely adopted to optimize inventory levels (Chopra & Meindl, 2016). Efficient inventory management demonstrably reduces capital tied up and improves cash flow (Garcia-Teruel & Martinez-Solano, 2007).

2.3.2. Receivables Management:

Manufacturing firms often operate with significant accounts receivable, particularly in business-to-business (B2B) transactions where credit sales are common. Effective receivables management involves establishing clear credit policies, conducting credit assessments, offering discounts for early payment, and efficient collection procedures (Emery, 1984). The trade-off here is between potentially increasing sales by offering liberal credit terms and the risk of bad debts and delayed cash inflows.

2.3.3. Payables Management:

Accounts payable represent a source of short-term financing. Manufacturing firms often strategically manage their payables to extend payment terms without damaging supplier relationships, thereby conserving cash. However, delaying payments too much can lead to penalties, loss of cash discounts, and strained supplier relations, potentially impacting supply chain reliability (Long et al., 1993).

2.4. Working Capital Management in Service Firms

Service firms, by their nature, have a drastically different asset structure and operational model compared to manufacturing firms. Their primary assets are often intangible (human capital, intellectual property, brand) rather than physical inventory.

2.4.1. Minimal Inventory and Focus on Receivables:

A defining characteristic of service firms is their minimal or non-existent physical inventory. Instead, their "inventory" might conceptualize as unbilled services or work-in-progress, especially in project-based sectors like IT consulting or construction (Petersen & Rajan, 1997). Consequently, the primary focus of WCM shifts heavily towards accounts receivable management. Managing customer payment cycles, ensuring timely billing, and efficient collection processes are paramount. Delays in receiving payments can severely impact liquidity, despite low operational costs (Mansoori et al., 2012).

2.4.2. Revenue Recognition and Unbilled Revenue:

For service firms, particularly those engaged in long-term contracts or subscription models, revenue recognition and the management of unbilled revenue become critical. The timing of service delivery, milestones achieved, and billing cycles significantly in-

fluence cash flow. Accurately forecasting cash inflows from projects and managing customer advances or retention monies are crucial.

2.4.3. Human Capital and Operating Expenses:

While not directly working capital components, managing human capital costs (salaries, benefits, training) and other operating expenses (rent, utilities, marketing) is fundamental for service firms as these represent their primary outflows. Efficient cost control and aligning these outflows with cash inflows become essential for maintaining liquidity.

2.4.4. Faster Cash Conversion Cycle (Generally):

Service firms typically have a shorter operational cycle compared to manufacturing firms, as there is no lengthy production process (Afrifa, 2016). This often translates to a shorter cash conversion cycle, provided receivables are managed efficiently. However, this also means that any disruption in receivables can have a more immediate and severe impact on liquidity.

2.5. Comparative Studies on WCM across Sectors

While direct comparative studies are less abundant, some researchers have acknowledged the sectoral differences. Petersen and Rajan (1997) found that working capital needs and financing options differ based on industry characteristics, emphasizing the importance of sector-specific analysis. Koumanakos (2008), in a study of Greek manufacturing firms, found a negative relationship between WCM components and profitability, implying that the manufacturing sector's emphasis on inventory and production efficiency drives WCM outcomes. Afrifa (2016) conducted a comparative analysis of working capital management and profitability in UK manufacturing and service firms. The study confirmed that while both sectors benefit from efficient WCM, the specific components impacting profitability (e.g., inventory in manufacturing, receivables in services) differ. This highlights the necessity of tailored WCM strategies.

2.6. Studies on Working Capital Management in India

Research on WCM in India has grown significantly, reflecting the country's economic prominence. Many studies confirm the negative relationship between CCC and profitability, consistent with global findings. Agarwal and Maheshwari (2015) examined Indian manufacturing firms and found that a shorter cash conversion cycle positively impacts profitability, particularly for larger firms. Narware (2004) highlighted the importance of inventory and receivables management for Indian companies. Sharma and Kumar (2011) investigated the relationship between working capital management and corporate profitability in India, affirming that efficient management of working capital components (inventory, receivables, payables) contributes positively to firm performance. However, these studies often analyze a broad sample of firms without explicitly differentiating or

comparing between manufacturing and service sectors in a detailed manner. There's a notable gap in comprehensive comparative studies that delve into the distinct WCM nuances of these two critical sectors within the Indian economic context.

2.7. Recent Studies

Working Capital Management (WCM) remains one of the most significant determinants of corporate profitability, liquidity, and operational efficiency. Recent literature increasingly emphasises the role of efficient working capital practices in enhancing firm performance, particularly within emerging economies such as India.

Mahesh Chand Garg and Meentu (2023) investigated the relationship between working capital management and profitability among Indian manufacturing firms listed on the Bombay Stock Exchange. Using Generalized Method of Moments (GMM) estimation on panel data from 2012–2021, the study found that the Cash Conversion Cycle (CCC) and Inventory Conversion Period significantly influence firm profitability. The authors further identified an inverted U-shaped relationship between working capital investment and corporate performance, suggesting that both excessive and inadequate working capital levels may adversely affect profitability.

In a subsequent study, Mahesh Chand Garg and Meentu Singh (2024) analysed 419 Indian manufacturing firms over the period 2003–2022 using fixed and random effects panel regression models. Their findings demonstrated that working capital variables significantly affect financial performance, with shorter cash conversion cycles improving profitability and operational efficiency. The study reinforced the importance of efficient receivables and inventory management in Indian industrial firms.

Another sector-specific investigation by Garg and Singh (2023) examined steel sector firms in India using panel data techniques including pooled OLS, fixed effects, and random effects models. The study concluded that Inventory Conversion Period (ICP), Cash Conversion Cycle (CCC), and Accounts Payable Period (APP) negatively influence profitability. The findings highlighted that prolonged inventory holding and delayed operational cycles reduce returns in capital-intensive industries such as steel manufacturing.

Similarly, research on Indian automobile firms found a statistically significant relationship between working capital management and profitability. The study utilised panel regression methods and observed that efficient liquidity management contributes positively to financial performance by reducing financing pressure and improving operational continuity. Recent evidence from broader Indian corporate sectors also supports the importance of working capital efficiency. Diksha Sharma and Vaibhav Tripathi (2024) examined NSE-listed firms and reported that although working capital management is essential for maintaining liquidity and operational sustainability, its short-term effect

on profitability may vary across industries. Their findings suggest that improvements in working capital policies do not always immediately translate into higher profits due to sectoral and macroeconomic differences.

More recent comparative evidence has emerged analysing both manufacturing and service sectors simultaneously. A comparative empirical analysis conducted in 2026 investigated working capital ratios and profitability across Indian manufacturing and service firms. The study observed that the sensitivity of profitability to working capital components differs substantially between sectors because manufacturing firms rely heavily on inventory management, whereas service firms are more influenced by receivables management and liquidity cycles.

Further sectoral evidence from the Indian cement industry demonstrated that reductions in the Cash Conversion Cycle, faster receivables collection, and lean inventory management significantly improve profitability. The study employed advanced econometric methods including two-way fixed effects, quantile regression, and dynamic system GMM to address heterogeneity and endogeneity concerns. The findings confirmed the robustness of the negative relationship between excessive working capital investment and profitability.

The broader international literature also largely supports the inverse relationship between working capital duration and profitability. Studies conducted in emerging economies consistently show that shorter cash conversion cycles improve operational efficiency, reduce financing costs, and enhance shareholder returns. However, several studies also acknowledge that optimal working capital levels differ across industries due to variations in production cycles, inventory requirements, and customer credit structures.

2.8. Identification of Research Gaps

Based on the literature review, several research gaps become evident:

- i. **Limited Comparative Sectoral Analysis:** While general WCM studies are abundant, and some studies touch upon sectoral differences, a comprehensive, dedicated comparative analysis of WCM strategies and their performance implications specifically between manufacturing and service firms is lacking, particularly for India.
- ii. **Contextualized Indian Evidence:** Most comparative WCM studies are global or focus on developed economies. There is a need for more granular, contextualized evidence from an emerging market like India, where unique market dynamics, regulatory environments, and financing conditions might influence WCM practices.

- iii. **Integration of Quantitative and Qualitative Insights:** While quantitative studies provide statistical correlations, they often lack the depth of understanding derived from real-world operational practices. Integrating empirical analysis with in-depth case studies of Indian corporates can provide a more holistic view of WCM challenges and best practices.

This study aims to address these gaps by rigorously comparing WCM in Indian manufacturing and service firms, employing both quantitative analysis and case studies to provide a robust and nuanced understanding.

3. Theoretical Framework and Hypotheses Development

This section outlines the theoretical framework underpinning this study and develops specific hypotheses based on the distinctions between manufacturing and service firms in the context of working capital management. The primary theoretical lens will be the Cash Conversion Cycle (CCC) model, supplemented by the Trade-off Theory of Working Capital and insights from Agency Theory where relevant.

3.1. Theoretical Framework

3.1.1. The Cash Conversion Cycle (CCC) Model:

The CCC model, initially introduced by Gitman (1997) and extensively studied by researchers like Shin and Soenen (1998) and Deloof (2003), serves as the foundational framework. The CCC measures the time it takes for a firm's investment in working capital to be converted into cash. It is calculated as:

$$\text{CCC} = \text{Days: Inventory: Outstanding (DIO)} + \text{Days: Sales: Outstanding (DSO)} - \text{Days: Payables: Outstanding (DPO)}$$

Where:

- a. **DIO (Inventory Conversion Period):** Measures the average number of days inventory is held before being sold. For manufacturing, this includes raw materials, WIP, and finished goods. For services, this component is typically negligible or conceptualized differently (e.g., time to complete unbilled projects).
- b. **DSO (Debtor Conversion Period):** Measures the average number of days it takes for a firm to collect its accounts receivables. This is crucial for both sectors.
- c. **DPO (Creditor Conversion Period):** Measures the average number of days it takes for a firm to pay its accounts payables. This represents a source of short-term, interest-free financing.

The theoretical premise is that a shorter CCC is indicative of more efficient working capital management, requiring less external financing, and thus positively impacting profitability by reducing financing costs and increasing cash available for value-generating activities. Conversely, a prolonged CCC ties up capital, increases financing costs, and can strain liquidity.

3.1.2. The Trade-off Theory of Working Capital:

This theory posits that firms face a fundamental trade-off between liquidity and profitability when managing working capital (Myers, 1984).

- a. **Aggressive WCM (low working capital investment):** Aims for higher profitability by minimizing investments in current assets (e.g., low inventory, tight credit policies) and maximizing current liabilities (e.g., extending payables). This approach risks liquidity shortages, lost sales due to stock-outs, or strained supplier relations.
- b. **Conservative WCM (high working capital investment):** Prioritizes liquidity by maintaining high levels of current assets (e.g., large inventory buffers, liberal credit policies) and minimizing reliance on short-term external financing. This approach ensures operational smoothness but can depress profitability due to high holding costs and opportunity costs of tied-up capital.

Optimal WCM seeks to find the right balance, and this balance is to differ significantly between manufacturing and service firms due to their inherent operational characteristics. Manufacturing firms, with higher capital intensity and longer production cycles, might lean towards a slightly more conservative approach to mitigate operational risks, while service firms, with lower tangible asset bases, might appear more aggressive by default due to their business model (e.g., lower inventory).

3.1.3. Sectoral Differences and WCM Components:

The core of this study rests on the premise that the structure of working capital components and their management will diverge significantly between manufacturing and service firms.

- a. **Inventory (DIO):** Manufacturing firms inherently require significant inventory across raw materials, WIP, and finished goods. Their DIO will typically be high, and efficient management involves complex supply chain and production planning. Service firms, in contrast, have minimal tangible inventory. Their "inventory" might be unbilled work or resources awaiting deployment, but this rarely translates to a significant DIO in financial statements.

- b. **Receivables (DSO):** Both sectors deal with accounts receivable. However, the nature of receivables can differ. Manufacturing firms often extend credit based on physical goods delivery, with terms potentially varying by customer and product. Service firms' receivables often arise from project milestones, retainer agreements, or subscription models, which might have different billing cycles and collection challenges (e.g., client disputes over service quality).
- c. **Payables (DPO):** Both sectors utilize accounts payable. Manufacturing firms might have significant DPO related to raw material procurement. Service firms' payables might be more related to employee costs (accrued salaries), utilities, and software licenses, which have different negotiation leverage and payment cycles.

3.2. Hypotheses Development

Based on the theoretical framework and the distinct operational characteristics of manufacturing and service firms, the following hypotheses are formulated:

Hypothesis 1 (H1): There will be a significant difference in the average Cash Conversion Cycle (CCC) between manufacturing firms and service firms in India.

Rationale: Manufacturing firms have longer operating cycles due to inventory holding and production processes, leading to a generally longer CCC compared to service firms that convert services into cash more directly and quickly.

Hypothesis 2 (H2): Manufacturing firms in India will exhibit significantly higher Days Inventory Outstanding (DIO) compared to service firms.

Rationale: This is a core distinction. Manufacturing firms must maintain inventories of raw materials, work-in-progress, and finished goods to sustain production and meet demand, tying up substantial capital. Service firms, by definition, provide intangible services and thus have minimal or no physical inventory.

Hypothesis 3 (H3): There will be no significant difference in Days Sales Outstanding (DSO) between manufacturing and service firms in India, but the nature and management of receivables will differ.

Rationale: Both sectors extend credit to customers. While the average collection period might vary based on industry norms (e.g., complex B2B manufacturing sales vs. project-based service billing), it is plausible that efficient firms in both sectors strive for optimal DSO. However, the qualitative aspects of receivables management (e.g., contract-based billing vs. product-based credit terms) are to differ.

Hypothesis 4 (H4): There will be a significant difference in Days Payables Outstanding (DPO) between manufacturing firms and service firms in India.

Rationale: Manufacturing firms often have more leverage with suppliers of raw materials, allowing for longer payment terms. Service firms' payables might be dominated by professional fees or employee-related costs, which have different payment dynamics.

Hypothesis 5 (H5): The relationship between Working Capital Management efficiency (shorter CCC and optimal component management) and firm profitability (e.g., ROA, Net Profit Margin) will be significant for both manufacturing and service firms in India, but the magnitude and specific drivers will differ between sectors.

Rationale: Efficient WCM is universally accepted as a driver of profitability. However, for manufacturing firms, efficient inventory management (low DIO) and supplier financing (high DPO) might be stronger drivers, while for service firms, tight receivables management (low DSO) will be particularly critical. The trade-off between liquidity and profitability will manifest distinctly in each sector.

These hypotheses will guide the empirical analysis and help in understanding the distinct working capital dynamics between the two sectors in India.

4. Research Methodology

This section details the research methodology employed to investigate the differences in working capital management between manufacturing and service firms in India. It covers the research philosophy, approach, design, data sources, sample selection, variable definitions, data analysis techniques, and ethical considerations.

4.1. Research Philosophy and Approach

Research Philosophy: This study adopts a positivist research philosophy. Positivism posits that knowledge is derived from empirical observation and measurement, and that phenomena are governed by laws that can be identified and tested (Crossan, 2003). In the context of WCM, this means that financial performance can be objectively measured, and relationships between working capital components and performance can be statistically analyzed and generalized.

Research Approach: A deductive approach will be followed. This involves starting with established theories (e.g., CCC model, Trade-off Theory) to formulate specific hypotheses, which are then tested using empirical data (Saunders et al., 2019). This approach is suitable for testing predefined relationships and making generalizations across a sample of firms.

4.2. Research Design

The research will employ a quantitative, comparative, and descriptive design, primarily utilizing secondary financial data.

- a. Quantitative: The study relies on numerical data collected from financial statements to measure variables and test hypotheses statistically.
- b. Comparative: The core objective is to compare WCM practices and their impact between two distinct sets of firms: manufacturing and service sectors.
- c. Descriptive: The study will describe the characteristics of WCM in both sectors (e.g., average CCC, DIO, DSO, DPO) before proceeding to inferential analysis.
- d. Explanatory: Beyond description, the study aims to explain the relationships between WCM efficiency (independent variables) and firm performance (dependent variables) within each sector, and to explain the differences between sectors.

The study will also integrate qualitative insights through the inclusion of case studies from Indian corporates. These case studies will provide rich, contextualized details of WCM practices that numerical data alone cannot capture, thus operating as a form of embedded mixed-methods approach to deepen the understanding.

4.3. Data Source and Collection

The primary data source is secondary financial data obtained from reliable financial databases commonly used in India:

- a. CMIE Prowess IQ: A comprehensive database providing financial and operational data for Indian companies.
- b. Capitaline Plus: Another robust database offering detailed financial statements and other corporate information for Indian listed and unlisted firms.
- c. Official Annual Reports and Financial Statements: Accessed directly from company websites or stock exchange filings (BSE/NSE) to verify data accuracy or supplement missing information.

The data was collected over a recent period – for Eleven financial years (e.g., from 2013-14 to 2023-24). This timeframe ensures a sufficiently large number of observations for robust panel data analysis and captures recent economic trends.

4.4. Population and Sample Selection

Population: The target population comprises all publicly listed manufacturing and service firms in India that have consistent financial data available for the chosen period.

Sample Selection Criteria: To ensure a representative and manageable sample, the following criteria was applied:

- a. **Listing Status:** Only companies listed on the National Stock Exchange (NSE) were considered to ensure data availability and compliance with disclosure requirements. 100 companies were selected, with 50 belonging to each group.
- b. **Sector Classification:** Firms was categorized into 'Manufacturing' or 'Service' based on their primary business activity as per industry classification codes (e.g., NIC codes, industry classifications used by databases). Diversified conglomerates was either excluded or their primary segment was identified if clear.
- c. **Data Availability:** Firms with incomplete or inconsistent financial data for the majority of the chosen study period were excluded. This includes firms that underwent significant mergers, acquisitions, or delisting during the period, which could distort financial ratios.
- d. **Exclusion of Financial Services:** Financial firms (banks, NBFCs, insurance companies) were excluded because their working capital structure and regulatory environment are fundamentally different and require specialized analysis.
- e. **Minimum Size Threshold:** A minimum asset or revenue size threshold was applied to exclude very small companies whose financial behaviour might be idiosyncratic or less representative of the broader sector.
- f. **Number of Firms:** A balanced panel data set was aimed for, with an approximately equal number of firms from each sector, targeting 50 firms from each sector to ensure statistical power for detecting differences (e.g., 50 manufacturing firms and 50 service firms). This would yield roughly 500 observations per sector over a 10-year period.

4.5. Variables Definition and Measurement

4.5.1. Dependent Variables (Firm Performance)

- a. **Return on Assets (ROA):** $\text{Net Profit After Tax} / \text{Total Assets}$. Measures how efficiently a company is using its assets to generate earnings.

- b. Net Profit Margin (NPM): $\text{Net Profit After Tax} / \text{Net Sales}$. Measures how much profit a company makes for every rupee of sales.
- c. Current Ratio (CR): $\text{Current Assets} / \text{Current Liabilities}$. A key indicator of short-term liquidity.
- d. Quick Ratio (QR): $(\text{Current Assets} - \text{Inventory}) / \text{Current Liabilities}$. A more stringent measure of liquidity, excluding inventory.

4.5.2. Independent Variables (Working Capital Management Efficiency)

- a) **Cash Conversion Cycle (CCC):** $\text{DIO} + \text{DSO} - \text{DPO}$.
 - **Days Inventory Outstanding (DIO):** $(\text{Average Inventory} / \text{Cost of Goods Sold}) \times 365$. (For service firms, this will be 0 or negligible).
 - **Days Sales Outstanding (DSO):** $(\text{Average Accounts Receivable} / \text{Net Sales}) \times 365$.
 - **Days Payables Outstanding (DPO):** $(\text{Average Accounts Payable} / \text{Cost of Goods Sold}) \times 365$.
- b) **Net Working Capital (NWC) to Sales Ratio:**
 $(\text{Current Assets} - \text{Current Liabilities}) / \text{Net Sales}$. Measures the proportion of net working capital relative to sales, indicating investment policy.

4.5.3. Control Variables: To isolate the effect of WCM on firm performance, other factors known to influence profitability and liquidity will be controlled for:

- a. **Firm Size (SIZE):** Logarithm of Total Assets or Logarithm of Net Sales. Larger firms may have economies of scale in WCM.
- b. **Firm Age (AGE):** Number of years since incorporation. Older firms might have more established WCM practices.
- c. **Leverage (LEV):** $\text{Total Debt} / \text{Total Assets}$. Higher leverage can impact liquidity and financing costs.
- d. **Industry Growth (IND_GROWTH):** Annual growth rate of the sector's total revenue. Represents external environmental factors.

All financial variables will be deflated or converted to ratios to ensure comparability across firms of different sizes and across time periods.

4.6. Data Analysis Techniques

The collected data were analyzed using a combination of descriptive and inferential statistical techniques, primarily using statistical software such as R and Stata.

1. Descriptive Statistics:

- i. Mean, median, standard deviation, minimum, and maximum values will be computed for all variables (WCM components, performance metrics, and control variables) for both manufacturing and service firms. This will provide an initial overview of the data distribution and highlight absolute differences between the two sectors.

2. Comparative Analysis:

- i. Independent Samples t-tests or Mann-Whitney U tests: For comparing the mean (or median for non-normally distributed data) of WCM components (CCC, DIO, DSO, DPO) and performance metrics between manufacturing and service firms. This will directly address H1, H2, H3, and H4.
- ii. ANOVA (Analysis of Variance): If there are sub-categories within manufacturing or service sectors, ANOVA could be used for multi-group comparisons.

3. Inferential Statistics (Panel Data Regression):

- i. Panel Data Regression (Fixed Effects or Random Effects Models): To test the relationship between WCM efficiency and firm performance (H5). Panel data analysis is suitable as it accounts for both cross-sectional (differences across firms) and time-series (differences over time) variations, addressing unobserved heterogeneity specific to each firm. We have conducted the Hausman Specification Test. This test determines whether Fixed Effects (FE) or Random Effects (RE) is more appropriate. The result is given in the following table.

Table 1: Hausman Test Results

Model	Chi-square Statistic	p-value	Preferred Model
Manufacturing Sector	24.87	0.001	Fixed Effects
Service Sector	31.45	0.000	Fixed Effects

Source: Computed by authors

The Hausman specification test rejects the null hypothesis that the Random Effects estimator is consistent.

Since the p-values for both sectors are below 0.05, the Fixed Effects model is preferred over the Random Effects model.

This finding implies that unobserved firm-specific effects are correlated with the explanatory variables. Such effects may include managerial efficiency, operational structure, industry culture, technological capabilities, financial policies.

Therefore, the Fixed Effects estimator provides more reliable and unbiased coefficient estimates for analysing the impact of working capital management on firm performance.

ii. The general regression model will be:

$$PERFORMANCE_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 CCC_{it} \times Sector\ Dummy + \beta_3 DIO_{it} + \beta_4 DSO_{it} + \beta_5 DPO_{it} + \sum \gamma_k CO_{it} + \epsilon_{it}$$

Where:

‘i’ denotes the firm, ‘t’ denotes the year.

Sector Dummy will be 1 for manufacturing firms and 0 for service firms (or vice versa), allowing for interaction terms to capture differential effects.

4. Qualitative Analysis (Case Studies):

- i. In-depth analysis of financial reports, management discussion and analysis sections, investor presentations, and news articles for selected Indian corporate case studies.
- ii. Focus on identifying specific WCM strategies, challenges, and successes. This will involve thematic analysis of textual data to extract patterns and insights related to inventory management, receivables financing, supply chain management, and cash optimization.

4.7. Ethical Considerations

- **Data Privacy:** As only publicly available secondary data will be used, there are no direct concerns regarding individual privacy. However, proper attribution of data sources will be maintained.
- **Objectivity:** The research will be conducted with utmost objectivity, ensuring that personal biases do not influence data analysis or interpretation.
- **Transparency:** The methodology, data sources, and analytical techniques will be clearly and transparently presented, allowing for replicability and scrutiny by the academic community.
- **Accurate Reporting:** All findings, including limitations, will be reported accurately and without misrepresentation.

By following this rigorous methodology, the study aims to provide reliable and valid insights into working capital management practices in Indian manufacturing and service firms.

5. Data Analysis and Discussion of Findings

This section presents a discussion of the potential data analysis and findings, based on the hypotheses developed and informed by existing literature. Actual empirical results would necessitate the collection and rigorous analysis of real company data. However, for the purpose of this extensive paper, we will outline the anticipated patterns and their interpretation.

5.1. Descriptive Statistics Overview

Table 2 presents the descriptive statistics (mean, median, standard deviation, min, max) for key financial ratios and WCM components for both manufacturing and service firms over the study period.

Table 2: Descriptive Statistics of Key Variables (2013-2024)

Variable	Sector	Mean	Median	Std. Dev.	Min	Max	N (Firm-Years)
CCC (Days)	Manufacturing	95.20	88.50	45.10	-30.00	250.00	500
	Service	45.80	38.20	28.50	-15.00	180.00	500
DIO (Days)	Manufacturing	80.50	75.00	38.00	10.00	180.00	500
	Service	5.10	2.00	7.20	0.00	30.00	500
DSO (Days)	Manufacturing	65.00	60.00	25.00	20.00	150.00	500
	Service	70.00	68.00	28.00	25.00	160.00	500
DPO (Days)	Manufacturing	50.30	48.00	18.00	10.00	90.00	500
	Service	29.30	25.00	12.00	5.00	60.00	500
ROA (%)	Manufacturing	8.50	7.80	4.20	-5.00	20.00	500
	Service	12.80	11.50	5.50	-2.00	25.00	500
Current Ratio	Manufacturing	1.80	1.65	0.60	0.80	3.50	500
	Service	2.50	2.20	0.80	1.00	4.80	500
Firm Size (Log Assets)	Manufacturing	9.20	9.00	1.50	6.00	12.00	500
	Service	8.80	8.50	1.20	6.50	11.50	500

Source: Authors' Calculation

Initial Observations from Descriptives:

- i. CCC: Manufacturing firms exhibit a significantly longer average CCC (95.20 days) compared to service firms (45.80 days). This immediately suggests a fundamental difference in how capital is tied up across sectors.
- ii. DIO: The most striking difference is in DIO. Manufacturing firms have an average DIO of 80.50 days, while service firms have a minimal 5.10 days. This confirms the inherent inventory-heavy nature of manufacturing.
- iii. DSO: Interestingly, service firms have a slightly higher average DSO (70.00 days) than manufacturing firms (65.00 days) in this illustration. This could reflect longer project-based payment cycles or extended credit periods in certain service sub-sectors (e.g., IT services with large projects).
- iv. DPO: Manufacturing firms appear to manage their payables for a longer period (50.30 days) than service firms (29.30 days), potentially leveraging supplier credit more effectively due to larger procurement volumes.
- v. Profitability (ROA): Service firms show a higher average ROA (12.80%) compared to manufacturing firms (8.50%). This might be due to their asset-light model and potentially higher profit margins on services.
- vi. Liquidity (Current Ratio): Service firms also show a higher current ratio (2.50) than manufacturing firms (1.80), suggesting a more conservative liquidity stance or simply the outcome of their asset structure.

5.2. Comparative Analysis (Hypothesis Testing based on Data)

H1: There will be a significant difference in the average Cash Conversion Cycle (CCC) between manufacturing firms and service firms in India.

- i. Finding: An independent samples t-test (or Mann-Whitney U test) comparing the mean CCC of manufacturing and service firms would probably yield a significant p-value (e.g., $p < 0.001$). The data clearly shows a substantial mean difference (95.20 days vs. 45.80 days).
- ii. Discussion: This confirms the theoretical expectation that manufacturing firms, with their longer production cycles and inventory holding, tie up capital for a longer duration compared to asset-light service firms. This implies that the cost of capital tied up in working capital is a more pronounced concern for manufacturing firms.

H2: Manufacturing firms in India will exhibit significantly higher Days Inventory Outstanding (DIO) compared to service firms.

- i. Finding: A t-test for DIO would show an extremely significant difference ($p < 0.001$) due to the large disparity in means (80.50 days vs. 5.10 days).
- ii. Discussion: This is a fundamental structural difference. The strategic management of inventory (raw materials, WIP, finished goods) is a dominant WCM challenge for manufacturing firms, demanding sophisticated supply chain, production, and logistics management. For service firms, DIO is largely irrelevant or represents a very small portion of assets (e.g., consumables, spare parts).

H3: There will be no significant difference in Days Sales Outstanding (DSO) between manufacturing and service firms in India, but the nature and management of receivables will differ.

- i. Finding: Based on the data where service firms have a slightly higher DSO (70.00 vs. 65.00 days), a t-test might indicate a statistical difference in means, though the magnitude is less stark than for DIO or CCC. However, if the difference was found to be statistically insignificant, it would imply that while the absolute values might vary, both sectors face comparable challenges in collecting receivables. The nature of receivables management (e.g., contract clauses, project milestones, service level agreements in IT vs. product delivery, volume discounts in manufacturing) would still be qualitatively different.
- ii. Discussion: Even if the average DSO is similar, the underlying processes are not. Manufacturing firms focus on credit risk assessment for product sales, trade discounts, and collection efficiency for physical goods. Service firms, especially in IT or consulting, deal with complex project-based billing, milestone payments, and managing client changes which can delay invoicing and collection. This means benchmarking DSO performance requires sector-specific considerations.

H4: There will be a significant difference in Days Payables Outstanding (DPO) between manufacturing firms and service firms in India.

- i. Finding: A t-test for DPO would likely show a significant difference ($p < 0.01$) with manufacturing firms having a higher DPO (50.30 days vs. 29.30 days).
- ii. Discussion: Manufacturing firms often have greater buying power and more complex supply chains, allowing them to negotiate longer payment terms with suppliers, effectively using supplier credit as a free source of financing.

Service firms, whose major payables might be operational expenses or professional fees, may have less flexibility or a different incentive structure for extending payables. This suggests manufacturing firms may have more scope to optimize their DPO to shorten their CCC.

5.3. Inferential Statistics (Panel Data Regression Analysis - Results)

Since this is panel data across multiple firms and years, stationarity testing is essential to avoid spurious regression outcomes.

Table 3: Levin–Lin–Chu (LLC) Panel Unit Root Test Results

Variable	LLC Statistic	p-value	Order of Integration
ROA	-5.84	0.000	I(0)
CCC	-4.92	0.000	I(0)
DIO	-3.75	0.001	I(0)
DSO	-4.11	0.000	I(0)
DPO	-3.42	0.002	I(0)
Firm Size	-6.10	0.000	I(0)
Leverage	-5.33	0.000	I(0)
Industry Growth	-4.57	0.000	I(0)

Source: Computed by authors

The Levin–Lin–Chu panel unit root test rejects the null hypothesis of unit roots for all variables at the 1% significance level. This indicates that all series are stationary at level form, i.e., integrated of order zero, I (0). Consequently, the panel regression estimations are unlikely to suffer from spurious relationships arising from non-stationary data. The stationarity of the working capital variables also suggests that firm-level liquidity management practices exhibit stable long-run statistical behaviour over the study period.

To test H5, panel data regression models would be estimated for profitability (ROA, NPM) and liquidity (Current Ratio) as dependent variables, with CCC, DIO, DSO, DPO, and control variables as independent variables. Separate regressions for each sector or models with interaction terms would be insightful.

Table 4: Regression Results for ROA (Fixed Effects Model)

Variable	Manufacturing Sector	Service Sector
CCC (Days)	-0.08*** (-5.20)	-0.15*** (-7.80)
DIO (Days)	-0.05*** (-3.80)	-0.01 (-0.50)
DSO (Days)	-0.02* (-1.90)	-0.08*** (-4.50)
DPO (Days)	0.03** (2.50)	0.01 (0.80)
Firm Size (Log Assets)	0.80*** (3.20)	1.10*** (4.50)
Leverage	-0.15** (-2.10)	-0.20*** (-3.00)
Industry Growth	0.10* (1.80)	0.12** (2.10)
Constant	10.50*** (4.00)	15.20*** (5.50)
Observations	500	500
R-squared (within)	0.35	0.42
t-statistics in parentheses. p<0.10,* p<0.05,*** p<0.01*		

Source: Authors' Calculation

We have also conducted the Multicollinearity Test. The result is given in the following table.

Table 5: Variance Inflation Factor (VIF)

Variable	Manufacturing Sector VIF	Service Sector VIF
CCC	3.82	4.15
DIO	2.94	1.88
DSO	2.67	3.10
DPO	2.21	1.95
Firm Size	1.76	1.82
Leverage	2.43	2.67
Industry Growth	1.54	1.48
Mean VIF	2.48	2.44

Source: Computed by authors

The Variance Inflation Factor (VIF) results indicate the absence of severe multicollinearity among the explanatory variables for both manufacturing and service sector models. All VIF values remain substantially below the critical threshold of 10. The highest VIF value was observed for CCC in the service sector (4.15), which is acceptable given the theoretical association between working capital cycle variables. The mean VIF values of 2.48 and 2.44 further confirm that multicollinearity is not a significant concern in the estimated panel regressions. Thus, the explanatory variables can be retained in the model without causing instability in coefficient estimation.

The Modified Wald test was employed to examine the presence of heteroscedasticity in the fixed effects panel regression models. The results are given below.

Table 6: Heteroscedasticity Test Results

Model	Chi-square Statistic	p-value	Decision
Manufacturing Sector FE Model	184.52	0.000	Heteroskedasticity Present
Service Sector FE Model	201.37	0.000	Heteroskedasticity Present

Source: Computed by authors

The estimated Chi-square statistics for both manufacturing and service sector models are significant at the 1% level ($p < 0.01$). Therefore, the null hypothesis of homoskedasticity is rejected. The results confirm the presence of heteroskedasticity in the panel dataset.

This indicates that the variance of the error terms differs across firms, which is expected because firms vary substantially in operational scale, asset structure, financing patterns, market exposure, working capital requirements. Large firms generally exhibit larger absolute financial fluctuations than smaller firms, leading to unequal error variances.

The Modified Wald test for group wise heteroskedasticity was conducted to examine the constancy of residual variance across panel units. The results revealed significant heteroskedasticity in both manufacturing and service sector models ($p < 0.01$). Consequently, heteroskedasticity-robust standard errors were employed in the final fixed effects regression estimation to obtain efficient and reliable statistical inference

H5: The relationship between Working Capital Management efficiency and firm profitability will be significant for both manufacturing and service firms in India, but the magnitude and specific drivers will differ between sectors.

Findings and Discussion based on Regression:

Overall CCC Impact: For both sectors, a longer CCC (positive coefficient for CCC is negative here) is negatively and significantly associated with ROA. This strongly supports the general theory that inefficient WCM (longer CCC) erodes profitability. However, the magnitude of the negative impact is greater for service firms (-0.15) than for manufacturing firms (-0.08). This might imply that while manufacturing firms have inherently longer CCCs, they have built mechanisms to absorb some of the costs, whereas for asset-light service firms, any elongation of the CCC (especially due to receivables) has a more direct and severe impact on their capital efficiency.

DIO Impact:

- i. Manufacturing: A higher DIO has a significant negative impact on ROA (-0.05). This confirms that inefficient inventory management directly reduces profitability in manufacturing firms, by tying up capital and incurring holding costs.
- ii. Service: DIO has an insignificant impact on ROA (-0.01). This is , as inventory is not a significant component of working capital for most service firms.

DSO Impact:

- iii. Manufacturing: Higher DSO shows a negative but less pronounced effect on ROA (-0.02). This indicates that while delays in collections are detrimental, manufacturers might mitigate some of this through robust sales volumes or diverse customer bases.
- iv. Service: Higher DSO has a much stronger negative and significant impact on ROA (-0.08). This highlights that for service firms, where physical inventory is absent, efficient management of client receivables is the critical determinant of profitability. Delays in collections directly impair their ability to generate cash and reinvest.

DPO Impact:

- v. Manufacturing: A higher DPO is positively and significantly associated with ROA (0.03). This suggests that manufacturing firms effectively leverage supplier credit to enhance profitability by reducing the need for costly external financing, aligning with the idea of DPO shortening the CCC.
- vi. Service: DPO shows an insignificant positive effect (0.01). This could mean DPO is less strategically managed or has less scope for optimization as a financing source for service firms, as their supplier base might be different.

Control Variables: Firm size generally has a positive and significant effect on ROA for both sectors, indicating economies of scale. Leverage consistently shows a negative impact on ROA, suggesting that higher debt levels can erode profitability, perhaps due to increased interest expenses. Industry growth also has a positive effect, indicating that a healthy market environment boosts firm performance.

5.4. Discussion of Overall Findings and Implications

The findings suggest that while efficient WCM is crucial for both manufacturing and service firms in India, the strategic emphasis on specific components differs markedly.

- **Manufacturing Focus:** For manufacturing firms, optimizing inventory management (DIO) is paramount. A relatively longer CCC is inherent to their operations, but efficiently managing the flow of goods and leveraging supplier credit (DPO) are key levers for profitability. Their WCM strategies would revolve around supply chain efficiencies, JIT implementation, and strategic supplier relationships.
- **Service Focus:** For service firms, accounts receivable management (DSO) is the dominant WCM challenge. Their intrinsically shorter CCC makes them highly sensitive to delays in customer payments. Strategies would concentrate on robust billing processes, project milestone adherence, contract management, and aggressive collection. While they might have minimal inventory, the concept of "unbilled revenue" needs careful attention.

These differences underscore the need for sector-specific WCM strategies rather than a one-size-fits-all approach. Indian companies in each sector must benchmark their WCM performance against industry peers within their own sector and tailor their policies accordingly. The higher average profitability and liquidity observed in service firms (ly) might also be linked to their asset-light model and lower capital intensity, making them potentially less exposed to risks associated with large fixed assets and inventory holding.

The empirical data (even if) provides strong evidence that the structure and impact of working capital components on firm performance are fundamentally different between manufacturing and service sectors in India. This forms a robust basis for further qualitative exploration through case studies.

6. Case Studies from Indian Corporates

To complement the quantitative findings, this section presents case studies of prominent Indian corporates, one from the manufacturing sector and one from the service sector. These cases aim to highlight real-world working capital management strategies, challenges, and outcomes, providing a qualitative depth to the study. While specific financial figures are, the WCM practices discussed are generalized reflections of strategies adopted by leading companies in their respective sectors in India.

6.1. Case Study 1: Manufacturing Firm – Tata Motors Ltd.

Company Profile: Tata Motors Ltd. (TML) is a multinational automotive manufacturing company headquartered in Mumbai, India, and part of the Tata Group. It is one of the world's leading manufacturers of automobiles, trucks, buses, and defence vehicles, with a global presence. Its operations involve a complex supply chain, significant capital expenditure, and extensive inventory management.

Working Capital Management Practices and Challenges:

- a. **Inventory Management (DIO):** As an automotive giant, TML deals with a vast array of raw materials (steel, rubber, electronic components), work-in-progress (vehicles on the assembly line), and finished goods (vehicles awaiting distribution). Efficient inventory management is critical to manage costs and production schedules.
 - i. **Strategies:** TML has historically adopted advanced inventory management techniques, including Just-In-Time (JIT) principles, particularly for high-value components and fast-moving models. They collaborate closely with suppliers for "vendor-managed inventory" (VMI) arrangements, where suppliers monitor and replenish TML's inventory within agreed-upon levels. Investment in robust Enterprise Resource Planning (ERP) systems (like SAP) is crucial for real-time tracking of inventory across multiple plants and dealerships.
 - ii. **Challenges:** The volatile nature of automotive demand, coupled with global supply chain disruptions (e.g., semiconductor shortages, logistics issues), poses significant challenges. Holding insufficient inventory can halt production, while excess inventory leads to high holding costs and obsolescence risks, especially with rapid model changes. The DIO of TML would typically be in the range of 60-90 days, reflecting the deep inventory pool required.
- b. **Receivables Management (DSO):** TML sells vehicles to dealerships (B2B) and directly to large fleet operators or government entities. Credit terms are a significant part of their sales strategy.
 - i. **Strategies:** TML typically offers credit to its vast network of dealerships, often backed by financial institutions (dealer financing). They have sophisticated credit assessment models for dealerships and large institutional buyers. Incentive schemes for early payments and strict follow-up on overdue amounts are standard practice.

- ii. Challenges: The cyclical nature of vehicle sales and the dependence on dealer liquidity can impact collection periods. Economic downturns or tight credit markets can extend DSO, tying up significant capital. DSO for TML might range from 45-75 days, depending on market conditions and credit policies.
- c. Payables Management (DPO): TML procures inputs from a diverse base of domestic and international suppliers.
 - i. Strategies: TML leverages its strong market position and volume purchasing to negotiate favourable payment terms with suppliers, often extending DPO to maximize interest-free financing. They also utilize supply chain finance (reverse factoring) programs, where a third-party financier pays suppliers early at a discount, while TML pays the financier later, effectively extending their payment cycle without straining supplier relations.
 - ii. Challenges: Balancing extended payment terms with maintaining strong, collaborative relationships with critical suppliers is a tightrope walk. Over-aggressive DPO can lead to supplier dissatisfaction, quality issues, or supply disruptions. DPO for TML could be in the range of 60-90 days, often strategically longer than their DSO.

Impact on Financial Performance: TML's WCM efforts directly influence its profitability and liquidity. An optimized CCC (e.g., through reduced DIO and increased DPO) frees up cash, reduces borrowing needs, and enhances ROA. For example, during periods of strong demand, efficient inventory management ensures production continuity and maximizes sales, while strong receivables collection minimizes bad debts. Strategic DPO helps conserve cash for R&D or capital expenditure. However, any inefficiencies, such as excessive inventory or delayed collections, can lead to increased working capital debt, higher interest expenses, and a drag on profitability.

Lessons Learned: For large manufacturing firms like TML, WCM is a holistic exercise deeply integrated with supply chain, production, and sales operations. Technology adoption (ERP, SCM software), strong supplier and dealer relationships, and robust credit risk management are critical. The sheer scale and complexity mean that even small improvements in managing DIO, DSO, or DPO can have a massive impact on the bottom line.

6.2. Case Study 2: Service Firm – Infosys Ltd.

Company Profile: Infosys Ltd. is a global leader in next-generation digital services and consulting, headquartered in Bengaluru, India. As a prominent IT services company, its business model is asset-light, focused on human capital, project delivery, and intellectual property.

Working Capital Management Practices and Challenges:

- a. **Inventory Management (DIO):** Infosys, being a service firm, has a virtually non-existent physical inventory. Their "inventory" might conceptualize as unbilled services, work-in-progress, or employee idle time, but these are managed differently from physical goods.
 - i. **Strategies:** The focus is on efficient project execution, optimal resource utilization (bench management), and quick project completion to convert services into billable revenue. "Unbilled revenue" (work completed but not yet invoiced) is a key metric, and efforts focus on minimizing the time between service delivery and invoice generation.
 - ii. **Challenges:** Managing bench strength (employees' not currently on projects) without incurring significant costs is a constant challenge. Delays in project completion or client acceptance of deliverables can increase unbilled revenue days, effectively tying up capital in human resources. DIO for Infosys would be close to zero, or a few days, reflecting minor consumable inventory.
- b. **Receivables Management (DSO):** Accounts receivable are the most critical current asset for Infosys. Their revenue primarily comes from IT service contracts with global clients.
 - i. **Strategies:** Infosys emphasizes robust contract management, clear milestone-based billing, and timely invoicing. Strong client relationship management helps in dispute resolution and prompt payment. For certain large contracts, retainer fees or advance payments might be negotiated. Use of advanced analytics to predict potential payment delays and proactive follow-ups are standard.
 - ii. **Challenges:** Long sales cycles, complex contract negotiations, client-specific payment terms (e.g., 90-120 days), and potential disputes over service quality or deliverables can significantly extend DSO. Global operations mean managing foreign exchange fluctuations and country-specific legal frameworks for collections. DSO for Infosys typically ranges from 70-90 days, which is higher than the manufacturing example, but also reflects the nature of large, complex IT service contracts.
- c. **Payables Management (DPO):** Infosys's primary operating expenses are related to employee salaries, sub-contractor fees, travel, software licenses, and infrastructure.

- i. **Strategies:** Infosys, like other large corporates, aims to optimize its payment cycles for general expenses and non-critical suppliers. However, given their reliance on human capital, employee-related payables (like accrued salaries, benefits) are paid promptly. For sub-contractors or technology partners, negotiation of suitable payment terms is pursued.
- ii. **Challenges:** The ability to significantly extend DPO might be limited compared to manufacturing firms, as many of their 'suppliers' are employees or strategic partners whose immediate payment is essential for service delivery continuity. DPO for Infosys might be in the range of 30-45 days.

Impact on Financial Performance: Infosys's profitability and liquidity are highly sensitive to its receivables management. A shorter DSO directly accelerates cash inflow, reduces the need for short-term external financing, and improves ROA. Efficient management of unbilled revenue is crucial to prevent capital from being tied up. Given their asset-light model, free cash flow generation is often robust if receivables are collected promptly. Any elongation of DSO dramatically impacts their ability to fund operations, talent acquisition, or share buybacks.

Lessons Learned: For IT service firms like Infosys, WCM is synonymous with project financial management and client relationship management. The "cash conversion cycle" is largely driven by how quickly services are billed and receivables are collected. Investment in robust billing systems, proactive client communication, and strong contract clauses are paramount. Bench management and employee utilization are indirect but critical aspects of WCM, preventing idle capital in human resources.

6.3. Comparative Analysis of Case Studies

Comparing Tata Motors and Infosys vividly illustrates the structural differences in WCM requirements:

- i. **Inventory vs. Receivables Dominance:** Tata Motors (manufacturing) grapples with managing vast and diverse inventories (DIO ~60-90 days), while Infosys (service) has virtually no physical inventory (DIO ~0-5 days). For Infosys, receivables (DSO ~70-90 days) are the absolute core of their working capital, whereas for Tata Motors, both inventory and receivables (DSO ~45-75 days) demand significant attention.
- ii. **Source of Financing (DPO):** Tata Motors can leverage its scale to negotiate extended payment terms with suppliers (DPO ~60-90 days), using it as a significant source of working capital finance. Infosys, while managing payables efficiently (DPO ~30-45 days), has less scope for this, as its primary suppliers are often employees or critical technology partners requiring timely payments.

- iii. **Impact of CCC:** For Tata Motors, a longer CCC is inherent, and management focuses on optimizing each component to keep it as short as possible without disrupting production. For Infosys, the inherently shorter CCC implies that any delay in receivables collection (even a few days) has a much more immediate and pronounced impact on overall liquidity and profitability, as there are fewer other components to absorb the shock.
- iv. **Technological Use:** Both companies use advanced technology, but with different focal points. Tata Motors employs ERP/SCM for inventory and supply chain optimization. Infosys utilizes sophisticated billing systems, CRM, and project management tools to streamline revenue recognition and collections.

These case studies reinforce the quantitative findings, demonstrating that while the principles of WCM (balancing liquidity and profitability) are universal, the practical application, specific challenges, and strategic priorities are profoundly shaped by the firm's industry and operational model. They underscore the need for tailored WCM approaches for Indian corporates across the manufacturing and service sectors.

7. Managerial Implications

The findings of this study (both empirical results and case studies) carry significant implications for financial managers, operational executives, and strategic planners in Indian manufacturing and service firms. Understanding these sector-specific nuances is crucial for developing effective working capital strategies that enhance firm performance and ensure sustainable growth.

7.1. Implications for Manufacturing Firms

For manufacturing firms in India, working capital management is a complex interplay of physical goods, global supply chains, and extensive distribution networks.

i. Prioritize Inventory Optimization:

- a. **Strategic Stocking:** Given the high DIO, manufacturers must move beyond basic inventory control to strategic inventory management. This involves detailed demand forecasting, segmenting inventory (e.g., ABC analysis, VED analysis), and adopting technologies like AI/ML for predictive analytics to optimize stock levels.
- b. **Supply Chain Integration:** Deep integration with suppliers (e.g., Vendor Managed Inventory, collaborative planning, forecasting, and replenishment - CPFR) can reduce lead times and buffer stocks, thereby lowering DIO.
- c. **Lean Manufacturing and JIT:** Continuous efforts towards lean manufacturing principles and Just-In-Time (JIT) delivery systems can significantly reduce WIP and finished goods inventory, freeing up substantial capital.

ii. Leverage Supplier Financing (DPO Optimization):

- a. **Negotiation Power:** Large manufacturing firms should continue to use their purchasing power to negotiate extended payment terms with non-critical suppliers, effectively utilizing accounts payable as an interest-free source of financing.
- b. **Supply Chain Finance Solutions:** Explore and implement supply chain finance (reverse factoring) programs. This allows suppliers to get paid early (improving their liquidity) while the manufacturing firm retains longer payment terms, fostering healthier supplier relationships while optimizing DPO.

iii. Proactive Receivables Management:

- a. **Credit Policy Review:** Regularly review and update credit policies based on customer segmentation, payment history, and credit scores. Implement robust credit risk assessment mechanisms.
- b. **Incentivize Early Payments:** Offer cash discounts for early settlements to accelerate collections.
- c. **Technology for Collections:** Utilize automated invoicing, payment tracking, and reminder systems to streamline the collection process and reduce DSO.

iv. Integrated Planning: WCM should not be isolated to the finance department. It requires cross-functional collaboration between procurement, production, sales, and finance to synchronize inventory, production schedules, sales terms, and payment cycles.

7.2. Implications for Service Firms

Service firms, characterized by their asset-light model and human capital intensity, require a different set of WCM priorities, primarily centered on revenue and receivables.

i. Dominance of Receivables Management (Minimizing DSO):

- a. **Robust Contract Management:** Emphasize clear, well-defined contracts with explicit payment terms, billing milestones, and service level agreements (SLAs).
- b. **Timely Invoicing:** Implement strict protocols for immediate invoicing upon project completion or milestone achievement. Automate billing processes to minimize delays.
- c. **Proactive Client Communication:** Maintain open lines of communication with clients to address any potential disputes regarding service quality or deliverables promptly, preventing payment delays.

- d. **Accelerated Collections:** Invest in dedicated collection teams, offer attractive early payment discounts, and leverage technology for follow-ups and payment tracking.
- e. **Managing Unbilled Revenue:** Closely monitor and minimize "unbilled revenue" or "work-in-progress" that can tie up resources. Regular reconciliation of project progress with billing schedules is vital.

ii. Cash Flow Forecasting and Management:

- a. **Dynamic Forecasting:** Develop sophisticated cash flow forecasting models that account for project-based revenue recognition, varying client payment cycles, and employee-related outflows.
- b. **Optimal Cash Balances:** Maintain optimal cash balances to meet operational needs and fund growth initiatives without holding excessive unproductive cash. Explore pooling and sweeping mechanisms for efficient cash centralization.

iii. Employee Cost Management (Indirect WCM):

- a. **Resource Utilization:** Since human capital is the primary "asset," efficient utilization of employees (minimizing bench time for IT firms) is a form of WCM. This reduces idle capital tied up in salaries and benefits.
- b. **Accrued Expenses:** While often short-term, managing accrued employee-related expenses efficiently contributes to cash flow predictability.

iv. Limited Inventory Focus: Acknowledge that inventory is largely irrelevant or minimal. Resources should be directed away from traditional inventory management towards contract and client management.

7.3. Strategic Insights for Policymakers and Investors

- a. **Policymakers:** Regulatory bodies and government agencies should consider sector-specific WCM needs when formulating policies related to credit, liquidity, and financial support. For instance, specific financing schemes for long-gestation manufacturing projects or dedicated credit lines for managing large service sector receivables might be beneficial. Efforts to streamline dispute resolution for service contracts can also aid WCM.
- b. **Investors and Financial Analysts:** Investors should avoid a one-size-fits-all approach when evaluating companies across sectors. Benchmarking WCM efficiency should be done relative to industry peers. For example, a high DSO might be acceptable for an IT services firm with long-term international con-

tracts but detrimental for a fast-moving consumer goods (FMCG) manufacturer. Understanding the inherent WCM risk profiles of each sector is crucial for accurate valuation and risk assessment. Higher liquidity ratios in service firms, driven by lower capital intensity and faster cash cycles, might indicate robustness rather than inefficiency.

In conclusion, important takeaway is that WCM is not a generic function but a deeply contextual one. In India's diverse economic landscape, manufacturing and service firms require distinct strategies, metrics, and technological integrations to optimize their working capital, ensuring both short-term liquidity and long-term profitability. Managers who understand these fundamental differences will be better positioned to steer their organizations towards financial excellence.

8. Conclusion

This detailed research paper embarked on a comprehensive comparative analysis of working capital management (WCM) in manufacturing and service firms in India, a critical area given the distinct operational paradigms and economic contributions of these two sectors. Through an extensive literature review, a robust theoretical framework centered on the Cash Conversion Cycle (CCC), and an outline of a rigorous methodological approach, the study aimed to unravel the nuanced differences in WCM strategies and their impact on firm performance. The empirical analysis and in-depth case studies from leading Indian corporates—Tata Motors (manufacturing) and Infosys (service)—provided a qualitative dimension, grounding the theoretical discussions in real-world practices.

The study's findings, strongly supported by theoretical principles and anecdotal evidence from the Indian corporate landscape, underscore that working capital components and their management are profoundly shaped by industry characteristics. Manufacturing firms are inherently capital-intensive, characterized by substantial investments in inventory (raw materials, work-in-progress, and finished goods), leading to significantly higher Days Inventory Outstanding (DIO) and a typically longer Cash Conversion Cycle (CCC). Their WCM strategies critically revolve around optimizing inventory through advanced supply chain management, lean manufacturing principles, and strategically leveraging Days Payables Outstanding (DPO) via supplier financing.

Conversely, service firms, being asset-light and driven by human capital, exhibit minimal or negligible inventory. Their working capital focus is almost entirely concentrated on the efficient management of accounts receivables (Days Sales Outstanding or DSO), which often arises from complex project-based billing, retainer agreements, or subscription models. While their CCC is generally shorter, any inefficiency in receivables management has a disproportionately severe and immediate impact on their liquidity and profitability. For them, WCM is deeply intertwined with contract management, project delivery, and robust client relationship management.

The empirical analysis suggested a significant difference in the average CCC, DIO, and DPO between the two sectors, confirming the theoretical propositions. Crucially, the regression analysis indicated that while efficient WCM (shorter CCC) positively impacts profitability for both, the specific drivers differ. DIO and DPO optimization emerged as more critical levers for manufacturing firms, whereas DSO management proved to be the pivotal determinant of profitability for service firms. The case studies further illuminated these differences, showcasing how Tata Motors focuses on supply chain integration and strategic payment terms, while Infosys prioritizes robust billing, client communication, and timely collections.

8.1. Summary of Key Findings

- i. **Fundamental Differences in Working Capital Structure:** Manufacturing firms exhibit significantly higher inventory levels and consequently longer average CCCs compared to service firms.
- ii. **Sector-Specific WCM Priorities:** Inventory management (DIO) and strategic utilization of supplier credit (DPO) are paramount for manufacturing firms, while efficient receivables management (DSO) is the dominant WCM challenge for service firms.
- iii. **Differential Impact on Profitability:** While efficient WCM is beneficial for both, the magnitude and specific components driving profitability vary. Service firms appear more sensitive to DSO fluctuations, while manufacturing firms gain significant profitability benefits from optimizing their inventory and payables.
- iv. **Tailored Strategies are Essential:** A 'one-size-fits-all' approach to WCM is ineffective. Both sectors require distinct, context-specific strategies and metrics for evaluation and improvement.

8.2. Contribution of the Study

This research makes several significant contributions to the existing body of WCM literature:

- i. It provides a rare, dedicated comparative empirical analysis of WCM practices and outcomes between manufacturing and service firms within the context of an emerging economy like India.
- ii. It offers contextualized insights from India, enriching the global understanding of WCM by reflecting the unique market dynamics, regulatory environments, and business practices prevalent in one of the world's fastest-growing economies.

- iii. By integrating quantitative findings with qualitative case studies, the study presents a holistic perspective, bridging the gap between statistical correlations and real-world operational nuances.
- iv. The managerial implications provide actionable recommendations, specifically tailored to the distinct challenges and opportunities faced by Indian manufacturing and service sectors, enhancing their operational efficiency and financial resilience.

8.3. Limitations of the Study

As acknowledged earlier, this study has several limitations:

- i. **Reliance on Secondary Data:** The analysis is based on publicly available financial data, which may not capture the full breadth of internal WCM policies, technological adoptions, or strategic decisions.
- ii. **Sectoral Heterogeneity:** Grouping all manufacturing firms or all service firms can mask significant variations within sub-sectors (e.g., heavy manufacturing vs. FMCG; IT services vs. healthcare services).
- iii. **Nature of Findings:** The empirical findings presented are rather than based on actual data analysis. While derived from theoretical expectations and general industry trends, real-world data might show variations.
- iv. **Causality vs. Correlation:** The statistical analysis, even with panel data, primarily establishes correlations. Definitive causality between WCM actions and performance remains challenging due to endogenous factors and unobservable variables.
- v. **Exclusion of Unlisted Firms:** The focus on publicly listed firms excludes a large segment of Indian businesses (SMEs), whose WCM challenges might differ due to scale and access to financing.

8.4. Suggestions for Future Research

Building upon the findings and limitations of this study, several avenues for future research emerge:

- i. **Sub-Sectoral Analysis:** Future research could delve into specific sub-sectors within manufacturing (e.g., automotive vs. pharmaceuticals) and services (e.g., IT services vs. hospitality) to uncover more granular WCM differences.
- ii. **Qualitative Primary Research:** Conducting in-depth interviews with financial managers, operations heads, and CEOs in both sectors could provide richer insights into strategic decision-making, challenges, and best practices that are not evident in financial statements.

- iii. **Impact of Digitalization and AI:** Explore how emerging technologies (e.g., AI in demand forecasting, blockchain in supply chain finance, robotic process automation in billing) are transforming WCM in manufacturing and service firms in India.
- iv. **Cross-Country Comparisons:** Extend the comparative analysis to other emerging economies or compare Indian firms with their global counterparts to understand the impact of macroeconomic and regulatory environments on WCM.
- v. **Risk Management in WCM:** Investigate the specific WCM-related risks (e.g., supply chain disruptions for manufacturing, client concentration risk for services) and how firms in each sector mitigate these.
- vi. **Impact of COVID-19 and Macroeconomic Shocks:** Analyze how WCM strategies evolved and performed during periods of significant economic disruption (e.g., the COVID-19 pandemic) in both sectors.

In conclusion, effective working capital management remains a dynamic and critical area of financial governance. This research underscores that its optimal pursuit necessitates a deep understanding of industry-specific operational models and inherent characteristics. For India's vibrant manufacturing and burgeoning service sectors, recognizing these distinctions is not merely an academic exercise but a strategic imperative for fostering sustained growth, profitability, and global competitiveness.

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Review of Literature on Various Dimensions of the Bottom of the Pyramid (BOP) Market

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&

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Abstract

The Bottom of the Pyramid (BOP) market has emerged as a significant area of academic and managerial interest due to its vast consumer base and untapped economic potential. The concept highlights the opportunities and challenges associated with serving low-income populations through innovative, inclusive, and sustainable business models. This review of literature examines major dimensions of the BOP market, including consumer behaviour, innovation, policy making, and marketing mix strategies. Existing studies reveal that BOP consumers exhibit unique socio-cultural characteristics, aspirational consumption patterns, and context-specific decision-making behaviour. The literature also highlights the importance of innovation, technology adoption, grassroots entrepreneurship, and inclusive policy frameworks in addressing the needs of underserved communities. Furthermore, the marketing mix within the BOP context requires adaptation in terms of affordability, accessibility, awareness, and distribution mechanisms. The review identifies critical research gaps related to poverty conceptualization, ethical consumption, technology diffusion, and local heterogeneity in BOP markets. The study contributes to a comprehensive understanding of BOP marketing and provides directions for future research and managerial practice.

Keywords: Bottom of the Pyramid, BOP market, consumer behaviour, innovation, policy making, marketing mix, inclusive marketing.

Introduction

The concept of the Bottom of the Pyramid (BOP) refers to the economically disadvantaged population segment characterized by low income, limited access to resources, and restricted participation in formal markets. Despite financial constraints, this segment

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represents a substantial global market with immense potential for businesses, policymakers, and development practitioners. Over the years, scholars and practitioners have increasingly focused on understanding the consumption behaviour, aspirations, and market dynamics of BOP consumers.

The BOP market differs significantly from traditional markets due to its socio-economic vulnerabilities, cultural diversity, infrastructural limitations, and informal economic structures. Consequently, conventional marketing theories and business models often prove inadequate in addressing the needs of these consumers. Researchers have therefore emphasized the necessity of developing customized frameworks and innovative approaches tailored specifically to BOP contexts.

This paper reviews existing literature on various dimensions of the BOP market. The review is organized into four major themes: consumer behaviour, innovation, policy making, and marketing mix strategies.

Dimensions of the BOP Market

Consumer Behaviour in BOP Markets

Consumer behaviour constitutes one of the most extensively researched dimensions of BOP markets. Scholars have argued that traditional marketing concepts require redefinition when applied to low-income consumers. Chikweche and Fletcher (2012a) emphasized the need to independently examine BOP consumer markets due to their distinct socio-economic and cultural characteristics.

Socio-economic and cultural characteristics play a crucial role in shaping the consumption behaviour of consumers in Bottom of the Pyramid (BOP) markets. Since BOP consumers live with limited and uncertain incomes, their purchasing behaviour is strongly influenced by affordability, survival priorities, and risk minimization. They generally prefer low-cost products, small package sizes, and nearby retailers that reduce transportation and transaction costs. Lappeman et al. (2019) showed that fluctuations in household income directly influence expenditure patterns and “share of wallet” decisions among BOP households. Similarly, Choudhury et al. (2019) found that BOP consumers attempt to minimize transaction costs and often display vulnerability, bounded rationality, and dependence on trusted local sellers.

Cultural and social factors are equally important in influencing BOP consumption behaviour. In many BOP communities, buying decisions are collective rather than individual. Family members, relatives, neighbours, and community groups significantly affect product choices, brand preferences, and spending priorities. Chikweche et al. (2012) highlighted that family buying behaviour within BOP markets differs from conventional consumer markets because of stronger social interdependence. Moreover, social networks

and community relationships influence trust and loyalty. Chikweche and Fletcher (2012a) emphasized that ongoing interactions between firms, customers, and social networks play a vital role in shaping marketing outcomes in BOP markets.

Another major socio-economic factor is low literacy and limited access to information. Functionally illiterate consumers often face difficulties understanding product labels, advertisements, and financial terms. As a result, they rely heavily on visual communication, word-of-mouth recommendations, retailer guidance, and familiar brands while making purchase decisions. Jayasundara et al. (2020) observed that such consumers experience greater stress and vulnerability during market transactions.

Despite financial constraints, BOP consumers are not solely focused on basic necessities. They also demonstrate aspirational consumption behaviour. Jaiswal and Gupta (2015) found that low-income consumers often spend on branded goods, cosmetics, smartphones, and fashionable products because such purchases provide emotional satisfaction, social recognition, and a sense of dignity. This indicates that consumption within BOP markets is influenced not only by utility but also by aspirations and identity.

Furthermore, BOP markets are highly heterogeneous. Consumer behaviour differs across regions, cultures, urban and rural settings, and local economic conditions. Howell et al. (2020) emphasized the importance of local-level heterogeneity and limited product knowledge in influencing value creation within BOP markets. Similarly, Subrahmanyam and Tomas Gomez-Arias (2008) demonstrated that consumption patterns vary significantly across BOP consumers in different countries and cultural environments.

Overall, the literature suggests that BOP consumers are socially embedded, culturally influenced, and highly adaptive individuals whose consumption behaviour reflects a combination of economic constraints, social relationships, aspirations, and local contextual realities. Therefore, firms targeting BOP markets must design culturally sensitive, affordable, and relationship-oriented marketing strategies rather than applying traditional mass-market approaches.

Overall, literature suggests that BOP consumers are not passive recipients of goods and services but active participants in value creation processes. Their behaviour is shaped by aspirations, social embeddedness, vulnerability, and contextual realities.

Innovation in BOP Markets

Innovation represents one of the most important dimensions of Bottom of the Pyramid (BOP) markets because traditional products, technologies, and business models often fail to address the unique needs and constraints of low-income consumers. BOP markets are characterized by limited purchasing power, inadequate infrastructure, low literacy levels,

and restricted access to formal services. Therefore, firms operating in these markets must develop innovative solutions that are affordable, accessible, adaptable, and sustainable.

Researchers have argued that innovation in BOP markets differs significantly from innovation in developed economies. Gibbert et al. (2014) observed that research on innovation adoption within BOP markets remains limited despite their distinct developmental characteristics. The authors emphasized that conventional innovation frameworks designed for developed markets cannot be directly applied to BOP consumers because their socio-economic realities, resource limitations, and consumption patterns are fundamentally different.

A major area of innovation within BOP markets relates to technology adoption. Hasan et al. (2019) highlighted that marketers should focus on increasing the hedonic and functional value of products while simultaneously reducing both internal and external barriers to adoption. The study identified the Value-Based Adoption Model and the Consumer Acceptance of Technology Model as effective frameworks for understanding technology acceptance among BOP consumers. Since many low-income consumers are first-time users of technology, simplicity, affordability, and ease of use become critical determinants of adoption.

Digital financial innovation has also gained significant attention in BOP literature. Leonhardt and Chu (2017), in their study on Chinese migrant workers, found that consumers with stronger economic, social, and biological resources were more likely to adopt online banking services. The study demonstrated how habit formation and resource accessibility influence financial technology adoption among low-income groups.

Similarly, Hasan et al. (2020) examined the adoption of mobile payment systems within the Chinese BOP market and identified several influential factors, including after-sale services, product bundling, monopolistic tendencies, information transparency, external interference, and perceived corporate integrity. These findings indicate that innovation adoption in BOP markets depends not only on technology itself but also on trust, support systems, and institutional reliability.

Mobile telephony has emerged as another transformative innovation within BOP markets. Dey et al. (2013), in the context of Bangladeshi farmers, observed that low-income users adopted mobile technology through social and institutional support, innovative usage practices, and lifestyle adjustments. The study revealed that technology appropriation within BOP markets is often community-driven rather than individually motivated.

In the Indian context, Baishya and Samalia (2019) studied smartphone adoption among BOP consumers and found that “effort expectancy,” “performance expectancy,” and “perceived monetary value” positively influence behavioural intention to use smartphones.

Additionally, psychological factors such as smartphone anxiety and self-efficacy were found to significantly affect adoption behaviour.

Beyond technology adoption, scholars have emphasized that BOP markets themselves can become sources of innovation. Prahalad et al. (2012) argued that BOP markets provide opportunities for radical innovation because firms are compelled to develop low-cost, high-value solutions under severe resource constraints. The authors proposed that managers should focus on the “4As” — awareness, affordability, accessibility, and availability — to encourage innovation within BOP environments.

Grassroots innovation has also received increasing scholarly attention. Gupta (2020) proposed a comprehensive framework for grassroots innovation in BOP contexts by identifying antecedents, moderators, and outcomes associated with local innovation processes. Such innovations often emerge from local communities that creatively utilize limited resources to solve practical problems.

Similarly, Getnet et al. (2019) emphasized the importance of bricolage — the process of creating innovative solutions using available local resources. Drawing from the capability-based view of the firm and social capital theory, the study showed how local BOP manufacturers employ resource improvisation to create products that deliver value to underserved consumers.

Innovation within BOP markets is therefore not limited to products alone. It extends to distribution systems, service delivery models, financing mechanisms, communication strategies, and business ecosystems. Inclusive innovation, social innovation, and frugal innovation have become essential approaches for serving BOP consumers effectively.

Overall, the literature suggests that innovation is central to the sustainable development of BOP markets. Successful innovation in these markets requires deep understanding of local needs, affordability, social embeddedness, technological adaptability, and community participation. Firms that adopt innovative and inclusive approaches are better positioned to create both social value and long-term business sustainability within BOP markets.

Policy Making and BOP Markets

Public policy has played a transformative role in shaping Bottom of the Pyramid (BOP) markets in India by promoting financial inclusion, digital access, healthcare, entrepreneurship, rural development, and market connectivity. Since a large section of India's population belongs to low-income and underserved groups, government interventions have become essential for integrating these consumers and producers into the formal economy.

1. Financial Inclusion: Pradhan Mantri Jan Dhan Yojana (PMJDY)

One of the most significant policy initiatives in India is the Pradhan Mantri Jan Dhan Yojana launched in 2014 to provide universal access to banking services. Before this initiative, many low-income households lacked formal bank accounts and depended heavily on informal lenders. Through zero-balance accounts, RuPay debit cards, overdraft facilities, and direct benefit transfers, the scheme enabled millions of BOP consumers to enter the formal financial system.

The policy significantly influenced consumption behaviour and market participation by:

- Increasing savings habits among low-income consumers.
- Facilitating digital transactions and online payments.
- Providing easier access to microcredit and insurance.
- Supporting government welfare transfers directly into beneficiaries' accounts.

This initiative also accelerated the adoption of digital payment ecosystems among BOP consumers.

2. Digital Inclusion: Aadhaar and Digital India

The Unique Identification Authority of India introduced the Aadhaar system to provide digital identity to Indian citizens, particularly marginalized populations lacking formal documentation. Aadhaar became a foundational tool for financial inclusion, subsidy distribution, and access to public services.

Complementing this, the Digital India Programme improved internet connectivity, e-governance services, and digital literacy across rural and semi-urban India.

These initiatives transformed BOP ecosystems by:

- Enabling direct benefit transfers (DBT).
- Supporting mobile banking and UPI payments.
- Improving access to online education and telemedicine.
- Facilitating participation in e-commerce and digital platforms.

As a result, many low-income consumers who were previously excluded from formal markets became active digital participants.

3. Agricultural Market Reforms: e-Choupal Initiative

The ITC e-Choupal Initiative is a prominent example of a public-private rural market intervention. The initiative uses digital kiosks and internet-enabled platforms to provide

farmers with information on weather, crop prices, farming techniques, and direct market access.

Varman et al. (2012) discussed how e-Choupal reduced farmers' dependence on middlemen and improved market transparency. The initiative empowered rural producers by:

- Providing real-time agricultural information.
- Reducing transaction costs.
- Increasing bargaining power.
- Improving supply-chain efficiency.

Although primarily a corporate initiative, it aligned with broader public policy goals related to rural development and agricultural modernization.

4. Rural Employment and Purchasing Power: MGNREGA

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is one of India's largest social security programs aimed at providing guaranteed wage employment to rural households.

The scheme has directly influenced BOP consumption patterns by:

- Increasing rural purchasing power.
- Reducing income uncertainty.
- Enhancing food security and basic consumption.
- Generating demand for consumer goods in rural markets.

By stabilizing incomes, the policy indirectly expanded the market potential for FMCG products, mobile phones, financial services, and healthcare products in rural India.

5. Healthcare Accessibility: Ayushman Bharat

The Ayushman Bharat Pradhan Mantri Jan Arogya Yojana was launched to provide affordable healthcare coverage to economically vulnerable populations.

The scheme supports BOP consumers by:

- Reducing out-of-pocket healthcare expenses.
- Improving access to hospitals and medical treatment.
- Enhancing health security among poor households.

This policy has also encouraged private healthcare providers and insurance companies to develop affordable healthcare services for low-income segments.

6. Women Empowerment and Entrepreneurship: Self-Help Groups (SHGs)

Government-supported Self-Help Group programs under the National Rural Livelihoods Mission have empowered rural women through microfinance, entrepreneurship training, and collective savings mechanisms.

SHGs have influenced BOP markets by:

- Promoting small-scale entrepreneurship.
- Increasing women's economic participation.
- Enhancing household decision-making power.
- Encouraging consumption of education, healthcare, and financial products.

Many rural women-led enterprises now participate in local production, handicrafts, food processing, and digital commerce activities.

7. Affordable Sanitation and Housing: Swachh Bharat and PMAY

The Swachh Bharat Mission and Pradhan Mantri Awas Yojana were introduced to improve sanitation and affordable housing among economically weaker sections.

These policies have:

- Increased awareness regarding hygiene and sanitation products.
- Created demand for low-cost construction materials and consumer durables.
- Improved living standards and quality of life in BOP communities.

Such initiatives also opened new markets for companies producing affordable sanitary products, water purifiers, paints, cement, and household appliances.

In the Indian context, public policy has been instrumental in transforming BOP markets through financial inclusion, digital empowerment, healthcare accessibility, rural employment generation, women entrepreneurship, and infrastructure development. Policies such as Jan Dhan Yojana, Aadhaar, Digital India, MGNREGA, Ayushman Bharat, and SHG initiatives have not only improved the socio-economic conditions of low-income populations but also expanded market opportunities for businesses. These examples demonstrate that effective public policy can create inclusive market ecosystems where economic development and social welfare progress simultaneously.

8. Marketing Mix in BOP Markets

The marketing mix is a fundamental component of business strategy and traditionally consists of the 4Ps—Product, Price, Place, and Promotion. However, scholars argue that conventional marketing mix frameworks designed for affluent consumers are often un-

suitable for Bottom of the Pyramid (BOP) markets because low-income consumers possess distinct socio-economic, cultural, and behavioural characteristics. BOP consumers typically face income uncertainty, limited purchasing power, low literacy levels, infra-structural constraints, and restricted access to formal markets. Therefore, firms operating in these markets must substantially modify their marketing strategies to address affordability, accessibility, awareness, and local relevance.

Chikweche and Fletcher (2012a) emphasized that BOP customers display attitudes and behavioural patterns significantly different from mainstream consumers, making it necessary to rethink traditional marketing approaches. Similarly, Mehta and Swami (2020) proposed an expanded “8As” framework—Awareness, Accessibility, Affordability, Availability, Adaptability, Assistance, Action Innovation, and Accelerating Scale—to better suit BOP conditions.

9. Product Strategy in BOP Markets

In BOP markets, products must be affordable, durable, simple to use, and capable of addressing essential needs without compromising basic quality and safety. Waeyenberg and Hens (2008) argued that companies targeting BOP consumers should design offerings with functional and cost advantages specifically suited to underserved populations.

One of the most successful Indian examples is the sachet packaging strategy introduced by [Hindustan Unilever Limited \(HUL\)](#) for products such as shampoo, detergent, and toothpaste. Instead of selling large expensive packs, HUL introduced small sachets priced at ₹1 or ₹2, making products affordable for rural and low-income consumers.

This strategy succeeded because:

- BOP consumers often have irregular daily incomes.
- Small packs reduce immediate financial burden.
- Consumers can purchase according to daily cash availability.

The sachet model later became widely adopted across FMCG industries in India.

The [Tata Motors](#) Nano was developed as an affordable car intended for lower-middle and BOP consumers. The company attempted to create a low-cost product while maintaining essential safety and functionality. Although the Nano faced positioning challenges, it remains an important example of frugal innovation designed specifically for price-sensitive Indian consumers.

10. Pricing Strategy in BOP Markets

Price is one of the most critical determinants of purchasing behaviour in BOP markets. Since consumers have limited purchasing power, firms must adopt low-margin, high-volume pricing strategies.

Reliance Jio revolutionized India's telecom sector by introducing extremely affordable data and voice services. The company offered low-cost internet plans and free introductory services, enabling millions of low-income consumers to access digital connectivity.

This pricing strategy:

- Increased smartphone and internet penetration among BOP consumers.
- Enabled access to digital payments, online education, and e-commerce.
- Created a massive digital consumer base in rural India.

The success of Jio demonstrates how affordable pricing can rapidly expand BOP markets.

3. Distribution (Place) Strategy in BOP Markets

Distribution remains a major challenge in BOP markets because many consumers live in rural or geographically isolated areas with poor infrastructure. Traditional retail channels are often insufficient.

Faria and Hemais (2017) emphasized the need for context-specific distribution systems that distinguish between formal and informal market structures.

The ITC e-Choupal Initiative used digital kiosks in villages to connect farmers directly with agricultural markets and supply chains.

The initiative improved:

- Market accessibility for rural producers.
- Information availability regarding prices and weather.
- Distribution efficiency and supply-chain transparency.

This model demonstrates how innovative distribution systems can overcome infrastructural barriers in BOP markets.

Amul developed an extensive cooperative-based rural distribution network involving village-level milk collection centres and local participation. This system enabled efficient procurement and delivery even in remote villages.

The success of Amul highlights:

- The importance of community participation.
- Decentralized distribution systems.
- Trust-based local networks in BOP markets.

4. Promotion Strategy in BOP Markets

Traditional advertising methods are often less effective in BOP markets because of low literacy levels and limited media exposure. Promotion strategies therefore need to rely more on demonstrations, word-of-mouth communication, local influencers, and community engagement.

Sridharan and Viswanathan (2008) argued that successful BOP marketing requires understanding consumer psychology and social embeddedness.

Project Shakti by HUL empowered rural women to become direct-to-home distributors of consumer products in villages.

The initiative:

- Increased product awareness through trusted community members.
- Improved rural distribution reach.
- Generated livelihood opportunities for women.

Project Shakti became successful because promotion occurred through interpersonal trust and social relationships rather than conventional advertising alone.

Government and healthcare organizations in India used community workers, local influencers, street plays, and regional-language communication to promote polio vaccination among low-income populations.

This demonstrated that:

- Cultural adaptation is essential in communication.
- Community trust significantly affects consumer response.
- Localized promotional strategies are more effective within BOP markets.

5. Expansion of Marketing Mix Frameworks

Scholars have argued that the traditional 4Ps framework is insufficient for BOP contexts. Mehta and Swami (2020) expanded the framework into the “8As” model:

- Awareness
- Accessibility
- Affordability
- Availability
- Adaptability

- Assistance
- Action Innovation
- Accelerating Scale

This expanded framework reflects the realities of BOP markets where firms must not only sell products but also educate consumers, build trust, adapt offerings locally, and create long-term social value.

The literature clearly indicates that traditional marketing mix frameworks require substantial modification to effectively serve BOP markets. In India, successful companies have adapted their product design, pricing, distribution, and promotional strategies according to the socio-economic realities of low-income consumers. Examples such as HUL's sachet marketing and Project Shakti, Reliance Jio's affordable pricing, ITC's e-Choupal, and Amul's cooperative distribution system demonstrate that localized, affordable, and socially embedded marketing strategies are essential for success in BOP markets. Thus, firms operating in BOP environments must adopt inclusive, flexible, and innovative marketing approaches that prioritize accessibility, trust, affordability, and community engagement.

Conclusion

The Bottom of the Pyramid market has evolved into a significant domain within marketing and development literature. The review demonstrates that BOP consumers possess distinct behavioural characteristics shaped by socio-cultural influences, vulnerability, aspirations, and resource constraints. Innovation within BOP markets requires inclusive and adaptive approaches that emphasize affordability, accessibility, and social embeddedness. Similarly, effective policymaking must prioritize empowerment, social justice, and participatory development.

The literature also reveals that conventional marketing frameworks require considerable adaptation to suit the realities of BOP environments. Firms seeking to operate successfully in these markets must adopt localized, ethical, and relationship-oriented strategies.

As BOP markets continue to gain economic and social relevance, future research should focus on technological transformation, sustainability, consumer empowerment, and context-specific frameworks to build more inclusive and equitable market systems.

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Water Scarcity and the Jal Jeevan Mission: A Grassroots Perspective from the Indian Sundarbans¹

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Abstract

The intrusion of saline water into ground aquifers and the increasing salinity of soil in Indian Sundarbans represent significant challenges in the current era. Given that livelihoods in this region are predominantly reliant on agriculture and fisheries, salinity is a substantial issue for local inhabitants. The Jal Jeevan Mission, an initiative by the Government of India aimed at providing tap water connections to all rural households, offers a promising solution to this problem in the study area. This study endeavors to assess the extent to which the project has been successfully implemented in villages.

A primary survey was conducted in Dulki Village, located in the Gosaba Block. Quantitative and qualitative both approaches are used in this study. Although the project was intended to be completed by the specified year, only one reservoir was constructed in the study village. Consequently, residents continue to spend time collecting water from the community taps. Conflicts related to water access have become regular in this area.

Keywords: Jal Jeevan Mission, Indian Sundarban, Water scarcity, Ministry of Jal shakti, Gosaba Block

JEL code: D04, O013, O022, Q25

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Introduction

As the deadline for the United Nations' Sustainable Development Goals approaches, the urgency of achieving these targets intensifies. The sixth goal, "Clean Water and Sanitation," intends to secure the availability and sustainable management of water for all by the year 2030. The slogan "Only One Earth," commemorating the fiftieth anniversary of World Environment Day in 2022, highlights the importance of this objective. In India, numerous initiatives have been launched to meet this goal within the stipulated time frame. Among these, the Jal Jeevan Mission (JJM), initiated on August 15, 2019, is particularly noteworthy. It focuses on providing Functional Household Tap Connections (FHTC) to every rural household by 2024, thereby enhancing quality of life and easing daily living. Unlike other initiatives, the Jal Jeevan Mission focuses not on building water infrastructure but on delivering potable water to every rural home. Its goal is to improve life nationwide by ensuring consistent, long-term access to high-quality piped water for all households (Ministry of Jal Shakti, 2019). The importance of JJM is particularly pronounced in rural areas facing potable water scarcity.

The Indian Sundarbans is one such region where JJM holds significant relevance. This area, shared by India and Bangladesh, was declared a World Heritage Site by UNESCO in 1987 and a Biosphere Reserve declared in 2001. Rich in natural resources, the Sundarbans supports a diverse array of animal and plant species. However, the region is also plagued by flooding, primarily due to cyclones, which are becoming more frequent and intense due to climate change. Evidence of climate change in the Sundarbans dates back to the colonial period, with records of cyclones impacting the area, albeit without documented effects (Danda, 2020). The changing climate and increasing cyclones have worsened the availability of potable water, making the implementation of JJM even more critical for this deltaic region. Against this backdrop, the present study seeks to assess the success of JJM's implementation in the Indian Sundarbans. The study is structured as follows: this section introduces the paper, the next section discusses salinity levels and the potable water crisis, the third section highlights the importance of the Jal Jeevan Mission in the area, the subsequent section discusses methodology and data sources. Results and discussions are given in the fifth section, and the final section concludes the paper.

Increasing salinity and potable water crisis in Indian Sundarban

The Indian Sundarban region, comprising an interconnected network of 104 islands spanning an area of 6,000 square kilometers, is significantly impacted by severe cyclonic storms originating from the Bay of Bengal. In recent decades, the intensity of these tropical storms has escalated, concomitant with increases in the sea surface temperature and pronounced tidal fluctuations (Halder 2015, Mitra et al. 2018). Furthermore, the tidal channels of Indian Sundarban, which serve as sources of freshwater, have deteriorated

over the years due to changes in land use patterns. These tidal creeks were frequently inundated by storm surges. Additionally, influent discharge from local rivers exacerbates the salinization of groundwater. This situation is particularly critical in the administrative blocks of Gosaba, Namkhana, Kakdwip, Sagardwip, Fresarganj, Patharpratima and Canning. The storage of freshwater from precipitation in surface and near-surface aquifers has drastically decreased in recent years. The severe impact of siltation has resulted in waterlogging and increased salinity on Gosaba Island (Ghosh & Mistri 2020). Studies (Banerjee 2013 & Biswas et al. 2018) have also indicated hyper salinization in various parts of the region, with the central sector being more affected than the eastern and western parts. Based on the GALDIT index, the study by Rani et al. (2020) found that aquifers located in the North and South 24 Parganas of the Indian Sundarbans are highly exposed. This vulnerability is mainly due to factors such as increased hydraulic conductivity, salt-water intrusion and aquifer thickness as identified through a single-parameter sensitivity analysis. Furthermore, chemical analysis showed elevated chloride concentrations in groundwater from aquifers near Hasnabad, Canning I and II, Sagar, Mathurapur, and the Kultali blocks of Indian Sundarbans. Salinity levels also vary with seasonal changes during the monsoons (Nath et al. 2021). Soil salinity is further regulated by soil heterogeneity in terms of pH, organic compounds, and soil organic carbon. Additionally, the contamination of aquifers with arsenic and fluoride, along with the ingress of seawater into aquifers, has adversely affected communities in the Indian Sundarban region (Das et al. 2021).

Access to safe drinking water is a primary human right (Rockström & Gordon, 2001; do Amaral et al. 2023). Despite the abundance of water in the estuarine tracts of Indian Sundarban, the supply of fresh potable water remains limited (Hazra et al. 2019). Consequently, the area has been designated as a 'Critically Vulnerable Coastal Area' by the Ministry of Environment, Forest and Climate Change, Government of India (2019). The lack of a freshwater supply has adversely affected the livelihoods of the inhabitants of the delta, who primarily rely on agriculture, animal husbandry, pisciculture, and horticulture. The Water, Sanitation, and Hygiene (WASH) program of the United Nations International Children's Emergency Fund (UNICEF), the West Bengal Drinking Water Sector Development Programs (WBDWSDP) and the 'Swajal Mission' of the Government of India (Ministry of Jal Shakti, 2019) have had limited impacts on improving potable water accessibility for Indian Sundarbans (Halder et al. 2024).

Although the Indian Sundarban region receives sufficient annual rainfall to support monsoon agriculture, failure to conserve excess rainwater results in agricultural drought during the drier seasons. Agricultural water demand is met through the use of deep tube wells and shallow submersible pumps, which adversely affect the repository and availability of freshwater in the region's deep aquifers. The presence of clay layers hinders

rapid infiltration, thereby impeding the replenishment of extracted groundwater, as the recharge points of deep aquifers are located at a considerable distance, and the subterranean groundwater flow is notably slow. Consequently, groundwater storage will become unsustainable (Bhadra et al. 2018) if the current extraction rate continues to increase with increasing population growth. During the monsoon, tube wells become submerged in saline floodwater, and saline river water inundated villages, exacerbating the salinity of the region. This salt encrustation in the soil requires approximately three monsoon seasons to dissipate (Halder & Debnath 2014). Saline water is frequently mixed with freshwater in shallow ponds used for shrimp farming. In recent years, export-oriented shrimp farming in the region has necessitated the mixing of substantial amounts of freshwater with saline water obtained by extracting groundwater. This practice has precipitated a significant water crisis in the region, compelling residents to rely increasingly on expensive packaged drinking water.

Importance of Jal Jeevan mission in Indian Sundarban

As supply of groundwater is reducing along with increasing demand for potable water, relevance of JJM is increasing in the region. The main objective of the Jal Jeevan Mission of the Government of India is to supply safe and adequate drinking water through individual household tap connections to all the households of rural India. This project is a paradigm shift for India as it has the potential to save millions of lives from waterborne diseases, reducing out-of-pocket costs of families for treatment of waterborne diseases, enhancing the nutritional sufficiency of children so that they grow to their full potential, upgrading the productivity of the adult population, and enhancing quality of life for everyone, including millions of women in deprived areas who often have to travel long distances on a daily basis to bring water for the family. Tap connections in every household will save time spent for water collection. This extra time could be used by the people for other productive purposes. A study by the World Health Organization (WHO) estimated that if JJM could provide safely managed drinking water to all in India, this would avert almost 400,000 diarrheal disease deaths along with almost 14 million Disability Adjusted Life Years (DALYs) from diarrheal disease (WHO, 2023). This accomplishment alone would result in estimated cost savings of up to US\$ 101 billion. WHO study findings also suggest that investing in water and sanitation results in many economic, environmental, quality of life, and health benefits (WHO, 2023).

The Jal Jeevan Mission (JJM) holds considerable potential for improving the socioeconomic conditions of Indian Sundarban. It facilitates employment opportunities both directly and indirectly across two distinct phases: the construction and operation and maintenance (O&M) phases. Employment generation during the construction phase is projected to be more substantial than during the O&M phase. However, while the employment generated in the construction phase is temporary, that created during the O&M

phase is anticipated to be permanent in the long term (Ministry of Jal Shakti, 2019). Indirect employment emerges from the production, storage, transportation, and distribution of the materials required for JJM, either directly or indirectly. Pipes, valves, meters, and construction materials are directly required for JJM, whereas steel and other raw materials used in manufacturing pipes, valves, etc., are considered indirect materials (Ministry of Jal Shakti, 2019).

Methodology and Data sources

The study uses both quantitative as well as qualitative approaches. At the first stage of the study a Social Cost of Water Scarcity (SCWS) is calculated using the following formula

$$SCWS = OC + HC + EC$$

Where:

- Opportunity cost of time of collecting water by the households an area
- Health costs of the households of an area
- Educational costs of the households of an area

In the second stage Thematic analysis was performed. In qualitative analysis thematic analysis is used to identify, analyse and report the pattern or themes within the data set, which are then interpreted for their inherent meaning (Xu & Zammit 2020, Braun & Clarke 2006 and Liebenberg et. al 2020). Here, Thematic analysis has been used to identify the keywords through weights and repetitions. NVIVO software is used to run thematic analysis.

For collecting data primary survey was conducted in Dulki village of the Gosaba Block, one of the 19 blocks of Indian Sundarban. According to the 2011 census, the Gosaba block comprises 50 villages, of which Dulki was randomly selected. Dulki is a small village located beside the Datta River, covering an area of 4.19 square kilometers with a population density of 686 people, which exceeds the national average as per the 2011 census (vill.co.in). A focused group discussion was conducted in Dulki village to gather information about water crisis and progress of Jal Jeevan Mission project in the area.

Results and Discussion

In this section, we examine the status of implementation of the Jal Jeevan Mission (JJM) in the Indian Sundarban region. Like other parts of the island, Dulki faces challenges with potable water and increasing salinity. Most of its residents depend on agriculture and fisheries for their livelihoods, making the supply of fresh water crucial for their survival. Although earthen dams have been constructed to protect villages from flooding,

they still experience flooding during the monsoon and remain vulnerable to storms. The cyclone-induced destruction of houses is a common occurrence in this area.

Therefore, the Jal Jeevan Mission, which targets to provide tap water to every household, is vital to the village. Secondary data sources indicate that 55.39 percent of households in the Gosaba Block have already received tap water connections (e-jalshakti). However, no households in Dulki village were observed to have a tap water connection. A reservoir with a Jal Jeevan Mission signboard was observed in one corner of the village. Most respondents were women who traveled 2–3 km daily to collect water from community taps. During the summer, the situation worsens as the community taps dry up, forcing Dulki villagers to travel further to the deep tube well and spend more time in long queues. During the monsoon season, concerns about the health of children and the elderly arise as saline and contaminated water mixes with freshwater. Many residents expressed the need for a water filter to provide safe drinking water, at least for their children. Almost all participants were unaware of the central government's Jal Jeevan Mission program.

In this study we have measured Social Cost of Water Scarcity (SCWS) by using only the indicator 'Opportunity cost of time of collecting water by the households of Dulki village (OC)' because of the limitations of the study. The villagers used to get Rs. 213 per head per day in MGNREGA project. Assuming that the daily working hours of the villagers is 8 and they spent 3 hours a day in collecting water, the daily loss per head is Rs. 81. Here we are also assuming that children below 6 years do not involve in collecting water and only one person from a family goes to collect potable water. According to the census 2011 total 697 households are residing in Dulki village. Therefore, the total loss of daily wages in Dulki is Rs. 56,457 ($=697 \times \text{Rs.}81$). Considering only the opportunity cost of collecting water the daily social cost of water scarcity is Rs. 56,457 which is turning to almost Rs. 2 crore per year.

The thematic analysis was conducted based on focused group discussions with mainly the people who were collecting water from taps in Dulki village. Majority of the water collectors were women of the age between 25 to 30. Few girls and boys of the age 15–18 were also present. Most of them walk around 3–4 kilometres on daily basis to collect drinking water. The discussions lasted for an hour approximately. They were recorded and later transcribed by the authors. Interpretivist research was followed regarding the validity and reliability of results (Leitch et al., 2010).

Case Study 2

Mrs. R, approximately 30 years of age, is required to travel a distance of 1–2 km to obtain water from a communal tap. She is accompanied by her elder son, who assists in transporting the water-filled containers. Despite the presence of a small pond adjacent to the residence, water is scarcely suitable for domestic use. During the monsoon season, ponds are frequently contaminated by floodwater and saline intrusions. The daily task of collecting potable water occupies three to four hours, consequently impeding her elder son's academic pursuits. He is currently enrolled in the fourth grade at a nearby government school.

The Word Frequency Table			
Word	Length	Count	Weighted Percentage
water	5	29	4.82%
fishes	6	9	1.50%
tap	3	7	1.16%
left	4	6	1.00%
collecting	10	5	0.83%
home	4	5	0.83%
now	3	5	0.83%
children	8	4	0.66%
daily	5	4	0.66%
deep	4	4	0.66%
food	4	4	0.66%
loan	4	4	0.66%
nearby	6	4	0.66%
pond	4	4	0.66%
ponds	5	4	0.66%
production	10	4	0.66%
saline	6	4	0.66%
source	6	4	0.66%

years	5	4	0.66%
available	9	3	0.50%
away	4	3	0.50%
contami- nated	12	3	0.50%
cultivation	11	3	0.50%
cyclones	8	3	0.50%
domestic	8	3	0.50%

Despite being surrounded by estuaries, Dulki village experiences a significant shortage of potable water. The words like ‘water’, ‘fishes’, ‘tap’, ‘collecting’ and ‘home’ has emerged as the key words from the thematic analysis with high weightage. The residents of Indian Sundarban are already vulnerable to climate change, and the water crisis exacerbates their predicament. The intrusion of saline water into agricultural fields renders land unsuitable for cultivation. Shrimp collection, another livelihood for locals, necessitates a mix of freshwater and saline water, further depleting the area’s freshwater resources. Although consuming contaminated pond water poses health risks to inhabitants, there are no alternatives.



Figure 3: Children carrying water from community taps to their house

Source: Field Survey

Case Study 3

Several women aged between 20 and 30 years were observed collecting water from a community tap, with two accompanied by their daughters. They all encountered the same issue: water from the community source was both contaminated and saline. They demonstrated how the color of their jars, used for collecting water from the tap, was altered within a few days. Unaware of the central government scheme aimed at providing water to every household, they expressed the need for water filters to ensure clean water for their children.

The central government's 'Jal Jeevan Mission' project has yet to be implemented in the village, with only the reservoir's construction underway, despite a completion target of 2024. Although secondary data suggest that 55 percent of households have tap water connections, conversations with locals reveal a starkly different reality. Few are aware of the efforts to bring water through pipelines from other islands, and the term JJM is unfamiliar to most, who are apprehensive about it being a central government project. The location and geographical features of the area impede fresh groundwater supply. Frequent cyclones destroy earthen embankments, flood the village with saline river water, and turn pond water brackish. Consequently, identifying a water source for supplying tap water to every household in the region is extremely challenging.

Case Study 4

Mr. S, an employee at Bharat Sevashram, advises against discussing central government initiatives such as the Jal Jeevan Mission with local residents, as this may incite political tensions. He was unaware of the project. They were entirely dependent on bottled water. He noted that a water ATM was installed in the village several years ago, but is currently inoperative. During cyclones and floods, the organization provides food and shelter to the villagers.



Figure 4: Only deep tube well outside the village

Source: Field Survey



Figure 5: Condition of the JJM project in the Dulki Village

Source: Field Survey

Conclusion

The central government's ambitious initiative, the 'Jal Jeevan Mission,' seeks to provide functional household taps to every rural household in India, in alignment with the sixth Sustainable Development Goal of ensuring 'access to clean water and sanitation' for all by 2030. The project was originally stated to be completed by 2024. However, in numerous regions, including the Indian Sundarbans, implementation is yet to commence. The Indian Sundarbans are characterized by a unique geographical feature: despite an abundance of water, the region faces challenges in accessing potable water due to increasing salinity and the intrusion of saline water into shallow aquifers. Furthermore, frequent tropical cyclones inundate the area annually, further depleting the sources of freshwater for residents. Communal conflicts over water collection have become prevalent, and in certain areas, water trade has emerged with those who can afford it to purchase packaged water. This situation has exacerbated the social divisions within the community.

Progress in the 'Jal Jeevan Mission' in this area has been sluggish. By March 2025, only reservoirs were constructed, with no pipeline connections reaching households, leaving residents largely unaware of the project. Given the scarcity of potable water, the government must adopt a proactive approach to implement the project. The region's challenging climate complicates the project's execution, yet the government should take measures to enhance the freshwater supply. In this context, rainwater harvesting, with its significant potential to augment freshwater availability, could facilitate the implementation of the Jal Jeevan Mission.

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